

## Psychology Units 3 & 4

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## ● Introduction

Insight's *VCE Revision Questions: Psychology Units 3 & 4* contains questions, sample responses and tips to help you develop skills for assessment. The questions cover all areas of study in Units 3 and 4 of VCE Psychology. A good habit to implement is to test yourself by working through this resource. The process of actively recalling information assists with deeper learning, and you will be able to compare your answers with the provided sample responses.

By using this resource as part of your study regimen throughout the year, you will be prepared for questions you may encounter in your end-of-year VCE exam.

We wish you well with your studies.

The Insight Team

## ● Questions

### Unit 3 | Area of Study 1 How does the nervous system enable psychological functioning?

#### Multiple-choice

##### Question 1

Dane accidentally stood barefoot on a pin. He immediately pulled his foot away.

Which one of the following sequences most accurately represents the transmission of neural information when Dane withdraws his foot?

- A. receptors in the sole of his foot → spinal cord → sensory areas of his brain
- B. receptors in the sole of his foot → spinal cord → muscles in his foot and leg
- C. sensory areas of his brain → spinal cord → muscles in his foot and leg
- D. receptors in the sole of his foot → sensory areas of his brain → muscles in his foot and leg

##### Question 2

Ryoji is running late for the train. He runs to the station as quickly as he can.

The movement of Ryoji's leg muscles is due to the

- A. autonomic division of the peripheral nervous system.
- B. somatic division of the peripheral nervous system.
- C. spinal cord of the central nervous system.
- D. somatic division of the central nervous system.

##### Question 3

Which one of the following is not a reflex action?

- A. slapping at a mosquito on your hand
- B. salivating when you are hungry
- C. retracting your hand when the skin is being burned
- D. contraction of the pupils in your eyes due to bright light



**Question 7**

Which one of the following is the main function performed by Helen's nervous system while she carries out Task 1?

- A. The somatic nervous system carries information to the central nervous system, which processes sensory information about the size and texture of the coin.
- B. The central nervous system initiates a voluntary motor response through the somatic nervous system to enable Helen to place the coin into the correct group.
- C. The somatic nervous system carries information to the peripheral nervous system, which processes sensory information about the size and texture of the coin.
- D. The peripheral nervous system initiates a voluntary motor response through the somatic nervous system to enable Helen to place the coin into the correct group.

**Question 8**

Which one of the following is the main function performed by Helen's nervous system while she carries out Task 2?

- A. The somatic nervous system carries information to the central nervous system, which processes sensory information about the size and texture of the coin.
- B. The somatic nervous system carries information to the peripheral nervous system, which processes sensory information about the size and texture of the coin.
- C. The peripheral nervous system initiates a voluntary motor response actioned by the somatic nervous system to enable Helen to place the coin into the correct group.
- D. The central nervous system initiates a voluntary motor response actioned by the somatic nervous system to enable Helen to place the coin into the correct group.

**Question 9**

Yann finishes the 400-metre race at her school's athletics competition and notices that her heart is beating very fast and she cannot seem to catch her breath. However, by the time Yann walks over to the judges to get her ribbon, she realises that her heart rate is back to normal and she can breathe easily again.

The changes that occurred to Yann's breathing and heart rate after the race are under the control of the

- A. sympathetic nervous system.
- B. somatic nervous system.
- C. central nervous system.
- D. parasympathetic nervous system.

**Question 10**

Alex has a fear of water. When Alex was a small child, he went to a pool for swimming lessons and when he was in the water, his leg got caught and he almost drowned. As an adult, Alex prefers not to go near large bodies of water, saying that it makes him feel too anxious.

Whenever Alex sees water,

- A. his spinal cord initiates a reflexive avoidance response.
- B. his flight-or-fight-or-freeze response is activated.
- C. his adrenaline and noradrenaline are inhibited.
- D. his parasympathetic nervous system is activated.

**Question 11**

When someone is throwing a ball, the transmission of neural impulses from the brain to the arm muscles involves

- A. electrical signals being carried within neurons and chemical signals being carried between neurons.
- B. chemical signals being carried within neurons and chemical signals being carried between neurons.
- C. electrical signals being carried within neurons and electrical signals being carried between neurons.
- D. chemical signals being carried within neurons and electrical signals being carried between neurons.

**Question 12**

A strength and a limitation of Selye's General Adaptation Syndrome model are

	<b>Strength</b>	<b>Limitation</b>
<b>A.</b>	Selye used human subjects when developing the model.	The model did not recognise the role of emotions and cognitive processes.
<b>B.</b>	Selye found the lower the intensity of the stressor, the greater the physiological response.	Selye found the greater the intensity of the stressor, the greater the physiological response.
<b>C.</b>	Selye made an important connection between prolonged arousal and ill health.	The model underemphasises the physiological elements of the stress response.
<b>D.</b>	Selye made an important connection between prolonged arousal and ill health.	It is difficult to generalise Selye's findings to people, because his research involved non-human subjects.



**Question 16**

A weakness of the Transactional Model of Stress and Coping is that it

- A. overlooks physiological responses to stress.
- B. overemphasises the physiological nature of the stress response.
- C. emphasises the personal nature and individuality of the stress response.
- D. suggests that people are able to change their thinking and responses in regards to a stressor.

**Question 17**

In a spinal reflex, the role of interneurons in the spinal cord is to

- A. initiate an adaptive motor response and relay this to motor neurons in the peripheral nervous system.
- B. initiate an adaptive motor response and relay this to sensory neurons in the peripheral nervous system.
- C. carry sensory information from the body to the brain, and motor information from the brain to the body.
- D. carry sensory information from the brain to the body, and motor information from the body to the brain.

Use the following information to answer Questions 18 and 19.

Layal is training to run a half-marathon in a few months. During the week, she completes two short runs, and on weekends she goes for a longer run. Layal has also been gradually increasing the distance that she covers each week. However, she is worried that if her work gets busier, she will not be able to fit in three training runs each week, and that may prevent her from being able to complete the 21 km distance on race day. Layal is feeling overwhelmed and anxious about fitting everything into her busy schedule.

**Question 18**

After another month of training, Layal is feeling more overwhelmed. Her role at work has increased, meaning that she must work longer hours. This has made it difficult for her to fit in her weekly training. In addition, Layal's dog was hit by a car last week and Layal had to make the awful decision to have her dog put down. Since then, Layal has been feeling sad, tired and run down, but she is still pushing ahead with her training schedule.

According to Selye's General Adaptation Syndrome, after Layal's dog was put down, which stage would she be in and why?

	Stage	Reason
A.	Alarm	Layal had to have her dog put down and is feeling sad, tired and run down.
B.	Resistance	Layal's ability to deal with the stressor of the half-marathon is above normal levels and she is coping well.
C.	Exhaustion	Layal's energy resources are depleted, and her ability to deal with the stressor of the half-marathon has dropped well below normal levels.
D.	Resistance	Layal is beginning to show signs of wear and tear, and is finding it difficult to deal with the additional stressor of having her dog put down.

**Question 19**

What would be one benefit and one disadvantage of the prolonged release of cortisol for Loyal?

	<b>Benefit</b>	<b>Disadvantage</b>
<b>A.</b>	Increased energy to deal with the stressor more efficiently	Impaired immune system functioning, which would increase vulnerability to illness
<b>B.</b>	Inhibited digestion, to divert energy to other parts of the body to help deal with the stressor	Decreased energy as a result of less glucose being available
<b>C.</b>	Enhanced immune system functioning, which would decrease vulnerability to illness	Inhibited digestion, to divert energy to other parts of the body to help deal with the stressor
<b>D.</b>	Inhibited thyroid functioning, including decreased metabolism	Blood glucose imbalances

**Question 20**

Dr Smith is interested in the neural changes that occur when a memory is formed. Dr Smith investigates these changes in octopuses, because the neurons of octopuses are quite large and changes can be easily detected.

What functional (activity) changes would Dr Smith observe in the octopuses' neurons when a memory is formed?

- A.** There would be a decrease in activity at the synapse, due to more neurotransmitters being released into the synapse.
- B.** There would be an increase in activity at the synapse, due to more neurotransmitters being released into the synapse.
- C.** There would be an increase in the number of axon terminals on the pre-synaptic neuron.
- D.** There would be a decrease in the number of dendrites on the post-synaptic neuron.

**Question 21**

Identify the term used to describe the structural and functional changes that occur at a neuronal level when a memory is formed, and the neurotransmitter involved in this process.

- A.** long-term potentiation; gamma-amino butyric acid (GABA)
- B.** long-term depression; gamma-amino butyric acid (GABA)
- C.** long-term depression; glutamate
- D.** long-term potentiation; glutamate

**Question 22**

The responses of the sympathetic nervous system

- A.** are ongoing throughout the body, rather than only responsive to specific stimuli.
- B.** are simple.
- C.** do not always include the brain.
- D.** bring about change in the skeletal muscles of the body.

**Question 23**

Which of the following correctly identifies a neurotransmitter and the effect it has on post-synaptic neurons?

	Neurotransmitter	Effect on post-synaptic neurons
A.	glutamate	inhibitory
B.	glutamate	excitatory
C.	GABA	excitatory
D.	noradrenaline	inhibitory

**Question 24**

When an individual first encounters a stressor, according to a biological model of stress, their body will automatically

- A. show a decrease in normal functioning.
- B. release adrenaline.
- C. cause their heart rate to increase.
- D. increase the tension in their stomach muscles.

**Question 25**

Mei recalls walking towards the door to the room where she was to meet the King of England for the first time. When she first opened the door and walked into the room, her body reacted to the stress.

This initial stage of Mei's biological response to stress is referred to as

- A. counter shock.
- B. resistance.
- C. alarm reaction.
- D. shock.

Use the following information to answer Questions 26–31.

Nadia is a 33-year-old woman living in Melbourne. She loves her job as a personal trainer and is highly successful in her career. In her spare time, Nadia enjoys playing basketball and training with her elite team. Despite being happy and healthy, Nadia often feels lonely. Her long-term relationship ended 13 months ago, and ever since then she has felt stressed and anxious because she thought they would get married. In the first few months after the break-up, Nadia was able to train her clients and be successful on the basketball court. However, more recently, she has been experiencing migraines and depression-like symptoms, and recently has been bedridden due to the flu.

**Question 26**

According to Selye's General Adaptation Syndrome, what stage was Nadia in most recently?

- A. exhaustion
- B. counter shock
- C. resistance
- D. shock

**Question 27**

What would be happening to Nadia's immune system if she was in the resistance stage of Selye's General Adaptation Syndrome?

- A. Her immune system would be more active due to activation of her parasympathetic nervous system.
- B. Her immune system would be stronger due to the impact of cortisol.
- C. Her immune system would be less active due to changes in her sympathetic nervous system.
- D. Her immune system would be weaker due to the prolonged release of cortisol.

**Question 28**

According to Lazarus and Folkman's Transactional Model of Stress and Coping, if Nadia remains single and never gets back together with her ex-boyfriend, her primary appraisal would involve identifying the situation as stressful and

- A. believing that she will not be able to cope, due to a lack of support and coping ability.
- B. seeing it as a potential threat to her future, but also believing that she has sufficient resources to cope with it.
- C. seeing it as a challenge, providing opportunity for growth.
- D. a source of loss and grief.

**Question 29**

Nadia never wanted to talk about her break-up with her friends or her psychologist. She refused to pick up her belongings from her ex-boyfriend's house and would get angry if anyone spoke his name. Nadia dedicated more time and effort to her basketball training than ever before. She participated in extra training sessions during the week and called her coach for additional feedback.

Nadia's coping strategy most likely reflects

- A. a secondary strategy.
- B. an approach strategy.
- C. an avoidance strategy.
- D. a flexible strategy.

**Question 30**

Nadia's housemate, Becky, is finding it stressful to search for a full-time job.

According to Selye's General Adaptation Syndrome,

- A. Nadia and Becky would experience different physiological responses in the initial stages of their stress reactions.
- B. Nadia's sympathetic nervous system would increase her resistance to stress above normal levels, whereas Becky's sympathetic nervous system would not increase her resistance to stress as the stressor is not as significant.
- C. Nadia and Becky would both experience a non-specific stress response due to activation of the sympathetic nervous system.
- D. Nadia's long-term stress would lower her resistance to stress initially, whereas Becky's short-term stress would increase her resistance to stress initially.

**Question 31**

Nadia's coping strategy would have high context-specific effectiveness if she

- A. pressured Becky to get a job so she did not have to worry about Becky paying rent.
- B. ensured that there was a good balance between the stress of her break-up, her individual needs and her basketball training.
- C. evaluated her diet and made sure she was getting adequate sleep each night.
- D. evaluated whether her basketball training was the most effective coping strategy, and changed strategies if she perceived it to be ineffective.

**Question 32**

Which one of the following is true regarding long-term depression?

- A. Long-term depression refers to a long-lasting strengthening between synapses that results in enhanced functioning of the neurons.
- B. Long-term depression refers to a long-lasting decrease in the strength of synaptic connections.
- C. Long-term depression only occurs in the temporal lobe of the brain.
- D. Long-term depression is more likely to occur in children, because they have not completed development.

**Question 33**

Yannick went to Japan with his parents for two weeks during the school holidays. They travelled to a few different cities while they were there. Yannick enjoyed looking at the cherry blossoms that were blooming and he loved all the different foods he ate.

Which neurotransmitter would have helped Yannick to form memories of the places he visited in Japan?

- A. GABA
- B. glutamate
- C. adrenaline
- D. dopamine

**Question 34**

Alicia works part-time at a childcare centre while she is studying psychology at university. She plans to use classical conditioning techniques to teach an infant to fear her dog, Fido, by introducing a loud noise with the dog by banging a saucepan with a spoon.

Alicia plans to extinguish the infant's fear of dogs after her experiment. This will involve presenting her dog without the loud noise multiple times until the infant no longer produces a fear response towards it. It is likely that the infant will experience long-term depression as a result of this process.

Extinguishing the infant's fear response will involve connections in the infant's brain between the dog and the

- A. loud noise being weakened due to a lack of stimulation over time.
- B. fear response being weakened due to a lack of stimulation over time.
- C. fear response being weakened due to low-level stimulation of the dog being presented without the loud noise.
- D. loud noise being weakened due to low-level stimulation of the dog being presented without the loud noise.

**Question 35**

Which one of the following statements describes the function of a neuromodulator?

- A. It is a hormone that acts on many neurons at a time.
- B. It is a neurotransmitter that acts on many neurons at a time.
- C. It is a neurotransmitter that is released into a single synapse.
- D. It is a hormone that is released into a single synapse.

**Question 36**

Which one of the following statements is correct regarding the role of serotonin?

- A. Serotonin is a hormone that helps regulate sleep.
- B. Serotonin is a neuromodulator that plays a role in mood regulation.
- C. Serotonin is a neuromodulator that excites post-synaptic neurons.
- D. Serotonin is a hormone that plays a role in mood regulation.

**Question 37**

Which one of the following statements correctly describes a distinction between sprouting and rerouting?

- A. Sprouting is the growth of new neural connections between neurons, whereas rerouting is the elimination of disused neural connections.
- B. Sprouting is the growth of new neural connections between neurons, whereas rerouting is the use of alternative neural pathways for sending a neural message.
- C. Sprouting is the use of alternative neural pathways for sending a neural message, whereas rerouting is the growth of new neural connections between neurons.
- D. Sprouting and rerouting both involve the same changes to neural connections and cannot be distinguished.

**Question 38**

Which of the following options is most likely, regarding the neurons involved in long-term potentiation and long-term depression?

	<b>Long-term potentiation</b>	<b>Long-term depression</b>
<b>A.</b>	involves adjacent neurons undergoing rerouting	involves adjacent neurons undergoing sprouting
<b>B.</b>	involves adjacent neurons undergoing pruning	involves adjacent neurons undergoing rerouting
<b>C.</b>	involves adjacent neurons undergoing pruning	involves adjacent neurons undergoing sprouting
<b>D.</b>	involves adjacent neurons undergoing sprouting	involves adjacent neurons undergoing pruning

**Question 39**

Which one of the following most accurately describes the link between the gastrointestinal tract and the brain?

- A.** The brain communicates with the gastrointestinal tract to release hormones that control our stress levels.
- B.** The gastrointestinal tract signals the brain to release neurotransmitters to produce feelings of hunger.
- C.** The gastrointestinal tract and the brain influence each other in a bi-directional manner with regards to stress.
- D.** Changes to microbiota in the gastrointestinal tract only impact physiological responses to stress.

**Question 40**

A limitation identified by gut–brain axis (GBA) researchers is that

- A.** the GBA is accepted by the psychological community as an important factor in human stress.
- B.** GBA research is an emerging area and most empirical research so far has used animal studies.
- C.** GBA research is unreliable because it has only studied humans, not other mammals.
- D.** GBA research directly contradicts other models of stress.

**Question 41**

Fiona is returning to Melbourne from a holiday in New Caledonia, via Sydney. Her flight from New Caledonia to Sydney has been delayed, and there is a risk that she will miss her connecting flight in Sydney and not be able to get home tonight. She is immediately very concerned as she has an important meeting the next morning, but is quickly calmed when the airport staff assure her that the flight will arrive in time for the connection.

Which of the following is likely to be true?

- A.** Fiona is experiencing acute stress, producing a flight-or-fight-or-freeze response.
- B.** Fiona is experiencing acute stress, with ongoing production of cortisol.
- C.** Fiona is experiencing chronic stress, producing a flight-or-fight-or-freeze response.
- D.** Fiona is experiencing chronic stress, with ongoing production of cortisol.

## Short-answer and extended-answer

### Question 1 (7 marks)

Mario is a single father who takes his kids to school every morning before going to work. Mario often relies on his mum to pick the kids up from school in the afternoons, and she helps to get dinner ready at night. Unfortunately, Mario's mum fell down the stairs and broke her hip and is now slowly recovering slowly from hip surgery. Mario has had to struggle to make alternative arrangements for his kids, as his mother can't help like she used to. However, his primary worry is for her health, as it stresses him to see her in pain. In addition, Mario's boss has asked him to work on a big project that could lead to a promotion for Mario at work. Mario works late at home and often does not get to bed until after midnight, because he really wants the promotion.

Mario soon develops a bad cold and cough, and goes to see his doctor.

- a. Identify the stage of the General Adaptation Syndrome (GAS) model of stress that Mario is likely to be in, and explain how the stress associated with Mario's family life and work may have contributed to his illness.

3 marks

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- b. In terms of primary appraisal in Lazarus and Folkman's Model of Stress and Coping, explain how Mario's evaluation of the new work project would differ from the primary appraisal he would have experienced when his mother suffered her injury.

4 marks

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**Question 2** (4 marks)

Just before going on a big road trip around Australia with his best mate Rob, Cameron loses his driver's licence. He is becoming increasingly worried about being able to go on the trip. After a few days, he decides to ask Rob to do the driving.

Discuss whether Cameron's new coping strategy will be effective, by referring to coping flexibility and context-specific effectiveness.

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**Question 3** (7 marks)

Emily is on a diet and agrees to go to the footy with her sister, Verity, as long as they bring healthy snacks. Verity is running late, so Emily finds their seats and waits for her. A man selling snacks walks past saying, 'Hot pies, cold drinks!' Emily begins to salivate when she smells the meat pie. Despite bringing carrot sticks and dips with her, the meat pie smells so good that she decides to buy one to eat.

- a. With reference to how Emily responded to the sensory stimulus of smelling the meat pie, explain the difference between conscious and unconscious responses. 3 marks

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- b. Outline how **two** divisions of Emily's nervous system would have been involved when she bought the meat pie and ate it.

4 marks

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**Question 4** (4 marks)

Jane is an organisational psychologist. She was employed by Ace, an accounting firm, to help reduce the stress levels of employees. Jane was provided with the following background information about the company.

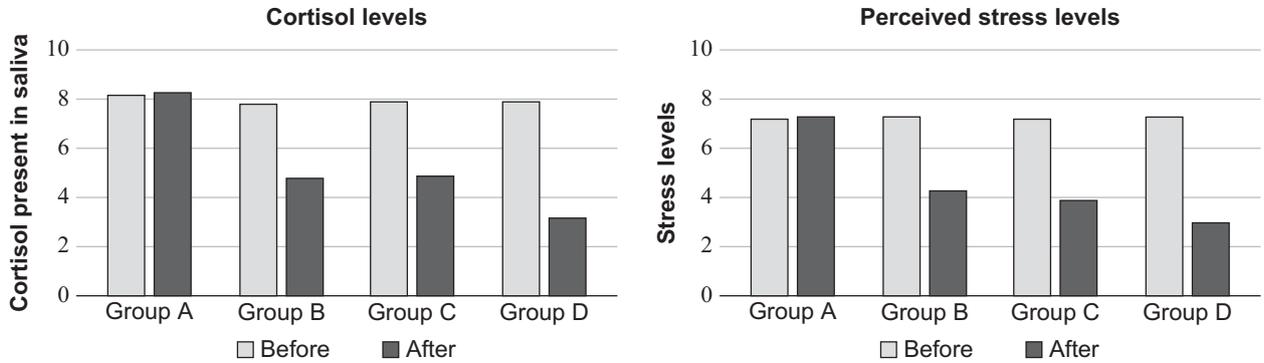
Ace is an Australia-based accounting firm that employs 196 full-time staff. Managers within the firm have noticed that at particular times of the year (e.g. towards the end of financial year in June), the stress levels of staff significantly increase. This also coincides with many staff experiencing sore throats and colds. As a result, many staff take time off work, resulting in reduced productivity at an important time of the year. Ace wants to reduce its employees' stress levels, by educating them and providing them with opportunities to learn about how to cope effectively with stress.

At the beginning of her contract, Jane asked for volunteers from all areas in the company to take part in her study. She wanted to establish the employees' baseline stress levels and compare them with their stress levels at the conclusion of the three-month study, after different coping strategies had been introduced. The 80 employees who agreed to participate were divided into four equal groups.

- Group A were told to use their existing coping strategies.
- Group B were told to exercise at a moderate level for at least 20 minutes three times a week, as an avoidance strategy to distract themselves.
- Group C were told to use approach coping strategies, such as seeking support from others, writing a to-do list and setting goals.
- Group D were told to exercise at a moderate level for at least 20 minutes three times a week, and were also told to use approach coping strategies, such as seeking support from others, writing a to-do list and setting goals.

Jane's investigation involved two parts. The first part involved assessing cortisol levels in a saliva test before the study commenced, and again at the end of the three-month period. Cortisol level was represented as a score from 1 to 10 (1 being the lowest and 10 being the highest). The second part involved the employees rating their perceived stress levels before the study commenced and again at the end. This was also rated on a scale from 1 to 10 (1 being no stress and 10 being extremely stressed).

Jane's results are shown below.



- a. Outline a benefit of cortisol being released during the employees' stress responses. 1 mark

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- b. With reference to Selye's General Adaptation Syndrome (GAS), explain how cortisol levels could be linked to the Ace employees experiencing sore throats and colds during busy, stressful periods. 3 marks

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- c. Suggest an approach strategy that Ariella could use to help reduce the stress she is experiencing and provide one advantage of this strategy.

2 marks

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- d. Explain how Ariella could demonstrate high coping flexibility in this situation.

2 marks

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**Question 6** (4 marks)

Outline two differences between long-term potentiation and long-term depression.

Difference 1

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## Difference 2

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**Question 7** (4 marks)

Amahle started playing soccer at a new club when she moved to Australia from South Africa. The dynamic of the team was different to her original team and this caused her a lot of stress. Although Amahle has played soccer for over 15 years, and speaks confidently in front of people every day as a marketing manager, she could not respond when she was introduced to her new team and instead stood there frozen.

- a. Identify the division of the nervous system that would have been dominant when Amahle was unable to speak to her new team. Justify your response. 2 marks

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When Amahle froze, her coach was understanding and did not put pressure on her to speak. However, he later suggested that she could talk to the team at the next training session if she wanted to. Unfortunately, Amahle remained stressed, so she lied and said she was sick and couldn't attend the next training session.

- b. In terms of context-specific effectiveness, how appropriate was Amahle's coping strategy when she missed the next training session? Justify your response. 2 marks

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**Question 8** (7 marks)

Tess is a strong student who competes at a high level in equestrian competitions, often placing among the best riders in her state. In order to complete the courses, Tess needs to instruct her horse when to change pace or direction, and when to jump. She does this by using her body movements and shifting how she balances on the horse.

Tess trains hard with her horse, Red Velvet, and prepares by walking the course, carefully learning the sequences of jumps, and practising, in the days ahead of competition. During the September school holidays, she is ecstatic to win the championship for her age group.

- a. Distinguish between the role of glutamate and dopamine in Tess's training and performance in the equestrian championships.

4 marks

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- b. Explain how dopamine may play a role in encouraging Tess to keep riding horses competitively.

3 marks

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**Question 9** (5 marks)

Amna, aged 25, has completed a law degree and is currently studying to become a barrister. Her goal is to one day argue criminal cases in the Victorian Supreme Court.

When barristers 'pass the bar' and become fully qualified, they can choose to take the title of Senior Counsel. Alternatively, because they represent the monarch of the time, they can choose to be a Queen's Counsel or a King's Counsel.

When Queen Elizabeth II passed away, any lawyer who was a Queen's Counsel automatically had their title changed to King's Counsel, as they now represent King Charles III. Two of the barristers in Amna's law firm have had their titles changed. Amna keeps messing up when introducing them or writing an email, and it takes her several weeks to get into the habit of calling them King's Counsel instead of Queen's Counsel.

- a.** Using relevant key terms involved in memory formation, explain how the process of long-term potentiation has occurred and helped Amna to learn to refer to the barristers as King's Counsel.

3 marks

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- b.** Using relevant key terms, outline why Amna's memory of the barristers as Queen's Counsel has changed.

2 marks

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**Question 10** (8 marks)

Mike is a 60-year-old father who has been feeling flat for a couple of months. He has not been doing his usual weekly exercise, which in turn has made it harder for him to fall asleep.

Unfortunately, Mike's lack of sleep has also increased his stress levels at work, because he is continually making mistakes. Last week, after making another mistake, Mike got an official warning. He has started to worry about losing his job.

After work one day, Mike's teenage son Thomas encourages Mike to start exercising with him. Thomas tries to convince his father that exercise will help reduce his stress levels and potentially improve his sleeping habits. Although Thomas has already talked to Mike about this a number of times, on this night Mike decides he will try running with his son during the week, to see if it helps.

- a. With reference to Lazarus and Folkman's Transactional Model of Stress and Coping, explain how Mike would primarily appraise the stress of potentially losing his job. 2 marks

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- b. While Mike feels a little better after the exercise, because it takes his mind off his concerns and he enjoys running with his son, he is still feeling stressed about work. Mike's doctor asks some questions about his diet and is concerned that he is not providing himself with an appropriate level of nutrition.

- i. Name a neuromodulator that is primarily produced in the gut and which may have reduced production if Mike is not eating appropriately. 1 mark

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- ii. Outline one physiological change that Mike's stress may have caused to the regular functioning of his gastrointestinal system. 1 mark

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- iii. Describe how a physiological change in Mike's gastrointestinal system may impact his physiological response to a stressor. 2 marks

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- c. Explain the relative effectiveness, for Mike's mental wellbeing, of using exercise as an avoidance strategy compared to a suitable approach strategy for managing his stress.

2 marks

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**Question 11** (10 marks)

Mariah keeps seeing posts on her social media about gut health and why it is important to consume foods high in probiotics.

- a. Describe the gut–brain axis and state two main functions of it.

3 marks

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- b. Outline the link between the gut–brain axis and Selye's GAS model.

4 marks

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## Unit 3 | Area of Study 2 How do people learn and remember?

### Multiple-choice

#### Question 1

Penelope is quite anxious because she has just broken up with her boyfriend, and she is not sleeping well. During the day, she consumes at least four cups of coffee to increase her alertness. At night, she drinks two glasses of wine to help herself relax and settle down for sleep. Drinking a lot of coffee during the day and drinking wine at night have become regular habits for Penelope.

The learning principle associated with Penelope drinking wine to help herself sleep is

- A. positive punishment.
- B. negative punishment.
- C. classical conditioning.
- D. reinforcement.

#### Question 2

In terms of the Atkinson–Shiffrin multi-store model of memory, sensory memory

- A. has a smaller capacity than short-term memory.
- B. has a greater duration than short-term memory.
- C. has the same function as short-term memory.
- D. has a greater capacity than short-term memory.

.....  
*Use the following information to answer Questions 3 and 4.*

.....  
 : When driving home from work, Meg hits a cat. She pulls over to the side of the road  
 : and sees that the cat has died. The cat has a collar but no contact details for the  
 : owner, so Meg leaves the cat at the side of the road in the hope that someone will  
 : recognise the pet and let the owners know. Meg feels terrible and is so shaken up  
 : that she has trouble sleeping and keeps replaying the accident in her head for the  
 : next three days.  
 : .....

#### Question 3

Meg's emotional reaction to the death of the cat (and the memory of her emotional response) is likely due to the role of the

- A. hippocampus.
- B. amygdala.
- C. cerebellum.
- D. neocortex.

**Question 4**

Meg's recollection of specific details, such as the colour of the cat's fur, is an explicit memory that has likely formed due to the role of the

- A. hippocampus.
- B. amygdala.
- C. cerebellum.
- D. basal ganglia.

**Question 5**

Marcus decides to investigate the impact of stress on memory recall. He asks five peers from his class to participate. In the first condition, Marcus gives the participants a list of 20 words to learn in 45 seconds. He then makes them wait 12 seconds before allowing them to write down as many as they can remember.

In the second condition, Marcus gives the participants a different list of 20 words, but this time gives them only 15 seconds to learn the words. He then makes them wait 12 seconds before allowing them to write down as many as they can remember.

Marcus' results are shown below.

<b>Participants</b>	<b>Number of words recalled after Test 1 (45 seconds to memorise)</b>	<b>Number of words recalled after Test 2 (15 seconds to memorise)</b>
<b>Participant 1</b>	7	6
<b>Participant 2</b>	8	5
<b>Participant 3</b>	9	7
<b>Participant 4</b>	13	7
<b>Participant 5</b>	10	10
<b>Mean</b>	9.4	7.0
<b>Standard deviation</b>	2.3	1.9

Marcus made his participants wait 12 seconds before they were allowed to write down as many words as they could remember.

Marcus was most likely investigating

- A. sensory memory.
- B. short-term memory.
- C. long-term memory.
- D. declarative memory.

*Use the following information to answer Questions 6 and 7.*

Christina's cat, Peggy, is ruining the furniture by scratching it with her claws. Peggy wants to sharpen her claws and does not know that scratching the furniture upsets Christina. To prevent Peggy from scratching, Christina sprays water at Peggy's face every time she scratches the furniture. After scratching the furniture four times, and being sprayed with water each time, Peggy stops scratching the furniture. Christina thinks that the problem behaviour has been solved.

### Question 6

In terms of the three-phase model for Peggy,

- A. scratching the furniture is the antecedent, spraying the water is the behaviour and not scratching the furniture is the consequence.
- B. the unconditioned stimulus is the water, the unconditioned response is flinching at the water and the conditioned response is not scratching the furniture.
- C. scratching the furniture is the antecedent, needing to sharpen her claws is the behaviour and being sprayed in the face with water is the consequence.
- D. needing to sharpen her claws is the antecedent, scratching the furniture is the behaviour and being sprayed in the face with water is the consequence.

### Question 7

The water sprayed into Peggy's face acts as a

- A. punisher because it has the effect of decreasing the response rate.
- B. negative reinforcer because it has the effect of increasing the response rate.
- C. negative reinforcer because it has the effect of decreasing the response rate.
- D. punisher because it has the effect of increasing the response rate.

### Question 8

Max loves watching his favourite cartoons on television. When Max is naughty, his mum switches off the television. Max then stops being naughty.

Which one of the following best describes the television being switched off for Max?

- A. positive punishment
- B. negative punishment
- C. positive reinforcement
- D. negative reinforcement

**Question 9**

Alzheimer's disease is a neurodegenerative disorder.

It is likely that a sufferer's brain would

- A. have a hippocampus with less volume.
- B. have a greater mass than the brain of someone who does not have Alzheimer's disease.
- C. show growth of the cortex.
- D. show no noticeable change.

**Question 10**

In operant conditioning and observational learning, the learner's actions are followed by a consequence. One difference between the consequences in operant conditioning and those in observational learning is that

- A. the consequences in operant conditioning are always positive, whereas the consequences in observational learning are both positive and negative.
- B. the consequences in operant conditioning are always indirect, whereas the consequences in observational learning are always direct.
- C. the consequences in operant conditioning are always direct, whereas the consequences in observational learning may be indirect.
- D. the consequences in operant conditioning are both positive and negative, whereas the consequences in observational learning are always negative.

**Question 11**

When Khaviya misbehaves, her parents take her television away for a week. This is an example of

- A. punishment.
- B. negative reinforcement.
- C. positive reinforcement.
- D. modelling.

.....  
 :  
 : *Use the following information to answer Questions 12 and 13.* :  
 :

· A team of researchers has tested a non-invasive ultrasound technology designed to :  
 · remove amyloid plaques from the brain in patients with Alzheimer's disease. These :  
 · plaques are believed to be responsible for memory loss and decline in cognitive :  
 · function. :  
 ·

· Testing was conducted on 96 mice. The results showed that, in 75% of the mice, :  
 · memory function was completely restored without any damage to the surrounding :  
 · brain tissue. These mice also had improved performance on two memory tasks: a :  
 · maze and a test involving recognition of new objects. :  
 ·

**Question 12**

Alzheimer's disease is considered to be a neurodegenerative disease because it

- A. impairs cognitive functioning.
- B. temporarily impairs the functioning of neurons in the brain.
- C. gradually destroys neurons in the brain.
- D. involves the build-up of amyloid plaques in the brain.

**Question 13**

The researchers found that most of the mice in the study showed an improved ability to recognise new objects.

The brain structure that would have enabled a memory of each object to be consolidated was the

- A. neocortex.
- B. amygdala.
- C. cerebellum.
- D. hippocampus.

.....  
: *Use the following information to answer Questions 14 and 15.* :  
:

Petra puts on her blue jacket before she takes her dog for a walk every morning.  
: Recently, Petra has noticed that her dog wags his tail excitedly and stands at the  
: front door whenever she puts on her blue jacket.  
:

**Question 14**

In terms of classical conditioning, the neutral stimulus was the

- A. walk.
- B. wagging tail.
- C. blue jacket.
- D. front door.

**Question 15**

In terms of classical conditioning, the unconditioned response was the dog wagging its tail in response to

- A. walking.
- B. the blue jacket.
- C. the front door.
- D. Petra.

Use the following information to answer Questions 16 and 17.

Joel and his little brother Luke love playing soccer in their backyard. Luke idolises Joel and admires how good he is at goal kicking. Luke closely watches Joel's goal-kicking technique and tries to imitate it when Joel is around, so that he receives praise from his brother.

### Question 16

In terms of observational learning, when Luke closely watches Joel's goal-kicking technique, which stage is he likely to be in?

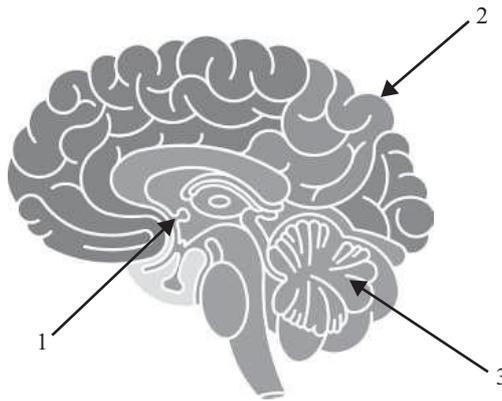
- A. attention
- B. retention
- C. reproduction
- D. motivation

### Question 17

In terms of observational learning, an example of Luke's motivation would be

- A. receiving praise from Joel for kicking the ball well.
- B. wanting to imitate Joel's goal kicking to receive praise from him.
- C. trying to imitate Joel's goal kicking and having the physical and mental capabilities to do so.
- D. remembering how to imitate Joel's goal-kicking technique.

### Question 18



Source: shopplaywood/Shutterstock.com

Each region of the brain labelled 1 to 3 on the diagram has a role in the formation of long-term memories, including implicit and explicit memories.

Which one of the following correctly identifies the role of each region?

	1	2	3
A.	consolidates emotional, explicit memories	stores procedural, implicit memories	temporarily stores implicit memories, including facts and personal experiences
B.	stores explicit memories, including facts and personal experiences	consolidates emotional, explicit memories	temporarily stores procedural, implicit memories
C.	consolidates emotional, implicit memories	stores explicit memories, including facts and personal experiences	temporarily stores procedural, implicit memories
D.	consolidates emotional, explicit memories	stores implicit memories, including facts and personal experiences	temporarily stores procedural, implicit memories

Use the following information to answer Questions 19 and 20.

Lauren is a high school Maths teacher who would like to determine whether using food incentives during her lessons improves learning outcomes for her students. She pre-tests the students of two of her Maths classes on their understanding of the current topic: probability. She then offers the students in one of her classes food incentives for completing tasks during each lesson for one month. Lauren does not offer any food incentives to her other class during this time. She then tests both classes again on the topic of probability, using a similar test. Lauren calculates the mean difference in the improvement of each class's scores.

Probability test results before and after one month of lessons			
	Before	After	Mean difference
<b>Food incentives</b>	67%	82%	+15%
<b>No food incentives</b>	57%	60%	+3%

### Question 19

Lauren providing food as an incentive for completing certain tasks in class is an example of

- A. positive reinforcement, which decreases the likelihood of students completing the tasks.
- B. positive reinforcement, which increases the likelihood of students completing the tasks.
- C. negative reinforcement, which increases the likelihood of students completing the tasks.
- D. positive punishment, which increases the likelihood of students completing the tasks.

**Question 20**

If Lauren takes the food incentives away from the students when they are disruptive during her lessons, this would be an example of

- A. positive reinforcement, which increases the likelihood of students completing the tasks.
- B. negative reinforcement, which increases the likelihood of students completing the tasks.
- C. positive punishment, which decreases the likelihood of students being unproductive or disruptive in class.
- D. negative punishment, which decreases the likelihood of students being unproductive or disruptive in class.

**Question 21**

Alicia works part-time at a childcare centre while she is studying psychology at university. Alicia plans to use classical conditioning techniques to teach an infant to fear her dog, Fido, by introducing a loud noise by banging a saucepan with a spoon.

For Alicia to successfully condition an infant to fear her dog, she would need to pair

- A. the loud noise (unconditioned stimulus) with the fear of the dog (unconditioned response).
- B. the dog (unconditioned stimulus) with the fear of the dog (conditioned response).
- C. the loud noise (unconditioned stimulus) with the fear of the loud noise (unconditioned response).
- D. the loud noise (unconditioned stimulus) with the dog (neutral stimulus).

.....  
 Use the following information to answer Questions 22 and 23.

Simon has been training his dog, Rex, to sit. He says the word 'sit'. When Rex sits, Simon gives him a treat.  
 .....

**Question 22**

In terms of the three-phase model of operant conditioning, the antecedent in this scenario would be

- A. the increased likelihood of Rex sitting.
- B. Simon saying 'sit'.
- C. Simon giving Rex the treat.
- D. Rex sitting.

**Question 23**

Which one of the following best explains why Simon would not be able to use classical conditioning to train Rex to sit?

- A. Sitting is an involuntary reflexive response for Rex.
- B. Rex sitting involves the association between two stimuli: Simon saying 'sit' and the treat.
- C. Sitting is a passive response for Rex.
- D. Sitting is a voluntary response for Rex.

**Question 24**

Which of the following best identifies the function and duration of short-term memory in the Atkinson-Shiffrin multi-store model of memory?

	Function	Duration
A.	to store information for retrieval	relatively permanent
B.	to temporarily store information so that it can be consciously manipulated	5–9 seconds
C.	to temporarily store long-term memories and sensory stimuli from the environment	18–30 seconds
D.	to temporarily store sensory stimuli from the environment	18–30 seconds

**Question 25**

Fran was recently diagnosed with Alzheimer's disease.

Which one of the following correctly describes the physiological changes that would be occurring in Fran's brain in the early stages of the disease?

- A. Cortical shrinkage would be occurring in the cerebellum.
- B. Amyloid plaques would be developing in the synaptic gap.
- C. Neurofibrillary tangles would be forming both inside and outside the neurons.
- D. Acetylcholine levels in the brain would be increasing.

**Question 26**

According to the Atkinson-Shiffrin multi-store model of memory, how many pieces of information will someone be able to hold temporarily in their memory?

- A. 2–5 pieces of information
- B. 5–9 pieces of information
- C. 9–14 pieces of information
- D. none of the above

**Question 27**

Ajax has been playing cricket for 20 years and has become very successful at the sport.

If Ajax's hippocampus was damaged six years ago, which one of the following symptoms would he be most likely to experience?

- A. He would remember last year's presentation night when he received the best and fairest award at his cricket club.
- B. He would be able to automatically swing the bat when a ball was bowled.
- C. He would be unable to feel emotion when winning a grand final.
- D. He would be able to remember his score in this week's game.

**Question 28**

Which of the following is correct in terms of Aboriginal and Torres Strait Islander ways of knowing?

- I involves spiritual and physical connections to Country
- II relies on strong kinship systems
- III involves involuntary associations between stories and locations

- A. I, II and III
- B. II and III
- C. I and III
- D. I and II

**Question 29**

Which of the following best explains why Aboriginal and Torres Strait Islander ways of knowing are considered multimodal?

- A. Aboriginal and Torres Strait Islander Peoples are connected with several locations on Country.
- B. Knowledge can be held and transferred through artwork, dancing and story-telling.
- C. Knowledge is transferred between generations through elders in the community.
- D. Participants are rewarded through community when knowledge is transferred.

**Question 30**

Finn experiences aphantasia.

Which one of the following is the least likely aspect Finn would be able to recall from their last visit to the beach?

- A. recalling that the sand was soft and fine
- B. picturing the seagulls flying across the waves
- C. counting the number of coconuts they could see hanging off a palm tree
- D. remembering the temperature that day

**Question 31**

In Victoria, an organisation known as the Independent Broad-based Anti-Corruption Commission investigates potential wrongdoing by politicians. This organisation is commonly referred to as IBAC.

'IBAC' is an example of

- A. an acrostic.
- B. an acronym.
- C. method of loci.
- D. a songline.

**Question 32**

Which one of the following is the best description of songlines used by Aboriginal and Torres Strait Islander communities?

- A. a mnemonic that aids memory by creating phrases that provide retrieval cues
- B. a mnemonic that aids memory by increasing the depth of encoding due to repetition of sung narratives
- C. a mnemonic that aids memory by forming pronounceable words out of phrases that are sung
- D. a mnemonic that aids memory by connecting important information with song and locations

**Question 33**

How do the mnemonics 'method of loci' and 'songlines' differ?

- A. Method of loci links information to locations, whereas songlines link multiple pieces of information together.
- B. Method of loci can be used to recall any information, whereas songlines are primarily used to recall cultural and navigational information.
- C. Songlines are only used as a verbal mnemonic, whereas method of loci is only used as a written mnemonic.
- D. Songlines are used to enhance encoding and retrieval, whereas method of loci only enhances retrieval.

## Short-answer and extended-answer

### Question 1 (5 marks)

Jude and Tom have been in a committed relationship for 50 years, and married for the past five years. At their anniversary celebration, Jude and Tom are reminiscing about their very first date. Jude remembers Tom picking him up in his brand new car, but Tom insists that he picked Jude up on his father's old motorbike.

Tom has been assessed as experiencing a condition that prevents him from forming voluntary visual images.

- a. Name the condition Tom is experiencing. 1 mark

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- b. Explain why Tom's and Jude's memories of their first date differ, with reference to types of long-term memory. 4 marks

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### Question 2 (5 marks)

Patrick is a nurse at a local medical clinic. Indy, an eight-year-old girl, attends the hospital each fortnight for treatment. On Indy's first visit, Patrick gave her an injection that was very painful. Now Indy screams when she is approached by a nurse, even if she does not need an injection.

According to the classical conditioning theory of learning, identify each of the following in the above scenario.

- a. unconditioned stimulus 1 mark

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- b. neutral stimulus 1 mark

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- c. conditioned stimulus 1 mark

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d. unconditioned response

1 mark

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e. conditioned response

1 mark

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### Question 3 (10 marks)

#### Behaviour modification techniques

Behaviour modification is based on the idea that good behaviour should lead to positive consequences and bad behaviour should lead to negative consequences.

You cannot force a child to change their behaviour, but you can change the environment in such a way that they will be more motivated to change. Behaviour modification is about modifying the environment in a way that gives your child more incentive to follow the rules.

Consistency is the key to making behaviour modification more effective. If you praise your child for doing their chores, use praise every time they do their chores until it becomes a habit. Then you can gradually phase out your praise over time.

Negative consequences should also be consistent. If your child only gets sent to timeout once out of every five times they hit someone, your consequences will not be effective. The child needs to go to timeout every time they hit someone.

Some examples of effective consequences that could be used include:

- giving a child an extra chore for lying when asked if they cleaned their room
- placing a child in timeout so they do not receive any positive attention and actively ignoring them when they have a temper tantrum
- saying, 'Great job for putting your dish away before I even asked you to'
- nagging your child to do their chores; they do their chores to make the nagging stop.

Source: Adapted from Amy Morin,  
<https://www.verywellfamily.com/what-is-behavior-modification-1094788>

a. Identify the type of consequence used when placing a child in timeout and ignoring them when they have a temper tantrum, and explain the desired effect it would have on the child's behaviour in the future.

2 marks

Type of consequence

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Effect on future behaviour

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- b.** In terms of observational learning, explain the role that praise would play in the stages of motivation and reinforcement when parents are teaching their children to put their dishes away.

3 marks

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- c.** Identify the learning model being applied in this scenario.

1 mark

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- d.** For the final example, 'nagging your child to do their chores; they do their chores to make the nagging stop', name and outline the three phases of the relevant learning model for the child, and explain the effect it will have on the child's future behaviour.

4 marks

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**Question 5** (2 marks)

Information is passed between generations of Aboriginal and Torres Strait Islander Peoples when children mimic the behaviour of their elders.

Compare and contrast Aboriginal and Torres Strait Islander Peoples' ways of knowing with observational learning.

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**Question 6** (4 marks)

Many years ago, Joanna taught her son, Lee, to swim in their backyard pool. Lee practised his strokes in the pool for several weeks until he could easily swim from one end to the other without touching the bottom of the pool. Now living with Alzheimer's disease, Joanna can still recall this experience as one of her fondest and best memories with Lee as he was growing up.

Lee also fondly remembers the lessons with his mother. Now that he has a young daughter, he is looking forward to teaching her to swim in his parent's backyard pool when she is ready.

- a. Explain how Lee can use his existing memory of learning to swim to predict what it may be like to teach his daughter to swim.

2 marks

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- b. Is it likely that Joanna would be able to engage in the same process as Lee? Justify your response.

2 marks

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**Question 7** (3 marks)

Jing, aged 8, is learning the names of the planets in our solar system. Her teacher teaches the class a sentence to help them remember the order of the planets: 'My Very Educated Mother Just Served Us Nachos'.

- a. What type of mnemonic device is Jing's teacher using? 1 mark

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- b. Explain how this memory tool will help Jing to remember the order of the planets. 2 marks

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**Question 8** (5 marks)

Liam is in Psychology class, learning about various mnemonic devices.

His teacher is instructing the class on how to use the method of loci, and asks students to practise using their own method of loci to recall the following list of words in order:

bird, water, fence, peach, bathtub.

- a. Explain how mnemonics work. 2 marks

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**b.** Demonstrate how Liam could use method of loci to recall the words in the list above, with a clear example for at least two words.

3 marks

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**Question 9** (4 marks)

Sally has had a fear of birds since she was a little girl. It started in primary school, when she was swooped by a magpie a number of times. However, her parents are encouraging her to try and get over the fear by feeding a magpie who lives around their property. They have made it Sally's job to give the magpie some food whenever it flies onto their veranda. If Sally's parents see her feeding the bird, she gets extra dessert.

Using the language and phases of operant conditioning, explain how Sally's behaviour will change over time.

Phase 1

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Phase 2

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Phase 3

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Effect on future behaviour

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**Question 10** (10 marks)

The staff at a local primary school are increasingly concerned about rising rates of obesity in children. They organise a specialist to speak at a parent information night about encouraging healthy eating habits for children.

The information night is well attended by parents, and the presenter speaks for over an hour. At the end, a pamphlet with some tips for parents is handed out.

Below is an excerpt from the pamphlet.

Getting your children to eat healthily can be a struggle, especially if they are picky eaters. Below are some tips for parents to help their children make better choices about the foods they consume.

- (1) **Be a role model.** Children are keen observers – what they see, they do. They admire and want to be like you. Therefore, it is important for you to model healthy eating behaviours. Make sure you eat vegetables and fruit around your children, and tell them how much you are enjoying the food you are eating.
- (2) **Sit down together for meal times.** Sit with your children while they are eating and share the meal with them. Give them plates and utensils to use, so they can eat food in a similar way to you.
- (3) **Turn off the TV and phones at meal times.** Remove any distractions, so that sharing a meal is just about spending time together as a family.
- (4) **Involve your child in meal planning.** It is important to involve your children in meal planning, because this will make them feel that their role is important. It is also important to ensure that every meal includes a healthy option that you know your children will eat. For example, if their favourite vegetable is corn, try to include corn in meals with a variety of other vegetables for them to try.
- (5) **Use praise as a reward, rather than food.** It is best not to use food as a reward. For example, avoid using ice cream or sweets as incentives for your children to eat their vegetables. Instead, offer non-food rewards such as praising them, offering one-on-one time together with you or allowing them to watch their favourite TV show.

Consider the advice provided to parents in this pamphlet.

Using psychological concepts from learning theories and/or behavioural models of learning, explain the processes of learning that would need to occur when fostering healthy eating habits in children. In your response you should make it clear which learning theories/models you are discussing and identify how the processes are addressed in the pamphlet.

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## Unit 4 | Area of Study 1 How does sleep affect mental processes and behaviour?

### Multiple-choice

#### Question 1

Penelope is sleeping soundly.

Which one of the following best describes Penelope's brain waves when she is sleeping deeply compared to when she is awake?

	Amplitude	Frequency
A.	higher	higher
B.	lower	higher
C.	higher	lower
D.	lower	lower

#### Question 2

As we grow older, it is likely that

- A. the amount of sleep we need will increase.
- B. our time spent in rapid eye movement (REM) sleep will drop from 50% of our sleep to 20–25% of our sleep.
- C. our time spent in REM sleep will increase from 50% of our sleep to 75% of our sleep.
- D. non-rapid eye movement (NREM) stages 3 and 4 will increase.

#### Question 3

The NREM/REM sleep cycle observed over a period of 90 minutes is known as

- A. an ultradian rhythm.
- B. a circadian rhythm.
- C. an infradian rhythm.
- D. a diurnal rhythm.

#### Question 4

The first ultradian rhythm of the night differs from the last ultradian rhythm of the night. The last ultradian rhythm of the night involves

- A. stage 2 of NREM sleep.
- B. more time spent in NREM sleep compared with REM sleep.
- C. a higher proportion of time spent in REM sleep than in NREM sleep.
- D. periods of sleepwalking.

**Question 5**

Normal waking consciousness occurs when we are aware of

- A. our internal thoughts, feelings and sensations from our environment.
- B. internal thoughts and feelings only.
- C. environmental sensations only.
- D. waking up after having been asleep.

**Question 6**

Cam is a truck driver who transports sheep across Australia. As a result, he often has to remain awake for up to 24 hours at a time.

The impairment caused by 24 hours of sleep deprivation is equivalent to a blood alcohol concentration (BAC) of

- A. 0.01
- B. 0.05
- C. 0.50
- D. 0.10

**Question 7**

Using your understanding of the effects of both partial sleep deprivation and legal BAC on cognitive functioning, which one of the following statements is the most correct?

- A. After longer periods (20+ hours) without sleep, performance on speed and accuracy tests is equivalent to having a legal BAC of 0.025.
- B. After 17–19 hours without sleep, performance on speed and accuracy tests is equivalent to or worse than having a legal BAC of 0.025.
- C. After longer periods (20+ hours) without sleep, performance on speed and accuracy tests is equivalent to having a legal BAC of 0.05.
- D. After 17–19 hours without sleep, performance on speed and accuracy tests is equivalent to or worse than having a legal BAC of 0.05.

**Question 8**

A difference between the sleep patterns of children and those of elderly people is that

- A. children experience less NREM than elderly people, particularly NREM stages 3 and 4.
- B. elderly people experience a greater proportion of REM sleep than children.
- C. children wake up less and sleep more deeply than elderly people, so children have more NREM stages 3 and 4 sleep.
- D. elderly people wake up less and sleep more deeply than children, so elderly people have more NREM stages 3 and 4 sleep.

*Use the following information to answer Questions 9 and 10.*

Charlie has recently started work as a nurse and has been put on a rotating shift. He has just done his first week of night shifts and has experienced severe sleep deprivation because he found it very difficult to sleep during the day. Now that he has finished his week of night shifts, he is finding it difficult to fall asleep at night.

### Question 9

In terms of circadian phase disorders, Charlie's difficulty sleeping during the day would be due to

- A. not feeling tired, because there is not enough melatonin in his system.
- B. not feeling tired, because of high levels of melatonin in his system.
- C. a mismatch between the requirements of his external environment and those of his biological clock.
- D. a mismatch between the requirements of his sleep patterns and those of his biological clock.

### Question 10

Charlie has been told that bright light therapy could be used to resynchronise his sleep patterns after he has finished his week of night shifts.

This would involve

- A. exposing him to bright light in the early evening.
- B. exposing him to bright light first thing in the morning.
- C. minimising bright light in the early evening.
- D. minimising bright light in the early morning.

### Question 11

An individual would be in a naturally occurring altered state of consciousness if they are

- A. meditating.
- B. under the influence of an anaesthetic.
- C. sleeping.
- D. hypnotised.

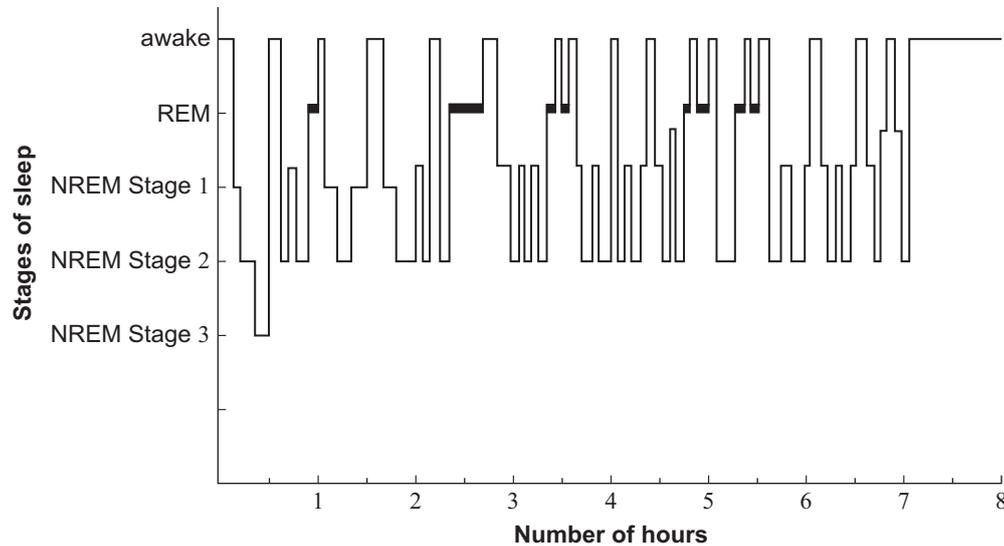
### Question 12

How do the ultradian rhythms of REM and NREM sleep change throughout the course of a night?

- A. The proportion of REM increases, while the proportion of NREM decreases.
- B. The proportions of REM and NREM both increase.
- C. The proportion of REM decreases, while the proportion of NREM increases.
- D. The proportions of REM and NREM both decrease.

Use the following information to answer Questions 13 and 14.

Dr Susan Hill is a leading scientist at a university. She is investigating the regular and naturally occurring sleep patterns of people at various ages, as an example of an altered state of consciousness. Below is a hypnogram based on data that she has collected from one of the patients in her study.



### Question 13

Which age group does the hypnogram most likely reflect?

- A. elderly, because the participant is not having many hours of deep sleep
- B. infant, because the participant is having no deep sleep
- C. adolescent, because the participant is more active later in the night
- D. adult, because the participant is spending 20% of the night in REM

### Question 14

What would be the best psychological term to describe what is happening in the first hour of sleep on Dr Hill's hypnogram?

- A. a body clock cycle
- B. a circadian rhythm
- C. a sleep-wake cycle
- D. an ultradian rhythm

**Question 15**

Han is a healthy 29-year-old man who has volunteered to sleep in a laboratory and have his sleep measured in an experimental sleep study. He is connected to an electroencephalograph (EEG) and an electromyograph (EMG) machine for this study.

Which of the following correctly describes what the researchers would expect to see when Han enters a deep sleep?

	EEG recording	EMG recording
A.	low frequency and high amplitude	low electrical activity
B.	high frequency and high amplitude	minimal electrical activity
C.	low frequency and high amplitude	occasional leg movement
D.	low frequency and low amplitude	low electrical activity

**Question 16**

Which brain structure is responsible for regulating the release of melatonin within the brain?

- A. hippocampus
- B. pineal gland
- C. amygdala
- D. suprachiasmatic nucleus

**Question 17**

Which of the following is correct regarding the psychological effects of sleep deprivation?

	Affective	Behavioural	Cognitive
A.	headaches	difficulty performing simple tasks	hallucinations
B.	uncontrollable aggressive outbursts	slowed reaction times	impaired memory
C.	depressed mood	irritability	lack of motivation
D.	heightened anxiety	hand tremors	reduced ability to maintain attention

**Question 18**

A person with a BAC of 0.10 compared to someone who is partially sleep deprived would be likely to show

- A. a greater sensitivity in mood.
- B. about the same level of cognitive impairment.
- C. no change in their level of concentration.
- D. better reasoning and problem-solving abilities.

**Question 19**

Which one of the following best describes the term 'zeitgeber'?

- A. a brain structure that regulates the sleep–wake cycle
- B. an environmental stimulus that triggers the brain to regulate the sleep–wake cycle
- C. a change in the timing or duration of sleep
- D. a biological stimulus that prompts the brain to mediate the sleep–wake cycle

**Question 20**

Adnan is a Year 11 student who is experiencing some challenges with his sleep due to pressures at home, working in a part-time job and trying to look after his ill mother.

Which of the following represent a zeitgeber that could impact Adnan's ability to sleep?

- I using his mobile phone at night
  - II not eating regular or nutritious meals
  - III delayed release of melatonin from the pineal gland
  - IV high summer temperatures
- A. I and III
  - B. I, II and III
  - C. I, II and IV
  - D. I, III and IV

**Short-answer and extended-answer****Question 1** (6 marks)

Warren, who is 42 years old, and his teenage son Aaron have very different sleep patterns. Warren goes to bed at 10 pm and wakes up at 5 am to go to his work as a builder, whereas Aaron stays up until 2 am. Warren finds it difficult to wake Aaron up for school on weekdays, and Aaron sleeps for most of the day on the weekend.

- a. Describe **two** differences between Warren's and Aaron's sleeping patterns, with reference to the typical feature of the lifespan.

2 marks

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- b. i. Identify the sleep problem that Aaron is most likely to be experiencing. 1 mark

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- ii. Aaron's sleep specialist recommends that Aaron use bright light therapy to treat his sleep problem.

Explain how bright light therapy would be used to correct Aaron's sleep-wake cycle shift.

3 marks

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### Question 2 (7 marks)

#### **New parents face 6 years of disrupted sleep**

A new study by researchers from the University of Warwick shows that after birth of the first child and up to 6 years after birth mothers and fathers sleep duration and sleep satisfaction do not fully recover to the levels before pregnancy.

In the paper 'Long-term effects of pregnancy and childbirth on sleep satisfaction and duration of first-time and experienced mothers and fathers', a collaboration with the German Institute for Economic Research and the West Virginia University studied sleep in 4659 parents who had a child between 2008 and 2015.

During these years parents also reported on their sleep in yearly interviews.

In the first three months after birth mothers slept, on average, one hour less than before pregnancy while fathers' sleep duration decreased by approximately 15 minutes.

...

However, when the children were 4–6 years old sleep duration was still about 20 minutes shorter in mothers and 15 minutes shorter in fathers compared to their sleep duration before pregnancy.

A similar time course was also observed for their satisfaction with sleep.

...

Dr Sakari Lemola, from the Department of Psychology at the University of Warwick, comments:

'While having children is a major source of joy for most parents it is possible that increased demands and responsibilities associated with the role as a parent lead to shorter sleep and decreased sleep quality even up to 6 years after birth of the first child.'

Source: University of Warwick. (2019, February 25). New parents face 6 years of disrupted sleep. *ScienceDaily*. Retrieved March 16, 2019 from [www.sciencedaily.com/releases/2019/02/190225192116.htm](http://www.sciencedaily.com/releases/2019/02/190225192116.htm)

- a.** It is possible that parents from this study were suffering from the effects of partial sleep deprivation.

With reference to the total amount of sleep that is required by adults, explain how partial sleep deprivation would affect the cognitive functioning of new parents.

3 marks

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- b.** Outline one change to eating patterns that new parents may be engaging with, that could impair their sleep.

2 marks

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- c.** Some baby monitors can stream what they record to a mobile phone, so parents can more easily check on their infant in bed without having to get up and look in on them.

Explain why this may ultimately be unhelpful for parents.

2 marks

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**Question 3** (13 marks)

Karl is a 32-year-old nurse who works night shifts. He is believed to be suffering from shift work disorder. To confirm this diagnosis, Karl's sleep specialist asked him to sleep in a sleep laboratory for one week. Karl was expected to complete a sleep diary each day in the laboratory, and an electrooculograph (EOG), an electroencephalograph (EEG) and an electromyograph (EMG) were used to measure his sleeping patterns each night. The sleep specialist's analysis of Karl's results confirmed that he was suffering from shift work disorder.

The results obtained are summarised in the tables below.

**Laboratory results (using EEG, EOG and EMG)**

average time slept each night (hours)	5.2
average time taken to fall asleep (minutes)	92.5
percentage of sleep spent in REM recorded	29.0
percentage of sleep spent in NREM recorded	71.0

**Recordings in sleep diary**

average sleep quality (1 = low quality, 5 = high quality)	1.8
average daytime sleepiness (1 = low levels of sleepiness, 5 = high levels of sleepiness)	4.3

- a. Describe what the EOG recording would show when Karl was in REM sleep. 1 mark

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- b. Explain why the sleep specialist confirmed that Karl had a circadian phase disorder, by referring to two pieces of evidence gathered in the sleep study. 3 marks

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- c. Why would Karl's sleep diary be subjective in nature and of limited use as a measure of consciousness?

2 marks

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- d. Karl's sleep specialist suggests trying bright light therapy at home to improve the quality and quantity of his sleep.

Describe when Karl should expose himself to the bright light and explain why this would help to improve his sleep during the day.

3 marks

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- e. State **two** affective and **two** cognitive effects that Karl may be experiencing from his lack of sleep.

4 marks

affective

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cognitive

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**Question 4** (2 marks)

Adam and Toby went to their friend's 18th birthday party and drank a lot of beer. When they took a taxi home to Toby's house at around 3 am, they still felt very drunk. At Toby's house, they decided to blow into his portable breathalyser for fun, just to see what their BACs were. Adam blew a BAC of 0.10, while Toby's was 0.20. They did not drink any more alcohol but stayed up all night playing games on Toby's console. At 9 am, Adam had a cup of coffee and drove home after being awake for nearly 24 hours.

Using your understanding of the effects of one full night of sleep deprivation on cognition, explain why it would be advisable for Adam to not drive home at 9 am.

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**Question 5** (3 marks)

Mike, a 60-year-old father, and his teenage son Thomas were comparing their daily sleep routines. Thomas kept reminding his father about the importance of sleep, because it would help to restore his body and mind each day. Mike laughed and said, 'You sleep in every morning and go to bed so late, I think you're the one who needs help with sleeping.'

With reference to the total amount of sleep each night, explain why Thomas falls asleep later at night and sleeps in later each morning compared to his father.

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**Question 6** (2 marks)

Why is sleep considered a psychological construct, and how might it be measured?

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**Question 7** (13 marks)

Chloe is a 17 year old who has been diagnosed with delayed sleep phase syndrome. Her mother, Anna, took her to see a sleep specialist after Chloe reported having difficulty getting to sleep at a 'normal' time and feeling tired every morning. Chloe regularly falls asleep in bed with her mobile phone while watching Tik Toks, despite her mother's plea to set up a 'family charge station' in the living room, where Anna charges her phone overnight. Chloe was reluctant to see the sleep specialist, complaining that 'I'm just a night owl, not an in-bed-by-8 pm early bird like you, Mum!'

The specialist took a family history and asked Chloe to complete a sleep diary for the next two weeks. In order to encourage her daughter to do this, Anna agreed to make it a family project for them both.

After two weeks, Chloe was required to spend a night in the sleep clinic, where technicians wired her up to machines that recorded various physiological characteristics. The specialist explained that they needed to see what was occurring in Chloe's brain, her eye movements and her muscles, as part of the process.

After examining Chloe's sleep diary, the physiological measurements and other data, the specialist diagnosed Chloe with delayed sleep phase syndrome.

- a. Name the physiological measure that can 'see what is occurring in Chloe's brain' and describe how it works.

2 marks

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- b.** Describe how measurements from this device would differ between when Chloe was in REM sleep and when she was in NREM Stage 3 sleep. 2 marks

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- c.** Explain why it may be expected that Chloe is experiencing delayed sleep phase syndrome, with reference to a contributing biological mechanism. 4 marks

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- d.** Compare how **two** types of information Chloe and Anna may have been asked to record in their sleep diaries might differ between the two women. 2 marks

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- e. Outline **two** pieces of advice that the specialist is likely to give Chloe to improve her sleep hygiene.

2 marks

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- f. Name **one** non-physiological measure of sleep not specifically referred to in the scenario that would likely be utilised at the sleep clinic.

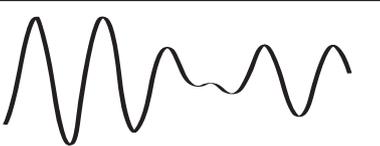
1 mark

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### Question 8 (6 marks)

Glenda's doctor recommended that she take part in a sleep laboratory study under controlled conditions, to investigate some sleep difficulties that she was experiencing.

Below are two EEG readings for Glenda, taken at different times of the night as she slept.

12 am	
1 am	

- a. Describe each reading and identify the likely stage of sleep Glenda was in at the time of each of the readings.

4 marks

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## Unit 4 | Area of Study 2 What influences mental wellbeing?

### Multiple-choice

*Use the following information to answer Questions 1 and 2.*

Alex has a fear of water. When he was a small child, he went to a pool for swimming lessons and when he was in the water, his leg got caught and he almost drowned. As an adult, Alex prefers not to go near large bodies of water, saying that it makes him feel too anxious.

#### Question 1

Alex has been diagnosed as having a phobia. A phobia is different from anxiety because

- A. anxiety is considered abnormal, while a phobic response is considered normal.
- B. anxiety can involve eustress and distress, while a phobia is characterised by distress only.
- C. the cause of anxiety may not be known, while the cause of a phobic response is generally known.
- D. anxiety is always an adaptive response, while a phobia is never adaptive.

#### Question 2

Alex avoids taking baths because he thinks that as soon as he steps into the bath he will fall over, hit his head and drown.

Alex's belief is an example of

- A. a phobia.
- B. catastrophic thinking.
- C. memory bias.
- D. attention bias.

*Use the following information to answer Questions 3 and 4.*

Fiona has a phobia of spiders. She has been prescribed a benzodiazepine medication (GABA agonist) to relieve her phobic symptoms. After seeing a spider in her apartment, Fiona took one of her prescribed tablets and soon after began to feel a sense of relief as her heart rate and breathing rate returned to normal.

### Question 3

GABA agonist medication works in the synapses of Fiona's brain to relieve her phobic symptoms by

- A. facilitating the effect of GABA by binding to its matching receptor sites, thus stimulating the excitatory action of GABA in the post-synaptic neuron.
- B. facilitating the effect of GABA by binding to its matching receptor sites, thus stimulating the inhibitory action of GABA in the post-synaptic neuron.
- C. increasing levels of GABA, thus enabling the excitatory effects of GABA on the post-synaptic neuron to occur.
- D. increasing levels of GABA, thus enabling the inhibitory effects of GABA on the post-synaptic neuron to occur.

### Question 4

In terms of perpetuation by operant conditioning, how might Fiona have behaved before receiving the benzodiazepine prescription?

- A. She may have stayed in the apartment and killed the spider, helping to reduce her phobia.
- B. She may have run out of the apartment, reducing her feelings of anxiety and thus leading to an elimination of her phobia.
- C. She may have run out of the apartment, reducing her feelings of anxiety and negatively reinforcing her phobia.
- D. She may have stayed in the apartment and let the spider be, negatively reinforcing her phobia.

### Question 5

Penelope has had trouble sleeping over recent months, and has begun a habit of drinking four coffees to help wake her up in the morning. However, she then finds herself anxious in the evening and drinks multiple glasses of wine in the evening to help calm her down after a stressful day and enable her to sleep.

Penelope's growing dependency on coffee and wine to help cope with her anxiety and sleeping issues suggests that, in relation to the mental wellbeing continuum,

- A. she has a mental health disorder.
- B. she is mentally healthy and has a high sense of wellbeing.
- C. she is developing a mental health problem and has a lower sense of wellbeing.
- D. she is normal.

**Question 6**

Which of the following correctly identifies a difference between a phobia and anxiety?

	<b>Phobia</b>	<b>Anxiety</b>
<b>A.</b>	can be considered normal	not considered normal
<b>B.</b>	can be adaptive and helpful	not considered adaptive and helpful
<b>C.</b>	is a diagnosable mental disorder	can develop into a mental disorder if not managed properly
<b>D.</b>	usually occurs in response to a wide variety of stimuli	usually occurs in response to a specific stimulus

*Use the following information to answer Questions 7–10.*

Richard was recently diagnosed with a phobia of birds. His phobia developed after he was repeatedly swooped by a magpie in primary school. On one occasion, he was injured by the magpie.

**Question 7**

Classical conditioning would have played a role in

- A.** perpetuating Richard's phobia by associating birds (conditioned stimulus) with being swooped by the magpie (unconditioned stimulus).
- B.** precipitating Richard's phobia by associating birds (conditioned stimulus) with being swooped by the magpie (unconditioned stimulus).
- C.** perpetuating Richard's phobia by associating being swooped by the magpie (conditioned stimulus) with pain and fear (unconditioned response).
- D.** precipitating Richard's phobia by associating being swooped by the magpie (conditioned stimulus) with pain and fear (unconditioned response).

**Question 8**

As a result of classical conditioning, Richard's conditioned response would be

- A.** experiencing fear in response to birds.
- B.** experiencing fear in response to being swooped by a magpie.
- C.** feeling pain in response to being swooped by a magpie.
- D.** avoiding birds.

**Question 9**

Richard started seeing a psychologist to manage his phobia. The psychologist said that he was experiencing a memory bias.

Which one of the following could be a memory bias that Richard has about birds?

- A. Richard believes that if he goes outside, birds will kill him.
- B. Richard remembers the good times he had with his pet parrot, as well as being swooped by the magpie.
- C. Richard only remembers the times when he got swooped by the magpie and the pain he experienced, rather than other pleasant bird memories he may have.
- D. Richard believes that the odds of being attacked by a bird when he leaves the house are higher than they really are.

**Question 10**

Richard's psychologist said that, in addition to his memory bias, he was experiencing irrational thoughts about birds, such as 'All birds will kill me' and 'If I leave the house I will get attacked by birds'. The psychologist began using cognitive behavioural therapy with Richard.

The cognitive component of this therapy would involve

- A. modifying unhelpful avoidance behaviours, such as not leaving his house.
- B. relaxation training, such as meditation to reduce Richard's anxiety levels.
- C. modifying unhelpful thoughts by challenging them with statistics about the likelihood of being attacked by birds.
- D. using systematic desensitisation and gradually exposing Richard to bird-related stimuli.

**Question 11**

Fran was recently diagnosed with Alzheimer's disease. Her daughter is concerned because Fran lives alone and has struggled with mental health issues in the past. Although Fran's daughter cannot slow down the progression of Fran's condition, she would like to find ways to maintain Fran's currently healthy mental state.

Which of the following correctly identifies mental health protective factors?

	<b>Social</b>	<b>Psychological</b>	<b>Biological</b>
A.	joining a support group	cognitive behavioural strategies	mindfulness meditation
B.	seeing a psychologist	experiencing stress	adequate diet
C.	joining a support group	cognitive behavioural strategies	adequate sleep
D.	seeing a psychologist	joining a support group	adequate diet

*Use the following information to answer Questions 12 and 13.*

Pradyumna is going on a holiday to Queensland. This should be an exciting time for him, but his phobia of aeroplanes is making him feel stressed and anxious.

### Question 12

Which one of the following would be an example of a cognitive bias Pradyumna holds about flying?

- A. The aeroplane is going to crash.
- B. No one is willing to drive me to Queensland.
- C. Queensland is too hot.
- D. I have always hated flying.

### Question 13

How could Pradyumna's family use psychoeducation to help Pradyumna prepare for flying when he expresses his fears?

- A. The family could give Pradyumna information about the safety of flying.
- B. The family could be given information about Pradyumna's fear of flying.
- C. The family could pay for Pradyumna's flight.
- D. The family could drive Pradyumna to Queensland instead of flying.

Use the following information to answer Questions 14 and 15.

Sophie is struggling to feel a sense of wellbeing as a new mother to her 3-month-old daughter Grace. She is extremely tired, because she is a single parent who does not have a partner to share the load, and her parents live interstate. She feels like she has been going non-stop for the past months, buying everything the baby needs, learning how to do lots of new tasks, planning and managing finances to take time off with Grace, and much more.

In addition, Sophie is frustrated because she is having difficulty with breastfeeding. This is upsetting her because her best friend, Wendy, has talked to her for years about the sense of connection generated from breastfeeding her children. Sophie is feeling a sense of loss that she is not having the same experience. At the moment, she is bottlefeeding Grace with what breastmilk she can express and supplementing this with formula, but she feels like she is not being a 'good enough' mother. Her maternal care nurse has reassured Sophie that Grace is doing well and currently meeting all expected developmental milestones, and that Sophie should not be so critical of herself, as many mothers find it challenging to breastfeed and there is so much more to parenthood.

Sophie's frustration is amplified by feeling that she has to maintain appearances by talking about the joys of motherhood and how amazing it is to be a mother, because she feels that is what is expected of her.

#### Question 14

Which of the following demonstrates Sophie displaying resilience?

- A. feeling extremely tired all the time
- B. managing a sense of loss around having difficulty with breastfeeding
- C. bottlefeeding with formula to supplement breastfeeding
- D. talking to parents and friends about the joys of motherhood

#### Question 15

Which one of the following demonstrates that Sophie is able to maintain a high level of functioning?

- A. talking to parents and friends about the 'joys' of motherhood
- B. managing her sense of loss around having difficulty with breastfeeding
- C. being a single parent
- D. learning lots of new tasks to care for Grace

**Question 16**

Which one of the following is the best way to describe the Aboriginal and Torres Strait Islander Social and Emotional Wellbeing framework?

- A. a mnemonic used to help learn key cultural information and pass this between generations
- B. a multidimensional and holistic framework for wellbeing that includes body, mind, family, community, Country and spirituality
- C. cultural continuity maintained within communities to allow for wellbeing
- D. a holistic framework that focuses on maintaining resilience through social cohesion when culture and community are challenged

Use the following information to answer Questions 17 and 18.

Elena is a 23-year-old woman who is studying at university and working full-time. She has a challenging relationship with her parents. Her father abandoned the family when she was young, and her mother has hidden important things from her in the past. When Elena was a teenager, she had to support her family financially while she studied.

Since leaving school, Elena has worked to support herself financially, and she moved out of home as soon as she could. She attends counselling to support her mental health, as she struggles with anxiety and depression. Her counsellor is teaching her to keep her focus on the here and now rather than letting her mind run away with imagined possibilities. She is finding that her university load is significant, and she often stays up all night ahead of deadlines to get her assignments in.

One thing Elena is grateful for is that her mother taught her how to cook, and she loves to cook for herself, her partner and her friends. Her partner and friends are also supportive, though only some of them are aware of her family context.

**Question 17**

Which of the following is a protective factor that Elena does not appear to be engaging with?

- A. adequate nutrition
- B. adequate sleep
- C. social support
- D. mindfulness meditation

**Question 18**

Which one of the following represents social support that is 'authentic and energising' for Elena?

- A. her partner bringing her a glass of wine when she arrives home from work
- B. her friends coming for dinner, praising her cooking skills and encouraging her to apply for TV cooking shows
- C. her mother texting to say happy birthday and to tell her to eat well or she'll come over and check on her
- D. her sister asking her to buy her a new phone so they can keep in touch



**Question 22**

What cultural determinant is reflected in the community's efforts to pass down knowledge to younger generations?

- A. building individual wealth
- B. promoting independence from family
- C. strengthening cultural continuity
- D. strengthening self-determination

**Short-answer and extended-answer****Question 1** (12 marks)

Patrick is a nurse at a local medical clinic. Indy, an eight-year-old girl, attends the hospital each fortnight for treatment. On Indy's first visit, Patrick gave her an injection that was very painful. Now Indy screams when she is approached by a nurse, even if she does not need an injection.

- a. Indy develops a phobia of nurses.

Name a neurotransmitter that would have been involved in the development of Indy's phobia.

1 mark

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- b. By referring to the principles of a theory of learning, discuss how Indy's phobia may be perpetuated by avoidance behaviours, and how this might affect her wellbeing.

7 marks

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**Question 2** (9 marks)

Luna has just been diagnosed as having a phobia of birds.

A few weeks ago, Luna was going for a jog when she was swooped by a magpie. She felt terrified and began to cry. Luna now refuses to leave her apartment, and has sought help from a psychiatrist.

In her first session with her psychiatrist, Luna reported that when she was a child, she had a traumatic experience with a large turkey who chased her around a farmyard. Luna was so frightened that she climbed up a tree to escape the aggressive turkey. Luna now believes that all birds are dangerous, and she avoids all places where birds may be present (e.g. parks and ovals).

- a.** Identify one type of cognitive distortion Luna is experiencing about turkeys. 1 mark

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- b.** Explain the role that long-term potentiation would play in the development of Luna's phobia. 3 marks

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- c.** Using the language of classical conditioning, describe how Luna's phobia could be treated with systematic desensitisation. 5 marks

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**Question 3** (14 marks)

Devorah has had a severe and irrational fear of wasps since she was a little girl. This started when Devorah saw her friend Alisha get attacked by wasps who swarmed Alisha while she was walking in a park. Since then, Devorah's fear has worsened. Now, just seeing a flying insect or just thinking about one will prevent her from leaving her house and socialising with her friends.

- a. Identify whether Devorah is suffering from anxiety or a phobia. Justify your response. 3 marks

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- b. Identify each phase of operant conditioning and explain how each phase perpetuates Devorah's fear of wasps.

6 marks

Phase 1

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Explanation

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Phase 2

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Explanation

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Phase 3

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Explanation

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- c. Devorah decides to seek help from a psychologist to manage her fear so that she feels more relaxed leaving the house and seeing her friends.

Outline how the psychologist could use cognitive behavioural therapy (CBT) to help Devorah.

5 marks

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**Question 4** (4 marks)

May broke up with her partner of three years a couple of weeks ago. Since then, she has been feeling sad and has not been socialising as much as she used to. However, she is still managing at work and regularly takes her dog for walks to help her relax. She also has a good friend who recently went through a divorce, and May finds it easy to chat to her about the situation.

- a. Identify one internal and one external factor that could influence May's position on the mental wellbeing continuum over time.

2 marks

Internal factor

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External factor

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- b. Explain why having a high level of resilience could help May deal with her relationship breakdown.

2 marks

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**Question 5** (6 marks)

Joelle is a young Aboriginal Larrikia woman from the Northern Territory. She attends a boarding school in Sydney and only gets to travel home during school holidays. She is one of only two Aboriginal students at her school. Her closest friend at the school is a Wiradjuri woman on her father's side.

Joelle enjoys the education she gets at her school, but misses her family terribly and misses being at home talking to her wonderful group of aunties and cousins, especially her closest auntie, who is quite sick. She feels that there are things she needs to learn that require her to be at home and in her community in order to learn them.

Her teacher encourages her to talk to the school counsellor but Joelle finds it doesn't make much difference. The counsellor claims it is normal to miss your family when in boarding school, but doesn't seem to understand when Joelle explains that 'it's more than that'.

Each time Joelle has to leave home to go back to school, she is increasingly unhappy about doing so.

- a. Identify a psychological and a social risk factor that would lower Joelle's mental wellbeing. 2 marks

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- b. State **two** domains in the social and emotional wellbeing framework, and explain how these are being challenged for Joelle. 4 marks

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**Question 6** (2 marks)

Outline how a focus on cultural determinants of mental wellbeing can lead to improved mental health outcomes for Aboriginal and Torres Strait Islander Peoples.

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**Question 7** (6 marks)

Connor and his twin sister Clara are aspiring AFL footballers who combine their Year 12 studies with competing in representative level under-18 competitions. They have received attention from talent scouts and both their coaches think they have a chance of being drafted in the AFL and AFLW national drafts. Connor and Clara share a dream of both playing for the same club together, and they encourage each other to be their best at every step.

Their parents are supportive of the teenagers, but are also determined to make sure that the twins have firm back-up plans in place. As such they put a lot of pressure on Connor and Clara to study hard and maintain strong grades. Their mother is fond of saying, 'An "A" on Friday means AFL on Saturday!', with the implied threat that they could withdraw the twins from AFL if their marks are not good enough.

Clara and Connor both understand the importance of sleep and get plenty of it, but have gone together to speak to a sports psychologist about managing the dual stress of schoolwork and elite sports.

- a. i. State one biological protective factor for mental health (other than sleep) that the psychologist may discuss with the twins.

1 mark

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- ii. Describe one specific suggestion the psychologist may make to the twins about this factor, and how this can support their mental health.

2 marks

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- b. Discuss how Connor and Clara could use mindfulness meditation to help them perform at their best on the field.

3 marks

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**Question 8** (3 marks)

Amit is a 32-year-old piano teacher and a single mother of twin boys, Noah and Levi, who have recently celebrated their first birthday. Since her separation from her partner, Amit has been feeling overwhelmed by the demands of parenting and maintaining her professional responsibilities. Most mornings, Amit finds herself waking up in tears, feeling a deep sense of sadness and exhaustion.

Despite these challenges, she makes a conscious effort to mask her emotions around her children, putting on a cheerful and resilient front for their sake. However, Amit is finding it increasingly difficult to balance her emotional wellbeing with her responsibilities at home and work.

Discuss why mental wellbeing is often represented on a continuum, and explain where Amit would currently be located on the mental wellbeing continuum.

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**Question 9** (7 marks)

Patrick grew up loving cricket and often played with his older brother, Jack, who was a cricket prodigy. Jack bowled with such speed and precision that Patrick occasionally got hit by the ball during their games. After being hit several times, Patrick began to associate playing cricket with pain, eventually refusing to play with Jack altogether.

Now an adult, Patrick continues to experience strong emotional and physical reactions, including anxiety and breathlessness, whenever someone suggests playing a game of backyard cricket. These reactions occur despite him no longer being in situations where he might get hurt.

- a. Identify and outline a social risk factor that contributed to the onset of Patrick's fear of cricket.

2 marks

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- b. Explain how Patrick could use breathing retraining to help him to cope when someone suggests a game of backyard cricket.

3 marks

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## Unit 4 | Area of Study 3 How is scientific inquiry used to investigate mental processes and psychological functioning?

### Multiple-choice

Use the following information to answer Questions 1 and 2.

Marcus decides to investigate the impact of stress on memory recall. He asks five peers from his class to participate. In the first condition, Marcus gives the participants a list of 20 words to learn in 45 seconds. He then makes them wait 12 seconds before allowing them to write down as many as they can remember. In the second condition, Marcus gives the participants a different list of 20 words, but this time gives them only 15 seconds to learn the words. He then makes them wait 12 seconds before allowing them to write down as many as they can remember.

Marcus' results are shown below.

Participants	Number of words recalled after Test 1 (45 seconds to memorise)	Number of words recalled after Test 2 (15 seconds to memorise)
1	7	6
2	8	5
3	9	7
4	13	7
5	10	10
<b>Mean</b>	9.4	7.0
<b>Standard deviation</b>	2.3	1.9

#### Question 1

What is the independent variable in Marcus' study and how has it been manipulated?

- The independent variable is time, manipulated as learning words in 45 seconds and 15 seconds.
- The independent variable is recall, manipulated as the number of words correctly recalled.
- The independent variable is relearning, manipulated as the number of words recalled.
- The independent variable is stress, manipulated as learning words in 45 seconds and 15 seconds.

**Question 2**

The experimental design used in this study was

- A. within subjects.
- B. between subjects.
- C. self-report.
- D. mixed design.

**Question 3**

A team of researchers has tested a non-invasive ultrasound technology designed to remove amyloid plaques from the brain in patients with Alzheimer's disease. These plaques are believed to be responsible for memory loss and decline in cognitive function.

Testing was conducted on 96 mice. The results showed that, in 75% of the mice, memory function was completely restored, without any damage to the surrounding brain tissue. These mice also had improved performance on two memory tasks: a maze and a test involving recognition of new objects.

Often, it is more ethically acceptable to use animals in a study than it is to use humans, especially if there are risks involved for the participants.

In terms of ethical principles, the researchers in this study would still have had to consider

- A. protection and security of participant information.
- B. voluntary participation.
- C. the role of the experimenter in protecting participants from harm.
- D. withdrawal rights.

Use the following information to answer Questions 4–6.

### **Sleep deprivation has the same effect as drinking too much, says study**

A lack of sleep not only causes us to drop off at our desks in the afternoon and feel cranky, it also weakens crucial communications between the neurons in the brain, according to a new study.

That weakening in the brain's signalling network can lead to lapses in memory and problems concentrating, and in some ways is comparable to being drunk, say the researchers.

The international team behind the study wants to see the problem of sleep deprivation taken more seriously, both in the harm it can do to our own bodies and the risks that we might be taking when we get behind the wheel or do our daily jobs.

'We discovered that starving the body of sleep also robs neurons of the ability to function properly,' says lead researcher Itzhak Fried, from the University of California at Los Angeles (UCLA). 'This leads to cognitive lapses in how we perceive and react to the world around us.'

Fried and his colleagues studied 12 patients preparing to have surgery for epilepsy, which meant their brains had already been fitted with electrodes to try and detect the locations of seizures before their operations.

Each volunteer was asked to categorise a series of images as quickly as possible, while the researchers measured the firing of the neurons inside the brain. In total, the activity of almost 1500 brain cells was recorded across the 12 participants.

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The study found that as patients got more tired, the neuron firing activity slowed down and lost strength.

'We were fascinated to observe how sleep deprivation dampened brain cell activity,' says one of the team, Yuval Nir from Tel Aviv University in Israel. 'Unlike the usual rapid reaction, the neurons responded slowly and fired more weakly, and their transmissions dragged on longer than usual.'

The scans suggested a lack of sleep was interfering with the neurons' ability to translate what was being seen into coherent thoughts, in the same way that a tired driver takes a moment to react to a pedestrian stepping out into the road.

Researchers also noticed sleep-like waves disrupting parts of the brain, almost as if certain areas were dozing off and causing mental lapses of concentration, while other sections of the brain carried on running as normal.

Source: David Nield, 'Sleep deprivation has the same effect as drinking too much, says study', *ScienceAlert*, 7 November 2017, <https://www.sciencealert.com/tiredness-sleep-deprivation-the-same-as-drinking-too-much>

#### **Question 4**

Which one of the following investigation methodologies was used by the researchers?

- A. self-report
- B. interview
- C. case study
- D. observational study

**Question 5**

The main limitation of this investigation methodology is that

- A. it is difficult to generalise the results to the population because only one or a few people are studied.
- B. it provides a wealth of detailed qualitative information.
- C. participants know they are being watched and may change their behaviour accordingly.
- D. only quantitative data is obtained, meaning the results would be lacking in detail.

**Question 6**

The level of neuron firing in the participants' brains was

- A. a dependent variable.
- B. an extraneous variable.
- C. a confounding variable.
- D. an independent variable.

Use the following information to answer Questions 7 and 8.

Lauren is a high school Maths teacher who would like to determine whether using food incentives during her lessons improves learning outcomes for her students. She pre-tests the students of two of her Maths classes on their understanding of the current topic: probability. She then offers the students in one of her classes food incentives for completing tasks during each lesson for one month. Lauren does not offer any food incentives to her other class during this time. She then tests both classes again on the topic of probability, using a similar test. Lauren calculates the mean difference in the improvement of each class's scores.

Probability test results before and after one month of lessons			
	Before	After	Mean difference
Food incentives	67%	82%	+15%
No food incentives	57%	60%	+3%

**Question 7**

Lauren calculated the mean test score for her classes.

A limitation of this measure of central tendency is that

- A. the mean uses every value in the data and is not representative of the data.
- B. repeated samples drawn from the same population tend to have similar means.
- C. it is closely related to standard deviation, the most common measure of variability.
- D. it is heavily influenced by outliers or extreme scores in the data.

**Question 8**

The type of data Lauren collated is

- A. primary, qualitative.
- B. secondary, quantitative.
- C. primary, quantitative.
- D. secondary, qualitative.

**Question 9**

Why did the researcher record the percentage change in probability test results?

- A. Because it was quicker than calculating the median values.
- B. Because this is the only way to measure the dependent variable in this study.
- C. To control for previous knowledge of the mathematical concepts.
- D. Because it is the best way to show improvement when using a within-subjects experimental design.

**Question 10**

Which one of the following would involve collating primary and quantitative data?

- A. A teacher asks her students to complete a rating scale that measures their attitude towards a lesson she taught.
- B. A university student gathers statistics on conformity from previous studies.
- C. A research assistant interviews ten new mothers about their sleeping behaviour since their baby was born.
- D. A doctor finds case studies online to help her diagnose a patient who has a strange combination of symptoms.

**Question 11**

When calculating data for research, the mean can be calculated as a form of descriptive statistics from the full range of scores. The mean may be negatively affected by any scores that are outliers.

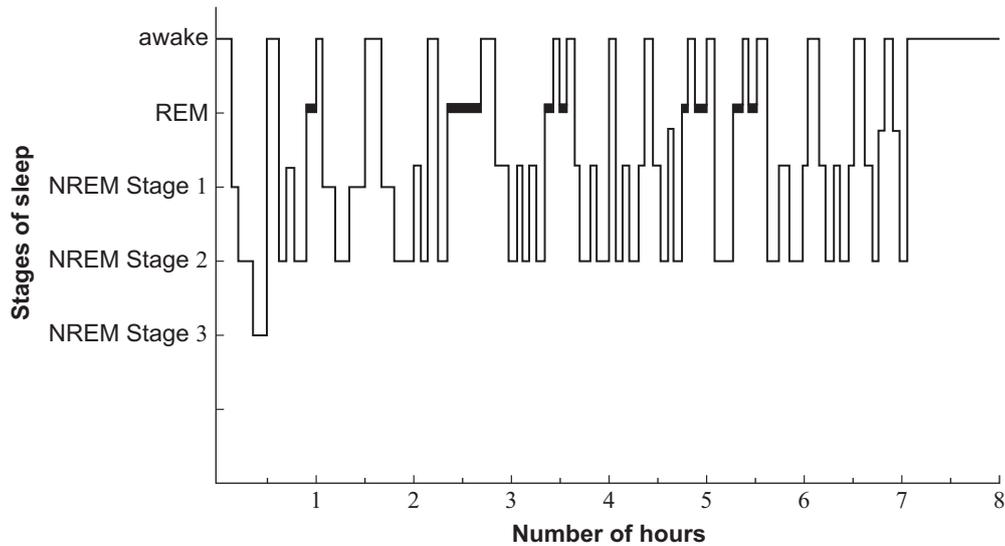
Considering the following scores, which is likely to represent an outlier?

20, 10, 5, 15, 50

- A. 05
- B. 15
- C. 20
- D. 50

**Question 12**

Dr Susan Hill is a leading scientist at a university. She is investigating the regular and naturally occurring sleep patterns of people at various ages as an example of an altered state of consciousness. Below is data that she has collected from one of the patients in her study.



Dr Hill assembled a team to continue her research into the sleep patterns of individuals. They want to make sure that their results have reproducibility.

What would be the most appropriate approach for the team to adopt?

- A. Dr Hill's team should replicate the study with different participants.
- B. Dr Hill should always be the experimenter running the studies, so that extraneous variables are controlled for.
- C. Dr Hill's team should check that their sample equally represents the population.
- D. Dr Hill's team should replicate the study with the same participants in exactly the same way.

**Question 13**

In a study on the effect of sleep deprivation on concentration, which of the following could be considered an extraneous variable?

- A. illness, such as a virus
- B. testing concentration through the application of an electroencephalogram
- C. the number of hours of sleep that you get
- D. the number of words you can remember from a list

**Question 14**

A new medication to slow the progression of Alzheimer's disease is being trialled. Fran's doctor believes that Fran would be a suitable candidate for the study.

The best way for Fran's doctor to obtain consent for her involvement in the study would be to

- A. wait for Fran's condition to progress and then get consent from her legal guardian.
- B. wait for Fran's condition to progress and then have her involuntarily admitted into hospital.
- C. obtain consent from Fran during a period of time when she is thinking clearly and her memory is functioning properly.
- D. sign the consent form on Fran's behalf.

**Question 15**

Nelson is a hard-working and diligent Year 12 student. Despite being motivated, over the past month he has been finding it difficult to focus in class. Nelson's friends are also getting worried because he has not been going to basketball training or hanging out with them like he used to.

The psychologist at Nelson's school would like to do a study examining Nelson's mental health status.

Would it be ethical for the psychologist to give Nelson a sugar tablet but tell him it was medicine?

- A.** No, because a psychologist cannot experiment on students.
- B.** It would be okay, provided Nelson's year-level coordinator at school gave permission on Nelson's behalf.
- C.** No, because it is not ethical to lie to participants.
- D.** It would be okay, provided Nelson was debriefed after the experiment had concluded.

**Question 16**

What is a distinction between a controlled experiment and a correlational study?

- A.** An experiment involves variables, whereas a correlational study does not.
- B.** An experiment involves manipulation of variables, whereas a correlational study does not.
- C.** An experiment collects data, whereas a correlational study simply analyses existing data.
- D.** An experiment involves an assessment of existing research, whereas a correlational study does not reference research.

Use the information below to answer Questions 17–24.

Dr Brown wants to investigate whether secondary school students who study in supportive groups show more academic improvement than those who study alone, and to see if this effect differs by age. Dr Brown selects 100 Year 9–12 students from Sunnydown College to test her hypothesis, taking advice from teachers to ensure that a good cross-section of individuals with different performance levels are participating. She lets the students study as they usually would for Semester 1. For Semester 2, she groups the students into pairs of equal ability, then randomly allocates one of the pair to either the supportive condition or to study alone. Those in the supportive condition study in groups of four for a two-hour period once a week for two months. The other member of the pair is assigned to the alone condition and is required to study by themselves at the same time for two hours once a week for two months.

Dr Brown uses the students' end-of-year English results compared with their Semester 1 results to calculate the average improvement for each condition. The results are shown here.

	Supportive condition	Alone condition
Average improvement in English performance for VCE (Year 11–12) students	26%	11%
Average improvement in English performance for Year 9–10 students	8%	5%

### Question 17

A research hypothesis for Dr Brown's study could be that

- A. secondary school students who studied in supportive groups would show more academic improvement.
- B. secondary students who studied in supportive groups would show more academic improvement than those who studied alone.
- C. 100 Year 9–12 students from Sunnydown College who studied in supportive groups would show more academic improvement than those who studied alone.
- D. those who studied in supportive groups would show more academic improvement on an English exam than those who studied alone.

### Question 18

What were the population and the sample in Dr Brown's study?

	Population	Sample
A.	100 Year 9–12 students from Sunnydown College	secondary school students
B.	students from Sunnydown College	students from Sunnydown College
C.	secondary school students	students from Sunnydown College
D.	secondary school students	100 Year 9–12 students from Sunnydown College

**Question 19**

Dr Brown submits her research to the *Australian Journal of Psychology* and in her paper, she suggests that her results can be generalised to the wider population.

Is Dr Brown correct?

- A. Yes, because the results supported her hypothesis.
- B. Yes, because her study used random sampling, and thus would have resulted in a sample that was representative of the wider population.
- C. No, because the study did not use random or stratified sampling, and thus would have resulted in a sample that was unlikely to be representative of the wider population.
- D. No, because the results did not support her hypothesis.

**Question 20**

What type of experimental design did Dr Brown use to conduct the experiment?

- A. between subjects
- B. within subjects
- C. mixed design
- D. correlational study

**Question 21**

Dr Brown kept the required study sessions (whether alone or in the study groups) restricted to one two-hour session once per week for the duration of the experiment.

This represents

- A. the independent variable.
- B. a controlled variable.
- C. a confounding variable.
- D. a systematic error.

**Question 22**

If some of the students had private tutoring in English outside of school, what type of error could this introduce?

- A. systematic error
- B. biased error
- C. random error
- D. reliability error

**Question 23**

What is a likely conclusion that Dr Brown might generate about her research?

- A. All students will benefit from access to supportive groups.
- B. VCE students show more benefit from supportive groups than non-VCE students.
- C. Supportive groups do not effectively help VCE students with their English results.
- D. Use of supportive groups for VCE students should be extended to other subjects in order to test their effectiveness.

**Question 24**

How might Dr Brown recommend testing the reproducibility of these results?

- A. Students at Sunnydown College should be retested the following year to see if their improvements continue.
- B. Students who participated in this study should participate in the same study again in their English classes next year.
- C. Use of supportive groups for VCE students should be extended to other subjects in order to test its effectiveness.
- D. Students at other schools should be instructed to try out study groups with their friends.

**Short-answer****Question 1** (11 marks)

Ms Mia is a primary school teacher who is also completing her doctorate degree. Her research topic is memory ability in children. Ms Mia asks two groups of children from her school if they would be happy to be involved in the study. Ms Mia decides to use a between-subjects design. The students in Group A are given a page showing 20 images of everyday items (e.g. pencil, spoon) and are asked to write down the name of each item five times. Meanwhile, the students in Group B are given the same 20 images to learn but are told to write a story using all the items in the list. Both groups of students are then tested after 5 minutes.

- a. Write a possible research hypothesis for this study.

2 marks

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- b.** What results would you expect for a study such as this? Support your response with reference to key psychological terminology. 3 marks

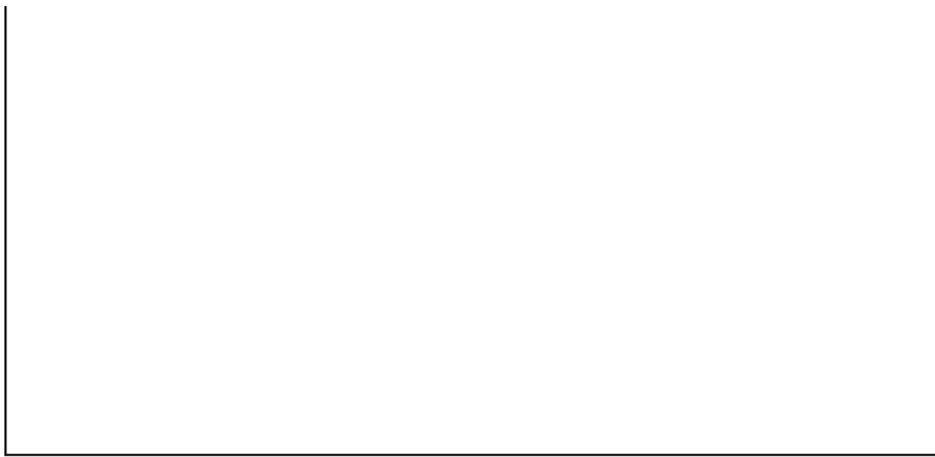
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- c.** Use the axes below to draw a bar graph illustrating the expected results of the study. The findings from both groups should be displayed on the one graph. 3 marks



- d.** Explain the term 'external validity' and evaluate the external validity of Ms Mia's results. 2 marks

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- e.** Ms Mia then decides to investigate the effect of exercise on memory ability, using a within-subjects design. In this study, all participants will exercise for 25 minutes before recalling the images.

In terms of the procedure for this study, what does a within-subjects design mean? 1 mark

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**Question 2** (5 marks)

Jane is an organisational psychologist employed by the Ace accounting firm to help reduce the stress levels of employees. She was provided with the following background information about the company.

Ace is an Australia-based accounting firm that employs 196 full-time staff. Managers of the firm have noticed that, at particular times of the year (e.g. in June, towards the end of the financial year), the stress levels of staff increase significantly. This coincides with many staff experiencing sore throats and colds. As a result, many staff take time off work, resulting in reduced productivity at an important time of the year. Ace wants to reduce its employees' stress levels, by educating them and providing them with opportunities to learn how to cope effectively with stress.

At the beginning of her contract, Jane asked for volunteers from all areas in the company to take part in her study. She wanted to establish the employees' baseline stress levels and compare them with their stress levels at the conclusion of the three-month study, after different coping strategies had been introduced. The 80 employees who agreed to participate were divided into four equal groups.

- Group A were told to use their existing coping strategies.
- Group B were told to use an avoidance strategy of exercising at a moderate level for at least 20 minutes, three times a week.
- Group C were told to use approach coping strategies, such as seeking support from others, writing a to-do list and setting goals.
- Group D were told to exercise at a moderate level for at least 20 minutes, three times a week, and to use approach coping strategies, such as seeking support from others, writing a to-do list and setting goals.

a. State an aim for Jane's study.

1 mark

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b. Name the experimental research design Jane used in this study.

1 mark

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c. Outline **one** advantage of using this experimental research design.

1 mark

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- d. Explain why it would be important for Jane to consider the ethical concept of justice in her study.

2 marks

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**Question 3** (6 marks)**New parents face 6 years of disrupted sleep**

A new study by researchers from the University of Warwick shows that after birth of the first child and up to 6 years after birth mothers and fathers sleep duration and sleep satisfaction do not fully recover to the levels before pregnancy.

In the paper 'Long-term effects of pregnancy and childbirth on sleep satisfaction and duration of first-time and experienced mothers and fathers', a collaboration with the German Institute for Economic Research and the West Virginia University studied sleep in 4659 parents who had a child between 2008 and 2015.

During these years parents also reported on their sleep in yearly interviews.

In the first three months after birth mothers slept, on average, one hour less than before pregnancy while fathers' sleep duration decreased by approximately 15 minutes.

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However, when the children were 4–6 years old sleep duration was still about 20 minutes shorter in mothers and 15 minutes shorter in fathers compared to their sleep duration before pregnancy.

A similar time course was also observed for their satisfaction with sleep.

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Dr Sakari Lemola, from the Department of Psychology at the University of Warwick, comments:

'While having children is a major source of joy for most parents it is possible that increased demands and responsibilities associated with the role as a parent lead to shorter sleep and decreased sleep quality even up to 6 years after birth of the first child.'

Source: University of Warwick, 'New parents face 6 years of disrupted sleep', *ScienceDaily*, 25 February 2019. Retrieved 16 March 2019, [www.sciencedaily.com/releases/2019/02/190225192116.htm](http://www.sciencedaily.com/releases/2019/02/190225192116.htm)

The researchers gathered data by conducting yearly interviews.

- a.** Describe what this investigation methodology involves and how its subjective nature could affect the internal validity of the results.

3 marks

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- b.** Explain how the sample size used by the researchers may affect the external validity of the results.

3 marks

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**Question 4** (8 marks)

Ms Hughes, a high school teacher, was concerned about VCE students staying up all night to study instead of sleeping during the nights leading up to VCE assessments. She decided to investigate students' ability to concentrate during assessments and respond to questions correctly when they were partially sleep deprived.

**Participants**

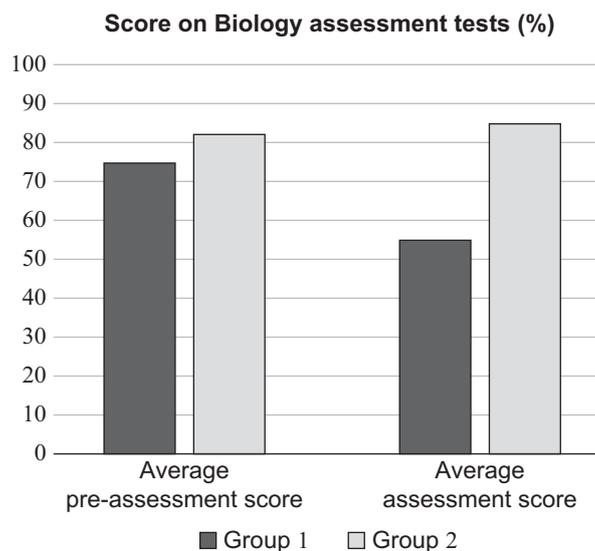
Twenty students, Year 11 Biology students from the school, volunteered to participate.

**Method**

Two weeks before a Year 11 Biology assessment, participants completed a pre-assessment test to measure their knowledge on the upcoming assessment. Participants were then randomly allocated into either the experimental group or the control group. Participants in Group 1 (the experimental group) were asked to not sleep for more than three hours per night for two nights before their assessment and instead use that time to study. Those in Group 2 (the control group) were asked to go to sleep at their usual sleep time. All participants completed the same Biology assessment test in the same room, at the same time.

**Results**

The results were collated and scores were recorded as a mean percentage.



- a. Identify the dependent variable and how it was measured in this study.

2 marks

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- b. Calculate the percentage change for Group 1 from pre-assessment to post-assessment.

1 mark

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- c. Identify a possible extraneous variable in this study and explain the effect it could have on the results.

2 marks

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- d. The 20 students who participated were in different Biology classes, and half of the participants in Group 1 had their assessment brought forward by a day (compared to if they had sat the assessment in class) so that all students in the study could be tested at the same time. The students complained that if they had had the same total time to study as the other students, they might have done better.

- i. What type of error does this represent in Ms Hughes' study?

1 mark

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- ii. One student in Group 1 improved their score from 45% in pre-assessment to 95% in the experimental assessment. The scores of most other students in this group declined.

Identify the phenomenon that this student's score is an example of, and outline what steps Ms Hughes should take to manage this phenomenon.

2 marks

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**Question 5** (16 marks)

A group of researchers wanted to conduct a study to investigate the impact of drinking alcohol on driving performance the following day (that is, when an individual is experiencing a hangover). The researchers recruited 52 participants, aged 18–25, to take part in a simulation study.

During the study, participants attended a driving simulator twice in the morning for driving assessment: once after an evening without alcohol consumption (no alcohol) and once after consuming alcohol the previous evening (alcohol/hangover). Participants did not ride or drive to the university on post-alcohol assessment days, and their health status was checked verbally and by observation on attendance, followed by breathalyser assessment. They were asked to follow their regular procedures on assessment days, with the exception that they were not to consume caffeine on the test days until after participation was completed.

Some participants were found to have a blood alcohol concentration (BAC) of zero, while others had a residual BAC from their previous night of drinking. Following completion of assessments, participants' health status was again checked before they left the university. On completion of the study, participants were provided with a debriefing sheet, including contact details for the experimenters, as well as advice on support for excessive alcohol use.

Researchers found a significant difference between the performance of participants on some measures.

	Control (no alcohol)	Hangover (post alcohol)
Mean response time (seconds)	2.4	3.5
Departures from lane (count)	10.6	18.9

Adapted from Alford, C., Broom, C., Carver, H., Johnson, S. J., Lands, S., Reece, R., & Verster, J. C. (2020). The impact of alcohol hangover on simulated driving performance during a 'commute to work'— zero and residual alcohol effects compared. *Journal of Clinical Medicine*, 9(5), 1435. <https://doi.org/10.3390/jcm9051435>

- a. Why would the researchers have designed this study as a simulation study? 2 marks

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- b. What information would the standard deviation provide researchers with? 1 mark

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- c. Comment on the internal validity of this study, with reference to the data being collected.

3 marks

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- d. Suggest an appropriate conclusion for this study.

3 marks

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- e. Evaluate the external validity of the study and suggest **two** ways this could be improved.

4 marks

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- f.** Outline what would be required to determine the repeatability and reproducibility of these specific findings.

2 marks

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- g.** The researchers are confident that their results are precise, but are less certain about their accuracy.

What is the difference between these measures?

1 mark

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## ● Suggested responses

### Unit 3 | Area of Study 1 How does the nervous system enable psychological functioning?

#### Multiple-choice

##### Question 1

*Answer: B*

##### Explanatory notes

Options A, C and D are incorrect because the brain is not involved in the activation of a spinal reflex.

Option B is correct because the question describes the activation of a spinal reflex in which the brain is not involved. (However, the brain will perceive the pain of the stimulus after the response has been initiated.)

##### Question 2

*Answer: B*

##### Explanatory notes

Option A is incorrect because the autonomic nervous system controls the regulation of internal organs, glands and visceral muscles of the body (not the skeletal muscles).

Option B is correct because the somatic nervous system activates the voluntary motor movements of skeletal muscles, such as those in Ryoji's legs.

Option C is incorrect because, although the spinal cord is essential for someone to be able to move and will carry the relevant motor messages to the peripheral nervous system, Ryoji's ability to activate his leg muscles and run is predominantly dependent on the somatic nervous system.

Option D is incorrect because the somatic nervous system is part of the peripheral nervous system (not the central nervous system).

**Question 3**

**Answer: A**

**Explanatory notes**

Option A is correct because slapping at a mosquito on your hand is voluntary and involves a conscious decision by the brain. The brain will have processed the sensation of the mosquito on your skin and then instructed the arm muscles to slap at the mosquito.

Options B, C and D are incorrect because they are all examples of spinal reflexes that involve involuntary responses.

**Question 4**

**Answer: B**

**Explanatory notes**

Option A is incorrect because Meg would have an increase in both heart rate and blood pressure when her stress response was activated.

Option B is correct because Meg would have an increase in both heart rate and blood pressure.

Options C and D are incorrect because Meg would have an increase in cortisol, not a decrease.

**Question 5**

**Answer: C**

**Explanatory notes**

Options A and B are incorrect because motor neurons (efferent neurons) are responsible for actions and carry information away from the brain rather than towards it.

Option C is correct because afferent neurons carry sensory information (about touch and size) to the brain.

Option D is incorrect because interneurons transfer information between sensory and motor neurons.

**Question 6**

*Answer: B*

**Explanatory notes**

Options A and C are incorrect because sensory neurons (afferent neurons) are not responsible for voluntary movement.

Option B is correct because efferent (motor) neurons are responsible for voluntary movement.

Option D is incorrect because interneurons transfer information between sensory and motor neurons.

**Question 7**

*Answer: A*

**Explanatory notes**

Option A is correct because it describes the transfer and processing of sensory information for Task 1.

Option B is incorrect because this describes Task 2, not Task 1.

Option C is incorrect because the peripheral nervous system does not process sensory information, it only carries it.

Option D is incorrect because the peripheral nervous system does not initiate a motor response and this relates to Task 2, not Task 1.

**Question 8**

*Answer: D*

**Explanatory notes**

Options A and B are incorrect because they describe Task 1, not Task 2.

Option C is incorrect because, while the peripheral nervous system carries out the physical movement via the somatic nervous system, it is not responsible for the decision-making/initiation of a motor response.

Option D is correct because it accurately describes the initiation and transfer of the voluntary motor response for Task 2 as being the responsibility of the central nervous system.

**Question 9**

**Answer: D**

**Explanatory notes**

Option A is incorrect because the sympathetic nervous system is responsible for increasing Yann's heart rate and breathing rate during the race.

Option B is incorrect because the somatic nervous system is responsible for actioning the voluntary movement of her skeletal muscles.

Option C is incorrect because the regulation of autonomic responses (e.g. changes to heart and breathing rate) occur within the peripheral nervous system subdivisions.

Option D is correct because the parasympathetic nervous system counterbalances the sympathetic nervous system, restoring the body to a state of calm once the need for sympathetic nervous system activation has passed.

**Question 10**

**Answer: B**

**Explanatory notes**

Option A is incorrect because avoidance is not a spinal reflex.

Option B is correct because Alex's flight-or-fight-or-freeze reaction is activated even when he is not facing any real threat or danger. Because Alex perceives the water to be a threat, this is enough to initiate his physiological stress response.

Option C is incorrect because when Alex sees water, this will activate the flight-or-fight-or-freeze response, in which adrenaline is secreted.

Option D is incorrect because when Alex sees water he will perceive it to be a threat and therefore his sympathetic nervous system will be activated. The parasympathetic nervous system would be active when Alex did not detect a threat.

**Question 11****Answer: A****Explanatory notes**

Option A is correct because in the transmission of neural impulses, information travels through the soma then along the axon to the axon terminals. This transmission occurs in the form of an electrical signal known as an action potential. Axon terminals then release neurotransmitters that travel across the synapse and bind to receptor sites on the dendrites of the post-synaptic neuron. This part of the process involves a chemical message.

**TIP**

» It is important to read multiple-choice questions carefully. There was a very small difference between the options in the question.

**Question 12****Answer: D****Explanatory notes**

Option A is incorrect because Selye did not use humans in the development of the model; he used rats. The use of rats made it difficult for Selye to generalise his results to humans.

Option B is incorrect because both are considered strengths of the model.

Option C is incorrect because Selye's research was primarily focused on the physiological elements of the stress response and its effect on illness.

Option D is correct. A strength of Selye's model was that he made a connection between prolonged arousal and ill-health, while a limitation is that his findings are difficult to generalise to people because his research involved non-human subjects.

**Question 13****Answer: A****Explanatory notes**

Option A is correct because, in a spinal reflex, the spinal cord receives a sensory message and initiates a motor message directly, to minimise damage to the body. This occurs before the sensory information reaches the brain to be consciously processed.

Option B is incorrect because the spinal cord does not process the pain.

Option C is incorrect because motor neurons do not process pain.

Option D is incorrect because the motor response does not depend on the brain.

**Question 14****Answer: C****Explanatory notes**

Option A is incorrect because harm/loss suggests Chenelle's focus is on a past event (e.g. losing her house). While this occurred, the scenario suggests she is focused on future impacts.

Option B is incorrect because Chenelle's concerns clearly have a significant impact on her.

Option C is correct because Chenelle is focused on a future possible harm or loss for her family, which is classified as a threat.

Option D is incorrect because Chenelle is not perceiving this possibility as an opportunity for growth or as a potential positive. She is concerned about the risks to her family.

**Question 15****Answer: B****Explanatory notes**

Options A and D are incorrect because assessing the significance of the event, and determining harm/loss, threat or challenge, are part of primary appraisal.

Option B is correct because secondary appraisal in the Transactional Model of Stress and Coping involves an individual working out what resources they have available to help them cope with the stressful event.

Option C is incorrect because the determination of eustress or distress relates to primary appraisal.

**Question 16****Answer: A****Explanatory notes**

Option A is correct because the Transactional Model of Stress and Coping does not acknowledge any physiological responses to a stressor.

Option B is incorrect for the reason given above.

Options C and D are incorrect because these are strengths of the model rather than weaknesses.

**TIP**

- » Be aware that the Study Design requires you to be able to identify limitations of the models studied in Units 3 and 4 Psychology. This includes models such as the Transactional Model of Stress and Coping, Selye's General Adaptation Syndrome and the Atkinson-Shiffrin multi-store model of memory.

**Question 17**

**Answer: A**

**Explanatory notes**

Option A is correct because interneurons initiate the motor response in a spinal reflex. This is adaptive because it results in a fast response, as the information is not required to first travel to the brain. Interneurons then relay this motor message along motor neurons in the peripheral nervous system so that it can be communicated to muscles in the body.

The major difference between unconscious responses (such as a spinal reflex) and conscious responses is that conscious responses usually involve the brain, and as such involve an awareness that unconscious responses do not. This is often why a person does not feel pain until after the spinal reflex response has occurred; the sensory information does not reach the brain to form a conscious awareness of the stimulus until after the response has been carried out.

**Question 18**

**Answer: D**

**Explanatory notes**

Option A is incorrect because feelings of sadness are not related to the alarm reaction stage.

Option B is incorrect because, while Layal is in resistance, it cannot be said that she is 'coping well' based on the scenario.

Option C is incorrect because Layal is still managing to deal with the original stressor.

Option D is correct because Layal is likely to be in the resistance stage due to the prolonged stress of preparing for the half-marathon. The pressure of dealing with the half-marathon and the additional stressor of her dog's accident and having to be put down would have placed strain on her bodily systems, such as her immune system, making her feel tired and run down.

**Question 19**

**Answer: A**

**Explanatory notes**

Option A is correct because cortisol would give Layal more energy to cope with the stress of the half-marathon and her dog's accident and death. However, over time the cortisol would impair her immune system, making her more likely to get sick.

Option B is incorrect because inhibited digestion would not be beneficial.

Option C is incorrect because immune system functioning is negatively affected by cortisol.

Option D is incorrect because the changes to thyroid function and metabolism described would not be advantageous.

**Question 20**

**Answer: B**

**Explanatory notes**

Option A is incorrect because there would be an increase in activity at the synapse when a memory is formed.

Option B is correct because there would be an increase in activity at the synapse when a memory is formed.

Option C is incorrect because the growth of axon terminals is a structural change, not a functional change.

Option D is incorrect because a decrease in the number of dendrites is a structural change, not a functional change.

**Question 21**

**Answer: D**

**Explanatory notes**

Option A is incorrect because the neurotransmitter involved is glutamate.

Options B and C are incorrect because long-term potentiation (not long-term depression) is the process.

Option D is correct because long-term potentiation is the process and the neurotransmitter is glutamate.

**Question 22**

**Answer: A**

**Explanatory notes**

Option A is correct because the sympathetic nervous system is responsible for changes in the visceral muscles, organs and glands controlled by the autonomic nervous system.

Option B is incorrect because this response is not simple; it is complex, because it involves the muscles, organs or glands.

Option C is incorrect because the brain is always involved in sympathetic nervous system responses, because the brain must first detect a threat.

Option D is incorrect because the skeletal muscles are not involved, as they are part of the somatic nervous system.

**Question 23**

*Answer: B*

**Explanatory notes**

Option A is incorrect because glutamate is not an inhibitory neurotransmitter.

Option B is correct because glutamate is the main excitatory neurotransmitter of the central nervous system.

Option C is incorrect because GABA is an inhibitory neurotransmitter.

Option D is incorrect because noradrenaline is a hormone and a neurotransmitter, but is classified as excitatory.

**Question 24**

*Answer: A*

**Explanatory notes**

Option A is correct. The question is asking about bodily responses to stress, otherwise known as Selye's General Adaptation Syndrome. This model suggests that our level of resistance to a stressor drops below normal when we first confront the stressor. Therefore, the body does not function as it normally does.

Options B, C and D are correct in terms of how the body responds, but they are not part of the initial reaction to stress.

**Question 25**

*Answer: C*

**Explanatory notes**

Options A and D are incorrect because counter shock and shock are not classified as stages, but rather are phases in the alarm reaction stage.

Option B is incorrect because the resistance stage is the second stage.

Option C is correct because the first stage of the biological response to stress is called the alarm reaction stage.

**Question 26**

*Answer: A*

**Explanatory notes**

Option A is correct because significant illnesses such as the flu, depression and migraines are usually experienced in the exhaustion stage.

Option C is incorrect because significant illnesses and being bedridden are unlikely to occur in the resistance stage.

Option B and D are incorrect because shock and counter shock are not classified as stages.

**Question 27**

*Answer: D*

**Explanatory notes**

Option D is correct because the resistance stage causes the body's sympathetic nervous system to continue releasing cortisol to protect the body from the stressor. However, if cortisol is released over a prolonged period of time, this weakens the immune system (although the immune system still functions).

**Question 28**

*Answer: D*

**Explanatory notes**

Option A is incorrect because the question specifically refers to primary appraisal, which means information about secondary appraisal and coping abilities is incorrect.

Option B is incorrect because if it was a threat, she would appraise it as a harm in the future. Option C is incorrect because there is nothing to suggest that Nadia perceives the situation as an opportunity for growth in her relationships in the future.

Option D is correct as the event has already happened, hence it is categorised as harm/loss.

**Question 29**

*Answer: C*

**Explanatory notes**

Option A is incorrect because the term 'secondary strategy' is not a relevant psychological term, and so is not an appropriate answer.

Option B is incorrect because an approach strategy would involve Nadia directly dealing with the stressor of her break-up.

Option C is correct because when Nadia copes indirectly with the break-up by distracting herself with basketball training, this is an example of an avoidance strategy.

Option D is incorrect because the term 'flexible strategy' is not a relevant psychological term, and so is not an appropriate answer.

**Question 30**

*Answer: C*

**Explanatory notes**

Option C is correct because Selye's General Adaptation Syndrome suggests that the stress response is non-specific, meaning each individual experiences the same physiological changes in the body, whatever the stressor. Nadia and Becky's stress has different significance for each of them, but the order and impact of the biological changes they experience are the same.

**Question 31**

*Answer: B*

**Explanatory notes**

Option B is correct because context-specific effectiveness exists when there is a good fit or match between the individual, the environment/context and the stressor.

Although the strategies in options A and C may be helpful, they are incorrect because they do not specifically address Nadia's break-up and how a coping strategy would be suitable.

Option D addresses coping flexibility rather than context-specific effectiveness.

**Question 32**

**Answer: B**

**Explanatory notes**

Option A is incorrect because long-term depression results in a decrease in synapse strength, rather than stronger neural connections.

Option B is correct because long-term depression results in a long-lasting decrease in the strength of synaptic connections.

Option C is incorrect because long-term depression occurs throughout the brain.

Option D is incorrect because although long-term depression occurs most efficiently during childhood, it can occur at any time in the lifespan.

**Question 33**

**Answer: B**

**Explanatory notes**

Option B is correct because glutamate assists with the formation of long-term memories (through the process of LTP).

**Question 34**

**Answer: D**

**Explanatory notes**

Option D is correct because long-term depression involves low-level stimulation that leads to a weakening of the connections between neurons in a neural pathway. In this case, neurons in the infant's brain connecting the dog (conditioned stimulus) and the loud noise (unconditioned stimulus) would be weakened as a result of the dog being presented without the loud noise (low-level stimulation).

**Question 35**

**Answer: B**

**Explanatory notes**

Options A and D are incorrect because it is incorrect to call a neuromodulator a 'hormone', as hormones act via the bloodstream.

Option B is correct because a neuromodulator is a neurotransmitter that is released into a large area within the brain and has the effect of changing the overall state.

Option C is incorrect because it best describes the specific action of a neurotransmitter in pathway signalling.

**Question 36**

*Answer: B*

**Explanatory notes**

Options A and D are incorrect because serotonin is a neuromodulator, not a hormone.

Option B is correct because serotonin is a neuromodulator that plays a role in mood regulation.

Option C is incorrect because serotonin does not act in an excitatory manner.

**Question 37**

*Answer: B*

**Explanatory notes**

Option A is incorrect because eliminating disused neural connections is pruning, not rerouting.

Option B is correct because sprouting is growth of new connections and rerouting is the use of alternative neural pathways.

Option C is incorrect because it incorrectly reverses the explanations of sprouting and rerouting.

Option D is incorrect because sprouting and rerouting are subtly different processes.

**Question 38**

*Answer: D*

**Explanatory notes**

Option A is incorrect because, while long-term potentiation (LTP) may involve rerouting, long-term depression (LTD) does not involve sprouting.

Option B is incorrect because, while LTD may involve rerouting (away from existing pathways), LTP is unlikely to involve pruning.

Option C is incorrect for both LTP and LTD.

Option D is correct because LTP involves the strengthening of neural connections (e.g. structurally by growth of new dendritic branches and functionally by increased release of neurotransmitter), and LTD involves the weakening of neural connections (e.g. structurally by pruning or atrophy of underused synapses, and functionally by decreased release of neurotransmitter).

**Question 39**

**Answer: C**

**Explanatory notes**

Option A is incorrect because although it is an accurate statement, it does not recognise the bi-directional nature.

Option B is incorrect because the gut–brain axis is more applicable to stress, not hunger.

Option C is correct because the gut–brain axis is bi-directional.

Option D is incorrect because microbiota changes can impact stress susceptibility as well as psychological and physiological responses to stress.

**Question 40**

**Answer: B**

**Explanatory notes**

Option A is incorrect because it is not a limitation of the gut–brain axis (GBA).

Option B is correct because the GBA is an emerging area of research that needs further study, in particular with human participants.

Option C is incorrect because most empirical studies so far have used animals.

Option D is incorrect because this area of research can complement our understanding of stress in models such as Selye’s General Adaptation Syndrome and Lazarus and Folkman’s transactional model.

**Question 41**

**Answer: A**

**Explanatory notes**

Option A is correct because the flight-or-fight-or-freeze response is triggered under acute stress. Fiona is experiencing acute stress because it lasts for a relatively short period of time.

Options B and C are incorrect because the flight-or-fight-or-freeze response is associated with acute stress, but ongoing release of cortisol is associated with chronic stress.

Option D is incorrect because although it accurately connects chronic stress and cortisol production, Fiona is not experiencing chronic stress.

## Short-answer and extended-answer

### Question 1a.

#### Sample response

According to Selye's theory, Mario is likely to be in the resistance stage. This is because he is dealing with multiple stressors, including his work, his mum and looking after his kids on his own. Although Mario is functioning fairly well, his immune system would be weakening due to the prolonged release of cortisol. This would make him more likely to become ill, and explain why he is experiencing a cold and cough.

#### Mark allocation: 3 marks

- 1 mark for stating the stage of General Adaptation Syndrome (GAS) as resistance. Mario is not yet in the exhaustion stage because he is still coping and resisting the various stressors.
- 1 mark for making it clear that Mario has been exposed to stressors at work and home for an extended period of time
- 1 mark for stating that Mario's immune system would be impaired due to the prolonged release of cortisol, and that this increases the likelihood of him getting sick



- » A question such as this would expect you to identify the stage of GAS Mario is in. Note that Mario is not yet in the exhaustion stage because he is still coping and resisting the various stressors.

**Question 1b.****Sample response**

Mario has assessed the work project as a challenge (an experience that involves the potential for individual gain or growth, because he may get a promotion). However, he has appraised his mother's injury as a harm/loss, because it hurts him to see her in pain.

**Mark allocation:** 4 marks

- 1 mark for Mario assessing the work project as a challenge
- 1 mark for explaining why (opportunity for promotion)
- 1 mark for Mario assessing his mother's injury as a threat or a harm/loss
- 1 mark for explaining why (link to possible reduced ability to help out with kids or Mario's concern for his mother's pain)

**TIP**

» It would not be acceptable to say that Mario assesses the new project as irrelevant or neutral. This is not the case, because Mario wants to work on the project for a promotion.

**Question 2****Sample response**

Cameron's new coping strategy is likely to be effective because he is demonstrating a high level of coping flexibility. He has realised that he needs to replace his ineffective strategy of driving around Australia with a more effective one, such as asking his friend to do the driving instead.

Cameron's new strategy is likely to be effective because it has a high level of context-specific effectiveness. There is a good match between the coping strategy used and the stressful situation because Cameron has realised the limitations of his previous plan and has decided to ask his friend to do the driving.

**Mark allocation:** 4 marks

- 1 mark for stating that Cameron is displaying a high level of coping flexibility
- 1 mark for providing an explanation of coping flexibility with reference to Cameron
- 1 mark for stating that Cameron's strategies are displaying high context-specific effectiveness
- 1 mark for providing an explanation of context-specific effectiveness with reference to Cameron

**Note:** Students who do not refer to the scenario in the question may only receive up to two marks for stating that having both coping flexibility and context-specific effectiveness will lead to effective coping.

**Question 3a.****Sample response**

Conscious responses involve awareness, whereas an unconscious response might not involve awareness. For example, when Emily smelled the meat pie, she unconsciously responded by salivating, which would not have involved awareness. When Emily decided to buy the meat pie, she would have been aware of this and it would have been a conscious response.

**Mark allocation: 3 marks**

- 1 mark for providing a difference between conscious and unconscious responses, such as:
  - › conscious responses are voluntary, whereas unconscious responses are involuntary
  - › conscious responses involve awareness, whereas unconscious responses do not involve awareness
  - › conscious responses tend to be complex, whereas unconscious responses tend to be simple
- 1 mark for providing an example of a conscious response from the scenario
- 1 mark for providing an example of an unconscious response from the scenario

**Question 3b.****Sample response**

Emily's brain, in her central nervous system, would have recognised the smell of the meat pie and processed this information, deciding to buy the pie and eat it. Emily's brain would have then initiated the motor movements necessary to get money out of her wallet and give it to the man selling snacks, as well as to hold the pie and eat it. The motor messages required to perform these movements would then be communicated to Emily's somatic nervous system via the spinal cord in her central nervous system, which would carry this information via motor neurons to the voluntary muscles in her arms and hands to get out the money and pay the man selling snacks.

**Mark allocation: 4 marks**

- 1 mark for correctly identifying each relevant division of the nervous system, such as the central nervous system, peripheral/somatic nervous system or the autonomic/parasympathetic nervous system, and applying the function of each division to the scenario (up to 2 marks)
- 1 mark for explaining each matching function of two relevant divisions of the nervous system (up to 2 marks), including the:
  - › central nervous system, which would be involved in interpreting sensory information about the smell of the meat pie or deciding to buy the pie
  - › peripheral/somatic nervous system, which would be involved in detecting and carrying sensory information about the meat pie or money in her hand, or performing the voluntary motor movements required to eat the pie or pay for it
  - › autonomic nervous system or parasympathetic division, which would be involved in the digestion of the meat pie, such as the production of saliva.

**Note:** The sympathetic division would not be relevant because Emily is not stressed or in a state of heightened arousal.

**Question 4a.****Sample response**

Cortisol is a stress hormone that enhances metabolism and increases energy levels in the body by increasing blood sugar levels. This would help the Ace employees to deal with stress more effectively in the short term.

**Mark allocation:** 1 mark

- 1 mark for outlining a positive impact of cortisol being released as a part of an employee's stress response

**Question 4b.****Sample response**

According to the GAS, employees falling ill and taking time off from work during busy and stressful periods would most likely occur when they are in the resistance stage. This occurs due to prolonged stress resulting in prolonged cortisol release. This places a strain on the employees' bodily systems, including inhibition of their immune system, making them more susceptible to illnesses such as colds.

**Mark allocation:** 3 marks

- 1 mark for identifying that the employees would most likely be in the resistance stage of the GAS when getting sore throats and colds. (They would not be in exhaustion yet, as it still appears that they are functioning fairly well.)
- 1 mark for explaining that, during the resistance stage, levels of cortisol are at their highest level for a prolonged period due to extended periods of stress
- 1 mark for linking the employees' increased likelihood of getting sick to the high levels of cortisol because it puts pressure on or weakens their immune systems, increasing their susceptibility to illness or disease

**TIP**

- » To determine whether someone is in the resistance or exhaustion stage of the GAS in a scenario, remember: the key distinction is that, in the resistance stage, the person may be feeling run down, have a sore throat or a cold, but they would still be functioning as normal. However, their immune system would be starting to become compromised. In the exhaustion stage, a person may not be functioning properly. They would potentially be bedridden and would have more a serious disease or illness, such as the flu, glandular fever or depression.

**Question 5a.****Sample response**

The neurotransmitter predominantly involved in Ariella learning to play the song 'Für Elise' was glutamate. Every time Ariella practised playing the song on her flute, she would have repeatedly stimulated the same neural pathways in her brain that were associated with her learning the song. As a result, the neurons in this pathway would have released glutamate, an excitatory neurotransmitter, which would make the post-synaptic neurons more likely to fire. This would have strengthened the neural connections in this pathway, increasing the likelihood of the same neurons firing again in the future, releasing more glutamate and making it easier for Ariella to play the song without needing her sheet music.

**Mark allocation: 4 marks**

- 1 mark for identifying glutamate as the neurotransmitter involved in the process
- 1 mark for stating that long-term potentiation involves repeated stimulation of the same neural pathways; for example, Ariella was repeatedly activating the pathways associated with playing the song 'Für Elise' every time she practised
- 1 mark for stating that glutamate would be released every time this pathway is activated, making the neurons more likely to fire (because glutamate is an excitatory neurotransmitter)
- 1 mark for stating that this would have strengthened the neural connections in the pathway, increasing the likelihood of these neurons firing again in the future, making it easier for Ariella to play the song without needing her sheet music

**Question 5b.****Sample response**

According to Lazarus and Folkman's model, Ariella would first determine whether the school concert was significant or stressful. Given that she is feeling nervous and worried, it seems that she has perceived the school concert to be significant and stressful. She has further determined that the school concert is a threat, because she believes there could be future harm or loss when performing at the school concert. This would be in the form of embarrassment in front of her family and friends.

**Mark allocation: 2 marks**

- 1 mark for explaining that primary appraisal would involve Ariella determining the significance of the event and recognising that, for her, it is stressful and significant because she is nervous and worried
- 1 mark for explaining that Ariella would then evaluate what type of stress it is (harm, loss, threat or challenge); for example, Ariella has determined the school concert to be a threat because she believes there could be future harm or loss in the form of embarrassment when performing in front of her family and friends

**Question 5c.****Sample response**

An approach strategy that Ariella could use involves dealing with the stressor directly. For example, Ariella could practise playing 'Für Elise' in front of her family or friends, to feel less nervous about performing in the school concert. By using this strategy, Ariella would be able to more effectively cope with her nerves at the concert, which should help her to feel more in control of the situation and less stressed about it.

**Mark allocation: 2 marks**

- 1 mark for suggesting an appropriate strategy that deals directly with the stressor; for example, practising at home in front of her friends and family
- 1 mark for explaining how this strategy would be advantageous to Ariella in this situation

**Question 5d.****Sample response**

Coping flexibility is the ability to effectively evaluate and modify or adjust one's coping strategies according to the demands of different stressful situations. If Ariella had high coping flexibility, then she would be able to recognise if her current strategy was not helping to reduce her nerves and would adapt or change to another strategy.

**Mark allocation: 2 marks**

- 1 mark for providing a definition or explanation of coping flexibility
- 1 mark for explaining how Ariella would demonstrate coping flexibility in this situation

## Question 6

### Sample response

Difference 1: Long-term depression is a long-lasting decrease in the strength of neural connections, whereas long-term potentiation is a long-lasting increase in the strength of neural connections.

Difference 2: Long-term potentiation involves high levels of repeated stimulation of the same neural connections, whereas long-term depression involves low levels of repeated stimulation of the same neural connections.

### Mark allocation: 4 marks

- 2 marks for identifying each accurate and congruent difference between long-term potentiation and long-term depression (up to 4 marks). These can include:
  - › Long-term potentiation results in an increasing number of dendritic spines on post-synaptic neurons, whereas long-term depression results in a decreasing number of dendritic branches on post-synaptic neurons.
  - › Long-term potentiation results in an increasing number of appendages on the axon terminals of pre-synaptic neurons, whereas long-term depression results in a decreasing number of appendages on the axon terminals of pre-synaptic neurons.
  - › In long-term potentiation, an increasing quantity of glutamate neurotransmitters is sent across the synapse, whereas in long-term depression, a decreasing quantity of glutamate neurotransmitters is sent across the synapse.

**Note:** Students can only receive 1 mark if the difference is not a congruent statement. For example, an answer such as 'Long-term potentiation results in an increasing number of dendritic branches on post-synaptic neurons, whereas long-term depression results in a decreasing number of appendages on the axon terminals of pre-synaptic neurons' could only receive a maximum of 1 mark, due to not being congruent.

**Question 7a.****Sample response**

Amahle's parasympathetic nervous system would be dominant in this situation. This is evident as she was unable to speak or move, and instead froze.

**Mark allocation:** 2 marks

- 1 mark for naming the parasympathetic nervous system. Although both the sympathetic and parasympathetic nervous systems would be active, the parasympathetic nervous system would be dominant in this case.
- 1 mark for providing evidence that a freeze response occurred in Amahle

**Note:** Students can only receive 1 mark in total if their response is generic and is not applied to the scenario. Either of the two possible examples of application given below, or similar, would be sufficient for full marks:

- referring to Amahle not being able to speak and standing frozen
- referring to Amahle's reaction when speaking to the new soccer team.

**TIP**

- » Amahle's autonomic nervous system initiated a freeze response when she was asked to speak to the new team. During this process, Amahle's sympathetic and parasympathetic nervous systems were activated. When both systems are activated in the freeze response, the parasympathetic is said to be dominant.

**Question 7b.****Sample response**

Amahle used an avoidance strategy to cope with the stress related to the second training session, because she pretended she was sick so she didn't have to give a speech. This strategy has low context-specific effectiveness as it does not have a good match with the stressor. Amahle is a soccer player and needs to attend training sessions, and therefore missing the session is not a suitable choice. Furthermore, indirectly dealing with the stressor only provides short-term stress relief and does not resolve the issue.

**Mark allocation:** 2 marks

- 1 mark for identifying that her coping strategy had low context-specific effectiveness
- 1 mark for justifying why an avoidance strategy was not a good fit for Amahle, the environment of the soccer club and the stressor (being stressed about speaking to her team)

**Question 8a.****Sample response**

Glutamate acts as the primary excitatory neurotransmitter in the central nervous system and its release activates and strengthens neural pathways that will help Tess learn the course and jumps (through the process of long-term potentiation). Dopamine acts as a neuromodulator to regulate motor messages within the brain, which will help Tess control fine motor movements when riding her horse.

**Mark allocation:** 4 marks

- 1 mark for describing glutamate as the primary excitatory neurotransmitter
- 1 mark for outlining the role of glutamate in learning (use of 'long-term potentiation' as key term not required)
- 1 mark for describing dopamine as a neuromodulator
- 1 mark for outlining the role of dopamine in regulating motor messages

**Question 8b.****Sample response**

When Tess does well in a competition (or has any positive experience on the horse), dopamine is released into her system. This release of dopamine is associated with reward, and will cause an overall pleasurable feeling for her. As a result of experiencing pleasure when competing with her horse, Tess is likely to repeat this behaviour so that she experiences the same feeling again.

**Mark allocation:** 3 marks

- 1 mark for stating that dopamine is released when Tess does well in competition
- 1 mark for stating that dopamine release is associated with reward / feelings of pleasure
- 1 mark for stating that feeling pleasure when competing increases the likelihood that Tess will repeat this behaviour

**Question 9a.****Sample response**

Long-term potentiation involves the long-lasting strengthening of synaptic connections between neurons due to repeated high-level stimulation of the same neural pathways. For Amna, this has resulted in the sprouting of new neural pathways that newly associate the term 'King's Counsel' with the barristers.

**Mark allocation:** 3 marks

- 1 mark for defining long-term potentiation
- 1 mark for identifying that long-term potentiation involves the repeated activation of the same neural pathways (can also refer to sprouting and/or rerouting)
- 1 mark for linking to the scenario to explain that the new neural pathway exists to link 'King's Counsel' to the barristers

**Question 9b.****Sample response**

Amna's memory of the barristers as 'Queen's Counsel' has undergone the process of long-term depression, where the relevant neural pathways have been weakened through synaptic pruning due to low levels of activation of the same neural pathways. This would weaken her memory of the term 'Queen's Counsel'.

**Mark allocation:** 2 marks

- 1 mark for naming long-term depression
- 1 mark for outlining that long-term depression involves the pruning and weakening of neural pathways

**Question 10a.****Sample response**

Mike would primarily appraise the potential of losing his job as stressful. He would then identify it as a threat, due him potentially losing his job in the future.

**Mark allocation:** 2 marks

- 1 mark for stating that Mike would identify it as stressful
- 1 mark for stating that Mike would identify it as a threat due to the impact on his future

**Note:** If a student's answer does not apply to Mike and his situation, it is too generic, and 1 mark should be deducted. Furthermore, just naming Mike is not sufficient for an application.

**Question 10b.i.****Sample response**

serotonin

**Note:** Up to 95% of serotonin is produced within the gut.

**Mark allocation:** 1 mark

- 1 mark for identifying serotonin

**Question 10b.ii.****Sample response**

altered balance of microbiota

**Mark allocation:** 1 mark

- 1 mark for any one of:
  - › altered balance of microbiota
  - › reduced blood flow in the gastrointestinal system
  - › decreased digestion efficiency
  - › intestinal permeability to bacteria
  - › increased inflammation

**Question 10b.iii.****Sample response**

A change in the balance of microbiota may lead to a more sensitive non-specific stress response. This could happen because of overaction of the flight-or-fight-or-freeze response, occurring due to the induced release of adrenaline.

**Mark allocation:** 2 marks

- 1 mark for indicating that physiological changes in the gut may increase the physiological response to stress
- 1 mark for referring to induced release of adrenaline or cortisol, which would increase arousal

**Question 10c.****Sample response**

In order to deal with Mike's stress, using an approach strategy to directly confront the stressor, such as fixing his diet to reduce his physiological experience of stress (or engaging in extra training at work/using a sleeping aid), will be more successful in supporting his mental wellbeing than using exercise. This is because exercise is distracting him from his concerns but not solving the issue or removing the stressor.

**Mark allocation: 2 marks**

- 1 mark for indicating an appropriate approach strategy that will directly tackle the stressor
- 1 mark for indicating that this will be more supportive of Mike's mental health than exercise as a distraction

**Question 11a.****Sample response**

The gut–brain axis is a bi-directional communication network between the central nervous system, the enteric nervous system and the gastrointestinal tract. It is responsible for processing food, absorbing nutrients and excreting waste. Microbiota in the gut are also responsible for the production of certain chemicals, such as serotonin, which helps with mood regulation.

**Mark allocation: 3 marks**

- 1 mark for describing the gut–brain axis
- 2 marks for two functions of the gut–brain axis, e.g. digesting food, producing neurochemicals, sending messages about muscle movements in the digestive system

**Question 11b.****Sample response**

Selye's GAS model proposes a link between prolonged stress and ill health. When a person is stressed and their sympathetic nervous system is activated, cortisol will be released. If this continues for a prolonged period, cortisol can start to have negative effects on the body. For example, the immune system may be weakened, which increases vulnerability to illness. In addition, when cortisol is released in the body it can travel through the vagus nerve to the gut. This can change the composition of microbiota in the gut and lead to gut dysbiosis. Gut dysbiosis can lead to digestive issues and can further reduce the efficiency of the immune system.

**Mark allocation:** 4 marks

- 1 mark for referencing either the resistance or exhaustion stage in the GAS
- 1 mark for explaining the link between prolonged stress and extended cortisol release
- 1 mark for explaining the negative effects that cortisol can have on the body
- 1 mark for indicating the negative effect cortisol can have on microbiota in the GBA

**Question 11c.****Sample response**

The gut contains a variety of microorganisms, which are referred to as gut microbiota. Our gut microbiome needs to be diverse to enable it to be stable and resistant to change. This is known as gut symbiosis. The composition of our microbiota can change as a result of diet, stress and antibiotic use, and this can lead to gut dysbiosis. In turn this can cause issues such as mood changes, heightened anxiety and digestive issues. Foods high in probiotics, such as kombucha and yoghurt, help to restore the balance of microbiota in the gut and minimise some of these issues.

**Mark allocation:** 3 marks

- 1 mark for discussing gut microbiota and the need for it to be balanced
- 1 mark for discussing what happens when microbiota become unbalanced
- 1 mark for explaining how probiotics improve gut health

## Question 12

### Sample response

It is likely that Cara will become ill in the lead-up to the exams, because her continued experience of stress involves the interaction of psychological and biological processes.

The psychological process of stress relates to the Lazarus and Folkman transactional model of stress and coping. Cara's stress response depends upon her interpretation of the stressor and her ability to cope with it. During the primary appraisal stage, Cara will first evaluate her situation to determine whether it is stressful. It is likely that Cara will judge her situation as stressful and a threat because, even with her hard work, she might not get the marks required to get into her chosen university course in the future. Cara will then go through the secondary appraisal stage, where she considers which coping resources are available to her. If she determines that she does not have enough coping resources to achieve her goal, her stress levels are likely to increase.

The psychological perception of stress initiates a biological stress response in Cara. The biological model is Selye's General Adaptation Syndrome (GAS) model. When Cara first perceived that she might not be able to get the marks she needed to get into her preferred university course, she would have first entered shock (the first part of the alarm reaction stage), where her resistance to stress would initially fall below her normal baseline level.

When Cara's flight-or-fight-or-freeze response was activated by her sympathetic nervous system, she would have moved into countershock (the second part of the alarm reaction stage). This is when her resistance to stress would rapidly increase above her baseline level. Because Cara's stressor was prolonged, she would have then gone into resistance (the second stage of GAS), where her body's resistance to the stressor rises above normal because cortisol is released to energise her body. During this time she would still be functioning normally; however, she would start experiencing wear-and-tear in her body.

Cara has been in the resistance stage for much of the past three months, so her body has been exposed to cortisol for a prolonged period. This prolonged release of cortisol will have weakened her immune system and made her more vulnerable to illnesses such as colds, hence the repeated colds her friends are concerned about. She has not yet entered the exhaustion stage, as she is currently continuing to manage her stressors. Her friends are correct to be concerned, because if this stress continues, Cara may subsequently enter the exhaustion stage due to a depletion of cortisol, and her body will be unable to sustain a high level of resistance to stress, and will no longer be able to overcome the effects of the stressor. During this stage, Cara's physiological systems may begin to show more significant signs of wear and tear, leaving Cara vulnerable to more serious illnesses such as ulcers, and she may no longer be able to manage her schoolwork, study and job.

Cara can consider her coping strategies in light of her situation. At present, she appears to be using avoidance strategies (strategies that do not deal directly with the stressor), as she is refusing to acknowledge the issue and talk to her friends, and is simply trying to push through. These strategies may have had high context-specific effectiveness initially, as she managed for the past few months.

However, as her cortisol reserves become depleted and her susceptibility to illness further increases, it may no longer be effective. In order to cope, Cara may need to show coping flexibility by recognising the ineffectiveness of her current strategy (avoiding her friends and discussion) and discontinuing it. Instead, she can use a strategy with high context-specific effectiveness, like an approach strategy, to tackle her stressors directly. For example, reducing her hours of work at the supermarket to give her more time to study, making sure she gets enough sleep to counter exhaustion, and accepting help from friends with study. By dealing with the stressors directly, she is likely to improve her mental wellbeing and be able to continue to manage the pressures of the VCE year effectively.

**Mark allocation:** 10 marks

**Notes:** A response that does not discuss **both** the GAS and the Lazarus and Folkman transactional model can score a maximum of 5 marks.

This question would be marked holistically using the following criteria.

• **8–10 marks**

- › Student provides commentary on the likelihood of Cara becoming ill by considering both the transactional model of stress and coping, and the GAS model. A lesser response does not discuss the interaction of the two models cohesively or has minor errors.
- › Student identifies and explains the two stages of the transactional model of stress and coping in relation to the scenario.
- › Student identifies and explains the three stages of the GAS model in relation to the scenario.
- › Student explains both approach and avoidance strategies, with examples and suggestions relevant to the scenario and an evaluation of which strategies are most effective.
- › Student discusses coping strategies in the context of coping flexibility, context-specific effectiveness and mental wellbeing.
- › Student's response is written coherently and fluently, integrating each point.

• **6–7 marks**

- › Student provides commentary on the likelihood of Cara becoming ill.
- › Student identifies and explains the two stages of the transactional model of stress and coping in relation to the scenario.
- › Student identifies and explains the three stages of the GAS model in relation to the scenario, perhaps with minor inaccuracies.
- › Student discusses approach and/or avoidance strategies, relating these to the scenario with some evaluation.
- › Student may use the terms of context-specific effectiveness and coping flexibility.
- › Student's response is written coherently, but may not integrate separate elements.

• **4–5 marks**

- › Student provides commentary on the likelihood of Cara becoming ill.
- › Student may identify and explain the two stages of the transactional model of stress and coping. Some elements may be missing or inaccurate.

- › Student may identify and explain the three stages of the GAS model. Some elements may be missing or inaccurate.
- › Student may refer to approach or avoidance strategies, with brief links to the scenario.
- › Student may be unlikely to have referred to coping flexibility and context-specific effectiveness.
- › Student's response is written mostly coherently but may lack organisation.
- **2–3 marks**
  - › Student provides commentary on the likelihood of Cara becoming ill.
  - › Student may briefly refer to GAS or the transactional model, but with notable omissions or errors.
  - › Student may discuss coping strategies but without key terms or detail.
  - › Student's response may lack depth or detail.
- **1 mark**
  - › Student's response lacks significant detail and may only briefly discuss some elements of the above criteria.
- **0 marks**
  - › The question has not been meaningfully attempted.

**TIP**

- » **Ten-mark responses are marked holistically. This means that the overall quality of the response and the extent to which it responds to the question stem are considered. In most ten-mark responses, unless explicitly stated, it is best to avoid using dot points. If you wish to organise your response to ensure that you have addressed each aspect of the question, subheadings are a good method of organisation.**

## Unit 3 | Area of Study 2 How do people learn and remember?

### Multiple-choice

#### Question 1

*Answer: D*

#### Explanatory notes

Options A and B are incorrect because Penelope's behaviour of drinking wine is increasing, not decreasing. (Punishment would decrease the likelihood of the behaviour being repeated.)

Option C is incorrect because Penelope is an active (not passive) participant and her responses are voluntary (not involuntary).

Option D is correct. Penelope is not sleeping well at night, so she drinks wine to help her fall asleep. Penelope is likely to repeat this behaviour (it becomes a habit), and therefore her behaviour is being reinforced. This could be seen as either positive reinforcement because she achieves a positive consequence (falling asleep) or as negative reinforcement because she avoids a negative consequence (not being able to fall asleep).

#### Question 2

*Answer: D*

#### Explanatory notes

Option A is incorrect because sensory memory has an unlimited capacity and short-term memory has a capacity of 5–9 items.

Option B is incorrect because sensory memory has a duration of 0.2–4.0 seconds and short-term memory has a duration of 12–30 seconds.

Option C is incorrect because the function of sensory memory differs from the function of short-term memory.

Option D is correct because sensory memory has an unlimited capacity.

**Question 3**

**Answer: B**

**Explanatory notes**

Option A is incorrect because the hippocampus is responsible for forming explicit memories, not memories of emotional responses.

Option B is correct because the amygdala plays a role in the consolidation of emotional memories.

Option C is incorrect because the cerebellum is involved in implicit, motor memories.

Option D is incorrect because, although the neocortex is involved in storage of explicit memories, Meg's emotional reaction relates to retrieval, which the neocortex is not involved in. The question specifically asks for emotional responses and emotional memories, which is a role of the amygdala.

**Question 4**

**Answer: A**

**Explanatory notes**

Option A is correct because the hippocampus retrieves explicit details such as the colour of the cat's fur.

Option B is incorrect because the amygdala retrieves emotional memories rather than facts.

Option C is incorrect because the cerebellum is involved in retrieving implicit, motor memories.

Option D is incorrect because the basal ganglia is involved in retrieving implicit, motor memories.

**Question 5**

**Answer: B**

**Explanatory notes**

Option A is incorrect because sensory memory has a duration of 0.2–4.0 seconds; waiting 12 seconds exceeds this duration.

Option B is correct because 12 seconds is within the short-term memory duration (12–30 seconds).

Option C is incorrect because 12 seconds falls within short-term memory duration (12–30 seconds). While it is possible that long-term memory is being investigated, the question asks which type of memory is likely.

Option D is incorrect because declarative memory is a type of long-term memory.

**Question 6**

*Answer: D*

**Explanatory notes**

Option A is incorrect because the question is asking for the three-phase model for Peggy. (Option A explains the three-phase model for Christina.)

Option B is incorrect because Peggy is not learning through classical conditioning; she is learning through operant conditioning, as scratching the furniture is a voluntary response.

Option C is incorrect because scratching the furniture is Peggy's behaviour, not the antecedent.

Option D is correct because it describes the three-phase model for Peggy.

**Question 7**

*Answer: A*

**Explanatory notes**

Option A is correct because being sprayed with the water is a punishment that decreases the response rate.

Options B and D are incorrect because being sprayed in the face with water does not increase the likelihood of Peggy repeating the behaviour, so it can't be a type of reinforcement.

Option C is incorrect because negative reinforcement involves the removal of an unpleasant stimulus to increase or strengthen a response. In this case, Peggy is presented with an unpleasant stimulus (the water) as a punishment to weaken or decrease her behaviour of scratching the furniture.

**Question 8**

*Answer: B*

**Explanatory notes**

Option A is incorrect because positive punishment is when an unpleasant stimulus is applied.

Option B is correct because switching off the television is taking away a pleasant stimulus (a negative punishment).

Options C and D are incorrect because the behaviour was undesirable and was not being strengthened.

**Question 9****Answer: A****Explanatory notes**

Option A is correct because the hippocampus shrinks due to the loss of neurons.

Options B and C are incorrect because Alzheimer's disease is a neurodegenerative disorder in which there is a death of neurons; brain mass would not increase.

Option D is incorrect because the brain would show shrinkage due to the disease.

**Question 10****Answer: C****Explanatory notes**

Option A is incorrect because the consequences in operant conditioning can be positive or negative.

Option B is incorrect because the consequences in operant conditioning are always direct.

Option C is correct because in operant conditioning the consequences are directly given to the learner. In observational learning, the consequences may be indirect/vicarious (e.g. the learner sees another person being given a consequence).

Option D is incorrect because the consequences in observational learning are always positive, because punishment is not involved.

**Question 11****Answer: A****Explanatory notes**

Option A is correct because Khaviya is being punished. Punishment involves being given an unpleasant stimulus that, when paired with a response (behaviour), weakens or decreases the response over time.

Option B and C are incorrect because her parents are trying to reduce Khaviya's misbehaviour, not increase it.

Option D is incorrect because observational learning is not being used in this scenario.

**TIP**

- » Remember that there are two types of punishment: positive (i.e. application of a negative stimulus to decrease the likelihood of a behaviour reoccurring) and negative (i.e. removal of a positive stimulus to decrease the likelihood of a behaviour reoccurring).

**Question 12**

*Answer: C*

**Explanatory notes**

Option A and B are incorrect because these are symptoms that can occur in disorders that are not degenerative in nature.

Option C is correct because Alzheimer's disease gradually destroys neurons in the brain.

Option D discusses amyloid plaques, which do develop as part of Alzheimer's disease, but this is not a specific characteristic of neurodegenerative diseases. Therefore, it is incorrect.

**Question 13**

*Answer: D*

**Explanatory notes**

Option A is incorrect because the neocortex stores explicit memories; it doesn't form them.

Option B is incorrect because the amygdala is responsible for forming new implicit, emotional memories, which doesn't relate to recognition of new objects.

Option C is incorrect because the cerebellum is responsible for forming new implicit, motor memories, which doesn't relate to recognition of new objects.

Option D is correct because the hippocampus is responsible for the consolidation of new explicit memories, which would include remembering the details of each new object to be able to recognise it later.

**Question 14**

*Answer: C*

**Explanatory notes**

Option A is incorrect because walking was the unconditioned stimulus.

Option B is incorrect because wagging its tail was a response, not a stimulus.

Option C is correct because the blue jacket was neutral before conditioning, and resulted in no relevant response from Petra's dog.

Option D is incorrect because the front door did not relate to the learnt behaviour.

**Question 15**

**Answer: A**

**Explanatory notes**

Option A is correct because the dog wagging its tail in response to walking (which is the unconditioned stimulus) is an automatic, reflexive, involuntary response that occurs during conditioning.

Option B is incorrect because the blue jacket was the neutral stimulus.

Options C and D are incorrect because they don't relate to the learnt behaviour.

**Question 16**

**Answer: A**

**Explanatory notes**

Option A is correct because attention would involve Luke closely watching his brother's goal-kicking technique.

Options B, C and D are incorrect because they do not relate to Luke actively watching Joel's goal-kicking technique.

**Question 17**

**Answer: B**

**Explanatory notes**

Option A is incorrect because this relates to reinforcement, not motivation. Motivation is the learner's desire to imitate the model's behaviour. On the other hand, reinforcement is the consequence the learner receives for performing the behaviour.

Option B is correct because Luke's motivation would be influenced by the potential for praise from his brother, thus making him more likely to want to imitate his brother's goal-kicking techniques.

Option C is incorrect because it is describing reproduction, not motivation.

Option D is incorrect because it is describing retention, not motivation.

**Question 18**

**Answer: C**

**Explanatory notes**

Option C is correct because Region 1 is the amygdala, which consolidates emotional, implicit memories. Region 2 is the cerebral cortex, which stores explicit memories, including facts and personal experiences. Region 3 is the cerebellum, which forms procedural, implicit memories.

**Question 19**

**Answer: B**

**Explanatory notes**

Option A is incorrect because positive reinforcement increases the likelihood of the behaviour being repeated.

Option B is correct because providing food involves presenting a pleasant stimulus that increases the likelihood of the students completing the tasks. This is positive reinforcement.

Option C is incorrect because providing food is positive reinforcement.

Option D is incorrect because punishment always reduces the likelihood of behaviour being repeated.

**Question 20**

**Answer: D**

**Explanatory notes**

Options A and B are incorrect because both types of reinforcement increase the likelihood of behaviour being repeated.

Option C is incorrect because Lauren is taking food incentives away from the students, rather than adding an unpleasant stimulus, which occurs in positive punishment.

Option D is correct because taking away a pleasant stimulus lowers the likelihood of the behaviour occurring again in future. This is categorised as a negative punishment.

**Question 21**

**Answer: D**

**Explanatory notes**

Option A is incorrect because the fear of the dog would be a conditioned response, not an unconditioned response.

Option B is incorrect because classical conditioning always involves the association of two stimuli, not a stimulus and a response.

Option C is incorrect because the unconditioned stimulus naturally produces the unconditioned response; they don't need to be associated during conditioning.

Option D is correct because the unconditioned stimulus of the loud noise (caused by banging the saucepan with the spoon) would be associated with the dog (neutral stimulus), leading to the infant fearing the dog.



**TIP**

» Remember that classical conditioning always involves the association of two stimuli, not a stimulus and a response. The goal of classical conditioning is to train or teach an individual or animal to produce a reflexive response to a stimulus that would not naturally produce a response.

**Question 22**

**Answer: B**

**Explanatory notes**

Options A and C are incorrect because they relate to the consequence, not the antecedent.

Option B is correct because Simon is saying 'sit' before the behaviour, to trigger it. This is an environmental stimulus that causes Rex's behaviour of sitting.

Option D is incorrect because it is stating the behaviour that is being learned, not the antecedent.

**Question 23**

*Answer: D*

**Explanatory notes**

Option A is incorrect because it is referring to an involuntary response, which relates to classical conditioning, rather than operant conditioning.

Option B is incorrect because classical conditioning also involves an association developing between stimuli.

Option C is incorrect because operant conditioning involves the learner being active, not passive.

Option D is correct because classical conditioning only involves reflexive, simple, passive and involuntary responses. Rex sitting is a voluntary behaviour that is being performed to get the reinforcement (a treat).

**TIP**

- » **Be sure to understand how the models of learning differ from each other – particularly the difference between operant and classical conditioning – because an understanding of this may be expected in the exam. Operant and classical conditioning differ in terms of the type of response they involve (classical is reflexive, whereas operant is voluntary), among other things.**

**Question 24**

*Answer: C*

**Explanatory notes**

Options A and B are incorrect because the duration of each is incorrect for short-term memory.

Option C is correct because the function of short-term memory is to hold information for 18–30 seconds to be able to work with it while it is in our conscious awareness.

Option D is incorrect because it is describing a function of sensory memory, not short-term memory.

**Question 25**

**Answer: B**

**Explanatory notes**

Option A is incorrect because cortical shrinkage would only occur in the cerebellum in the final stages of the disease.

Option B is correct because amyloid plaques are clusters of protein fragments that build up outside the neuron and impair neural transmission. This is a common symptom of Alzheimer's disease.

Option C is incorrect because neurofibrillary tangles always form inside neurons, not outside them.

Option D is incorrect because acetylcholine levels decrease as a result of Alzheimer's disease.

**Question 26**

**Answer: B**

**Explanatory notes**

Option B is correct because it lists the correct number of pieces of information. The Atkinson-Shiffrin multi-store model of memory suggests that short-term memory is the temporary storage of memory and can hold 7 items plus or minus 2 items, which equates to 5–9 pieces of information.

Options A, C and D are incorrect because they list the wrong number of pieces of information.

**Question 27**

**Answer: B**

**Explanatory notes**

Option A is incorrect because the hippocampus is responsible for forming new long-term explicit memories (specifically episodic and semantic long-term memories). Ajax remembering last year's presentation night or his first ever game of cricket would not be possible, as they would be explicit (episodic) memories.

Option B is correct because being able to automatically swing a bat would be an implicit, motor memory formed by the cerebellum and/or basal ganglia, which was not affected when his hippocampus was damaged.

Option C is incorrect because it is describing a role of the amygdala, which has not been damaged as far as we can see.

Option D is incorrect because forming a new memory of his score in this week's game would be an explicit (semantic) long-term memory, which would be impaired due to his hippocampal damage.

**Question 28**

*Answer: D*

**Explanatory notes**

Options A, B and C are incorrect because they all include item III, which is incorrect because it relates to classical conditioning.

Option D is correct because ways of knowing involves spiritual and physical connections to Country and relies on sharing information within kinship systems (i.e. items I and II).

**Question 29**

*Answer: B*

**Explanatory notes**

Option A is incorrect because it does not relate to ways of knowing being multimodal.

Option B is correct because it describes multiple ways that knowledge can be shared with a learner.

Option C is incorrect because it relates to the role of kinship, rather than multimodal ways of knowing.

Option D is incorrect because it relates to reinforcement.

**Question 30**

*Answer: B*

**Explanatory notes**

Options A, C and D are incorrect because they all involve semantic information that may be easily recalled.

Option B is correct because picturing the seagulls involves forming mental imagery, which an individual with aphantasia has difficulty doing.

**Question 31**

*Answer: B*

**Explanatory notes**

Option A is incorrect because an acrostic is a phrase formed using the first letter of each term to be recalled.

Option B is correct because an acronym is a pronounceable word formed using the first letter of each term to be recalled.

Options C and D are incorrect because they do not involve forming a pronounceable word.

**Question 32**

*Answer: D*

**Explanatory notes**

Option A is incorrect because it relates to acrostics.

Option B is incorrect because it describes a type of rehearsal, which is not related to songlines.

Option C is incorrect because it relates to acronyms.

Option D is correct. Songlines connect information with song and locations.

**Question 33**

*Answer: B*

**Explanatory notes**

Option A is incorrect because it describes songlines incorrectly – both method of loci and songlines link information with place.

Option B is correct.

Option C is incorrect because method of loci can be used as a verbal or written mnemonic.

Option D is incorrect because both types of mnemonics enhance both encoding and retrieval of information.

## Short-answer and extended-answer

### Question 1a.

#### Sample response

aphantasia

#### Mark allocation: 1 mark

- 1 mark for providing the key term: aphantasia

### Question 1b.

#### Sample response

Because Tom is unable to form voluntary visual images, he is likely to rely on the retrieval of (explicit) semantic memory to recall information about driving his father's motorcycle to pick up Jude, whereas Jude is likely to rely on the retrieval of (explicit) episodic memory to visualise a mental picture of the scenario and 'see' Tom driving up in his car.

#### Mark allocation: 4 marks

- 1 mark for identifying Tom's use of semantic memory
- 1 mark for identifying Tom's reliance on facts and knowledge related to the scenario
- 1 mark for identifying Jude's use of episodic memory
- 1 mark for identifying Jude's use of mental imagery to re-experience the event related to the scenario

### Question 2

- a. unconditioned stimulus: pain from the injection
- b. neutral stimulus: nurse or the sight of a nurse
- c. conditioned stimulus: nurse or the sight of a nurse
- d. unconditioned response: fear of pain from injection **OR** scream because of pain from injection
- e. conditioned response: fear of nurse **OR** scream at sight of nurse

#### Mark allocation: 5 marks

- 1 mark for each answer above (up to 5 marks)

**Question 3a.****Sample response**

Type of consequence: negative punishment

Effect on future behaviour: This would reduce the likelihood of the child having temper tantrums by removing any positive attention the child might get.

**Mark allocation:** 2 marks

- 1 mark for correctly identifying the type of consequence as negative punishment
- 1 mark for explaining and applying the effect of this consequence to the future behaviour of the child

**Question 3b.****Sample response**

Motivation in observational learning involves the learner wanting to imitate or reproduce the desired behaviour. In this case, the behaviour is the child putting their dish away before being asked to do it. The likelihood of the child performing this behaviour will depend on whether the child believes that there will be a desirable consequence for their behaviour. By offering praise, as suggested in the article, the parent would increase the child's motivation to put their dish away because they will be anticipating this positive reinforcement. This will increase the likelihood of the child repeating the behaviour in the future.

**Mark allocation:** 3 marks

- 1 mark for explaining that motivation in observational learning involves the learner wanting to imitate or copy the desired behaviour
- 1 mark for explaining that the reinforcement will influence the likelihood of the child reproducing the behaviour in the future by increasing their motivation to imitate it
- 1 mark for applying this to the scenario

**Question 3c.****Sample response**

operant conditioning

**Mark allocation:** 1 mark

- 1 mark for providing the key term: operant conditioning

**Question 3d.****Sample response**

Antecedent – parent asks child to do chores. Behaviour – child does their chores. Consequence – nagging from parents ceases. As this is the removal of an undesirable stimulus, it is negative reinforcement, which will increase the likelihood of the child undertaking the behaviour of 'doing chores' in future.

**Mark allocation:** 4 marks

- 1 mark for correctly identifying the antecedent
- 1 mark for correctly identifying the behaviour
- 1 mark for correctly identifying the consequence (negative reinforcement)
- 1 mark for correctly explaining the impact on future behaviour

**Question 4****Sample response**

Before conditioning, vegans did not have a response to smelling meat (neutral stimulus). However, they did have a natural, involuntary response to feel ill (unconditioned response) when thinking about animals being killed for meat (unconditioned stimulus). During conditioning, vegans would be repeatedly exposed to the smell of meat immediately before thinking about animals being killed for meat, to produce a response of feeling ill at the thought of animals being killed for meat. After conditioning, smelling meat alone (conditioned stimulus) will make some vegans feel ill (conditioned response).

**Note:** The response could also be written as dot points.

**Mark allocation:** 5 marks

- 1 mark for identifying the stages before conditioning/during conditioning/after conditioning accurately
- 1 mark for identifying that the neutral stimulus (smelling meat) produces no response
- 1 mark for identifying that the unconditioned stimulus (thought of animals being killed for meat) produces the unconditioned response (feeling ill at the thought of animals being killed for meat)
- 1 mark for mentioning repeated pairings of the neutral stimulus before the unconditioned stimulus to produce the unconditioned response
- 1 mark for identifying that, after conditioning, the conditioned stimulus (smelling meat) alone produces the conditioned response (feeling ill when smelling meat)

### Question 5

#### Sample response

A similarity is that both ways of knowing and observational learning can involve a learner actively watching a model. A difference is that ways of knowing may not involve reinforcement, whereas observational learning always involves reinforcement.

#### Mark allocation: 2 marks

- 1 mark for describing a similarity, such as learning through observation
- 1 mark for describing a difference, such as reinforcement not being involved, or that Aboriginal and Torres Strait Islander ways of knowing are patterned on Country/multimodal/relational

### Question 6a.

#### Sample response

Lee can retrieve his original episodic memories about learning to swim with his mother, and use this information to construct a possible imagined future about teaching his daughter how to swim.

#### Mark allocation: 2 marks

- 1 mark for referring to retrieving episodic memories
- 1 mark for referring to Lee constructing an imagined future about his daughter

### Question 6b.

#### Sample response

Joanna may not be able to engage in the same process, as people with Alzheimer's disease experience loss of neurons in their hippocampus. The hippocampus is responsible for retrieving explicit memories, which are used to create possible imagined futures.

#### Mark allocation: 2 marks

- 1 mark for stating that Joanna will not be able to engage in the same process as Lee
- 1 mark for stating that Alzheimer's disease damages the brain areas responsible for this process, specifically the hippocampus

**Question 7a.****Sample response**

acrostic

**Mark allocation:** 1 mark

- 1 mark for providing the key term: 'acrostic'

**Question 7b.****Sample response**

An acrostic involves using the first letter of each item to be recalled (i.e. names of the planets) to create a phrase/sentence. This will help Jing to form a stronger memory of the information as additional retrieval cues will be added.

**Mark allocation:** 2 marks

- 1 mark for explaining how acrostics function
- 1 mark for applying the acrostic to Jing's scenario

**Question 8a.****Sample response**

Mnemonics enhance our ability to encode, store and retrieve information. They do this by increasing the strength of encoding and/or creating more retrieval cues to recall the information from long-term memory more easily.

**Mark allocation:** 2 marks

- 1 mark for defining 'mnemonic'
- 1 mark for linking mnemonics to increasing strength of encoding and/or retrieval of information in long-term memory

**Question 8b.****Sample response**

Liam can use method of loci by visualising each word in the list in relation to a series of locations. For example, he could imagine walking outside his house and seeing a sparrow (bird) sitting on a deck chair. As he steps off the veranda, his foot lands in a puddle of water, and so on. To recall the items, Liam would take a mental journey through each of the locations and each location would act as a retrieval cue for the associated item.

**Mark allocation: 3 marks**

- 1 mark for explaining how method of loci involves visualising/picturing each word in the list in relation to a location
- 1 mark for referring to enhanced encoding and/or each of the locations acting as a retrieval cue
- 1 mark for providing an example that refers to at least two words in the list

**Question 9****Sample response**

Phase 1: Antecedent – Sally seeing the magpie.

Phase 2: Behaviour – Sally feeding the magpie.

Phase 3: Consequence – Sally receives extra dessert, which is the addition of a pleasant stimulus and therefore a positive reinforcement.

Effect on future behaviour: The likelihood of Sally feeding the magpie again in the future is increased.

**Mark allocation: 4 marks**

- 1 mark for naming phase 1 as antecedent, and applying it correctly to the scenario
- 1 mark for naming phase 2 as behaviour and applying it correctly to the scenario
- 1 mark for naming phase 3 as consequence and applying it correctly to the scenario, including the key term 'positive reinforcement'
- 1 mark for labelling each phase correctly and for correctly outlining the effect on Sally's future behaviour

## Question 10

### Sample response

A key learning theory that is targeted in this pamphlet is observational learning. In this case, the parent is the model and the child is the learner. This is an example of social learning because the child will watch their parents' behaviour and the consequences of their behaviour to guide their own future behaviours. The pamphlet explains to parents that they are models who should eat healthy food in front of their children (this is tip number 1 on the pamphlet).

There are five stages in observational learning: attention, retention, reproduction, motivation and reinforcement.

In terms of the first stage, attention, children need to be actively watching their parent, who is the model. Children are more likely to mimic the behaviour of a model they look up to. As discussed in the pamphlet, children want to be like their parents (tip number 1). Therefore, it is important for parents to be modelling healthy eating habits. Sitting down together at meal times would allow this to happen (tip number 2).

In the second stage, retention, children must form a mental representation of healthy eating behaviours. The pamphlet suggests that parents can encourage this by turning off the TV and putting phones away during dinner time (tip number 3). This will allow children to concentrate on eating and watching their parents.

In the third stage, reproduction, children need to be physically capable of copying the healthy eating behaviours they observed. For example, children must be able to use utensils to eat the healthy food being presented to them (tip number 2). The fourth stage is motivation. Children must have the desire to copy the healthy eating behaviour. Including children in meal planning will help them look forward to dinner time and be a part of the process, which can be motivating for them (tip number 4). Similarly, including a food that they like will also encourage them to copy the behaviours (tip number 4).

The final stage is reinforcement. This can involve using praise as a type of positive reinforcement for showing the correct behaviour (e.g. praising the children for eating healthy food). As a result, the children will be more likely to eat healthy food again.

A second learning model that is indicated here is operant conditioning, because a voluntary response is being learned and direct reinforcement is being applied. In operant conditioning, there is an antecedent that prompts a behaviour to occur. Next, there is a voluntary behaviour that the learner (in this case, the child) chooses to engage in. Following the behaviour, there is a consequence. If the behaviour is desired, the consequence will be a type of reinforcement to increase the likelihood of the behaviour being repeated. Alternatively, if the behaviour is not desired, the consequence may be a type of punishment to discourage that behaviour being repeated in the future.

When presented with an antecedent of vegetables, children may engage in the behaviour of eating their vegetables (healthy eating), which parents can reinforce by providing praise, one-on-one time, or their favourite TV show (the consequence). In each of these examples, parents would be adding a desired stimulus to the child's experience. This would positively reinforce the behaviour of eating healthy, making the child more likely to eat their vegetables again in future.

**Mark allocation:** 10 marks

**Note:** This question should be marked holistically. This means that the final mark is a judgement made by the assessor based on the quality and comprehensive nature of a student's response. Students may focus on observational learning and/or operant conditioning in their response. However, students referring only to one of observational learning or operant conditioning should be awarded a maximum of 5 marks. In addition, there is less information in the pamphlet relating to operant conditioning, so a response focusing only on this will earn fewer marks.

**• 9–10 marks**

- › All elements of the question are addressed.
- › A thorough explanation of observational learning is included, clearly linked to the scenario of children mimicking parents. Student identifies each of the five stages of observational learning and explains how this is an example of social learning (i.e. the parents are the models and the children are the learners who mimic what they see), with clear examples relevant to the pamphlet.
- › A clear and detailed explanation of operant conditioning is applied to the scenario, including a discussion of appropriate antecedents, behaviours and consequences.
- › There is a detailed use of formal and appropriate psychological terminology throughout the response. Terms that could be used include key terms related to learning such as observational learning, attention, retention, reproduction, motivation, reinforcement, operant conditioning (antecedent, behaviour, consequence, including positive/negative reinforcement and positive/negative punishment).

**• 7–8 marks**

- › All elements of the question are addressed.
- › A mostly thorough explanation of observational learning is included, clearly linked to the scenario of children mimicking parents. Student identifies each of the five stages of observational learning and explains how this is an example of social learning (i.e. the parents are the models and the children are the learners who mimic what they see). Some generalities or minor errors in application to each stage may be present.
- › A clear explanation of operant conditioning is applied to the scenario, including a discussion of appropriate antecedents, behaviours and consequences with correct reference to at least one of potential reinforcers and punishers.
- › Formal and appropriate psychological terminology is used throughout the response.

**• 5–6 marks**

- › All elements of the question are addressed for any mark higher than 5 to be achieved. A maximum of 5 marks is awarded if only one theory/model discussed at a high level.
- › A basic explanation of observational learning is included, clearly linked to the scenario of children mimicking parents. Student identifies most of the five stages of observational learning with reference to the scenario. Some minor errors or omissions in application to each stage are likely present.
- › A clear explanation of operant conditioning is applied to the scenario, including identification of appropriate antecedents, behaviours and consequences with reference to at least one of potential reinforcers and punishers.
- › Formal and appropriate psychological terminology is mostly used but may be absent for some portions of the response.

- **3–4 marks**

- › Not all elements of the question are addressed or addressed correctly (e.g. no reference to one of operant conditioning or observational learning).
- › A basic explanation of observational learning is included, with some identification of the five stages of observational learning with reference to the scenario. Some errors or omissions in application to each stage are present.
- › A basic outline of operant conditioning is provided, including identification of some portions of antecedents, behaviours and consequences.
- › Minimal formal and appropriate psychological terminology is used throughout the response.

- **1–2 marks**

- › A superficial attempt at the question.
- › A limited explanation of observational learning is included, with major errors and omissions.
- › A limited outline of operant conditioning is provided, with major errors and omissions.
- › Little formal and appropriate psychological terminology is used throughout the response.

- **0 marks**

- › The question has not been meaningfully attempted.



### TIPS

- » In reference to the second stage of observational learning, you could also discuss tip number 1 in terms of parents talking to their children about why they love eating healthy food. As meaning is being added to the action of eating the food, children are more likely to remember this due to elaborative rehearsal.
- » In reference to the fourth stage of observational learning, you could also discuss children's motivation behind understanding the reinforcement – in this case, being told they could watch TV.

## Question 11

### Sample response

#### Observational learning

Observational learning occurs when someone actively watches a model's actions and the consequences of their actions to guide one's own future actions. Sally is a live model who is demonstrating, acting out and/or describing to Ruby how to put her hands in front of her mouth when she coughs.

The attention stage describes that Ruby must actively watch Sally demonstrate how to cover her mouth when she coughs. Ruby is more likely to pay attention to her aunt because she admires her.

The retention stage describes that Ruby stores/forms a mental representation of how to cover her mouth when she coughs. Sally would make it meaningful to Ruby by showing her what to do and explaining the process step-by-step.

The reproduction stage describes that Ruby has the physical and mental ability to cover her mouth when she coughs.

The motivation stage describes that Ruby has the desire to cover her mouth when she coughs, because she believes that Sally will cheer for her.

The reinforcement stage describes that Ruby wants to make Sally proud and wants Sally to cheer (or any relevant example of positive reinforcement), which will make Ruby more likely to cover her mouth when she coughs in the future.

#### Atkinson-Shiffrin multi-store model of memory

Memory is an active information-processing system that encodes, stores and retrieves information. According to the Atkinson-Shiffrin model, the different memory stores function simultaneously and interact with each other.

Sensory memory is the entry point for new sensory information (e.g. smells, sounds, visuals). It has an unlimited capacity and a duration of 0.2–4 seconds. For example, the visual information of Sally putting her hand over her mouth when she coughs and/or the sound of Sally's cough would enter Ruby's sensory memory.

If Ruby paid attention to the sensory information, then it would move into her short-term memory. Short-term memory can hold 5–9 items for 12–30 seconds. When information is in short-term memory, we are consciously aware of it. For example, Ruby would need to hold information about the steps to cover her mouth in short-term memory after she watches Sally. She may also need to retrieve information from her long-term memory about how to lift her hands up to her face and/or what a cough sounds like.

Long-term memory can hold an unlimited amount of information for a potentially unlimited time. Ruby's long-term memory would store encoded information about how to cover her mouth when she coughs. For example, Ruby would store information about the fact that her hands need to be close together, so the cough does not escape.

#### Parts of the brain

Ruby putting her hands over her mouth when she coughs is a type of long-term memory called an implicit, motor memory. It is a memory that is unconsciously or unintentionally recalled which involves memories of motor responses, whereas an explicit memory requires conscious or intentional recall.

→ The cerebellum would have been involved in encoding and temporarily storing Ruby's implicit motor memories. For example, Ruby's cerebellum would have formed a memory about the skill of covering her mouth when she coughs.

The hippocampus is responsible for forming/consolidating and retrieving explicit memories. It also transfers new memories to the relevant parts of the neocortex for long-term storage. For example, Ruby's hippocampus would have been involved in forming an explicit memory about where she needs to put her hands.

**Mark allocation:** 10 marks

**Note:** This question would be marked holistically using the following criteria.

• **8–10 marks**

- › Student has provided a thorough and cohesive description of the observational theory of learning. In addition, they have discussed and evaluated how the relevant parts of the brain (the hippocampus, cerebellum and neocortex) are implemented to store the memory of the behaviours at each stage. The Atkinson-Shiffrin multi-store model of memory has been discussed in relation to sensory memory, short-term memory and long-term memory, and how information moves between these memory stores.
- › Student has drawn multiple links between the different areas of the brain that are involved in consolidating and storing Ruby's memory of how to cover her mouth when she coughs.
- › Student has confidently used key terminology to explain each theory and link different psychological terms and theories together.
- › Student's response has been written coherently and fluently.

• **6–7 marks**

- › Student has provided a description of both observational learning theory and the Atkinson-Shiffrin multi-store model of memory, but their response may lack some cohesion or detail, or may contain minor errors. In addition, student discusses how each theory could be used to explain changes that occur when Ruby learns how to cough with her hand on her mouth, but this discussion may lack some cohesion or detail, or may contain minor errors.
- › Student has identified at least two relevant parts of the brain, but the discussion is lacking some explanation and description about their role in the learning process (for examples, refer to the 8–10 mark range).
- › Student has used key terminology to explain each theory and how it links to other psychological terms and theories.
- › Student's response has been written coherently and fluently.

• **4–5 marks**

- › Student has provided a description of one or both of the observational learning theory and the Atkinson-Shiffrin multi-store model of memory. In addition, they have discussed how each theory could be used to explain changes that occur when Ruby is learning to cover her mouth when she coughs (with limited supporting evidence).
- › Student has identified at least one relevant part of the brain but an explanation and description of its role in the learning process is lacking (for examples, refer to the 8–10 mark range).

- › Key terminology or elements of one or both theories are missing.
- › Student's response has been written coherently.
- **2–3 marks**
  - › Student has provided a limited description of either the observational learning theory or the Atkinson-Shiffrin multi-store model of memory. They may have discussed how these theories could be used to explain changes when Ruby learns how to cover her mouth when she coughs.
  - › Student has not identified any relevant parts of the brain or its role in the learning process (for examples, refer to the 8–10 mark range).
  - › Key terminology and elements of the theory are missing from the discussion.
  - › Student's response lacks examples, or lacks depth and detail.
- **1 mark**
  - › Student has briefly described one theory or has identified one factor involved when Ruby learns to cover her mouth when she coughs.
  - › Key terminology and elements of the theory are missing.
  - › Student's response lacks examples as well as depth and detail.
- **0 marks**
  - › The question has not been meaningfully attempted.

## Unit 4 | Area of Study 1 How does sleep affect mental processes and behaviour?

### Multiple-choice

#### Question 1

*Answer: C*

#### Explanatory notes

Option C is correct because brain wave frequency (as measured on an EEG) is higher in amplitude and lower in frequency in deep sleep (i.e. delta waves) compared to being awake (i.e. beta waves).

#### Question 2

*Answer: B*

#### Explanatory notes

Option A is incorrect because the amount of sleep we need decreases as we get older.

Option B is correct because we spend less time in REM sleep as we get older.

Option C is incorrect because we spend less time in REM sleep as we get older.

Option D is incorrect because older people (aged 60 years or older) spend less time in NREM stages 3 and 4.

#### Question 3

*Answer: A*

#### Explanatory notes

Option A is correct because an ultradian rhythm has a period of less than 24 hours.

Option B is incorrect because a circadian rhythm has a period of 24 hours.

Option C is incorrect because an infradian rhythm has a period of more than 24 hours.

Option D is incorrect because diurnal rhythms are restricted to daylight hours.

**Question 4**

*Answer: C*

**Explanatory notes**

Option C is correct because the proportion of REM sleep increases as the night progresses and the proportion of NREM sleep decreases as the night progresses.

**Question 5**

*Answer: A*

**Explanatory notes**

Option A is correct because normal waking consciousness is when you are awake and aware of your thoughts, feelings and sensations from both internal events and the surrounding environment.

**Question 6**

*Answer: D*

**Explanatory notes**

Option D is correct because in terms of impairment, 17 hours of total sleep deprivation has similar effects to having a blood alcohol concentration of 0.05, whereas 24 hours of total sleep deprivation has similar effects to having a blood alcohol concentration of 0.10.

**Question 7**

*Answer: D*

**Explanatory notes**

Option D is correct because the cognitive effects of being sleep deprived for 17–19 hours are equivalent to having a legal BAC of 0.05.

**Question 8**

*Answer: C*

**Explanatory notes**

Option C is correct because elderly people wake up more and sleep more lightly than children. Elderly people therefore have fewer NREM stages 3 and 4 sleep than children.

**Question 9**

*Answer: C*

**Explanatory notes**

Option C is correct because circadian phase disorders occur due to a mismatch between the external environment (his job requiring that he works at night) and his internal biological clock (which tells his body to sleep at night).

**Question 10**

*Answer: B*

**Explanatory notes**

Option B is correct because bright light therapy would be needed first thing in the morning so that Charlie's melatonin production is stopped early in the day. This would allow him to feel sleepier earlier in the evening.

Option C is incorrect because, although it would be of benefit to Charlie, the essential ingredient of bright light therapy is exposure to intense amounts of light, which this option does not involve.

**Question 11**

*Answer: C*

**Explanatory notes**

Option C is correct. Sleep is a naturally occurring altered state of consciousness because it is controlled by the body's biological clock.

**Question 12**

*Answer: A*

**Explanatory notes**

Option A is correct because, throughout the night, the proportion of time spent in REM sleep increases while the proportion of time spent in NREM sleep decreases.

**Question 13**

**Answer: A**

**Explanatory notes**

Option A is correct because the graph reflects the sleep cycle of an elderly person, due to the frequent waking throughout the night and the short sleep cycles.

Option B is incorrect because an infant's sleep includes deep sleep.

Option C is incorrect because adolescents are not necessarily more active later in the night.

Option D is incorrect. It is accurate regarding adults, but this cannot be determined by the information given in the graph. Therefore, this is not the best option.

**Question 14**

**Answer: D**

**Explanatory notes**

Option D is correct, because the first hour of sleep is less than 24 hours. An ultradian rhythm repeats more frequently than once every 24 hours.

**Question 15**

**Answer: A**

**Explanatory notes**

Option A is correct. An electroencephalograph (EEG) detects, amplifies and records the electrical activity of the brain. An electromyograph (EMG) detects, amplifies and records the electrical activity of the muscles in the body. When Han is in a deep sleep, therefore, his EEG reading will show slow-wave sleep (i.e. low frequency and high amplitude). Low levels of electrical activity would be expected on the EMG. This suggests little to no activity in his body; note that 'occasional leg movement' is not what is recorded on an EMG. His body would only show higher levels of electrical activity during REM sleep and just before waking.

**Question 16**

**Answer: D**

**Explanatory notes**

Options A and C are incorrect because these structures are involved in memory, not sleep.

Option B is incorrect because, while the pineal gland releases melatonin, it is the suprachiasmatic nucleus that 'regulates' the release of it.

Option D is correct.

**Question 17**

*Answer: B*

**Explanatory notes**

Option B is correct. This question specifically asks for psychological effects of sleep deprivation. Although hand tremors and headaches are effects of sleep deprivation, they are physiological effects and therefore do not answer the question. The other options are accurate effects, but they have been labelled incorrectly in regard to being affective, behavioural or cognitive. For example, irritability is an affective psychological effect, not a behavioural effect.

**Question 18**

*Answer: A*

**Explanatory notes**

Someone who has a blood alcohol concentration (BAC) of 0.10 would experience similar effects to 24-hour (or total) sleep deprivation. Someone with total sleep deprivation is more lacking in sleep than someone who is only partially sleep deprived. Therefore, the impacts of a BAC of 0.10 would be more significant than those of partial sleep deprivation, so options B and C are incorrect.

Option D is incorrect because problem solving would also be worse in the person with a BAC of 0.10.

Therefore, Option A is correct.

**Question 19**

*Answer: B*

**Explanatory notes**

Option A is incorrect because it relates to a brain structure.

Option B is correct because a zeitgeber is an environmental stimulus that acts on the suprachiasmatic nucleus to help regulate the sleep–wake cycle through release of melatonin.

Option C is incorrect because it simply refers to circadian rhythm shifts, not what a zeitgeber is.

Option D is incorrect because a zeitgeber is an environmental stimulus, not a biological stimulus.

**Question 20****Answer: C****Explanatory notes**

Options A, B and D are incorrect because they all include statement III. While statement III is valid, as Adnan may be experiencing a delayed release of melatonin due to natural shifts in melatonin release during adolescence, this is not a zeitgeber (an environmental time cue), but rather an internal biological factor.

Option C is correct because using a mobile phone is likely to expose Adnan to blue light, which will affect the release of melatonin. Poor nutrition can affect sleep by changing the physiological functioning in the brain, and body temperature (which may be affected by external temperature) can make it difficult to sleep.

**Short-answer and extended-answer****Question 1a.****Sample response**

Warren is an adult and requires 7–8 hours of sleep per night, whereas Aaron is an adolescent and requires 9–10 hours of sleep per night.

Aaron is an adolescent and his sleep–wake cycle will be delayed by approximately 2 hours. This means that Aaron will feel tired and go to sleep around 2 hours later than Warren.

**Mark allocation: 2 marks**

- 1 mark each for up to two correct differences between the sleep patterns of adolescents and adults (up to 2 marks). These could include: total sleep time; proportion of REM sleep in a night; the shift in the adolescent sleep–wake cycle to 2 hours later than an adult

**Note:** Requires two comparisons for full marks.

**TIP**

- » **Ensure that you make the points in your response clear to the examiner. One of the best ways to do this is to use dot points.**

**Question 1b.i.****Sample response**

delayed sleep phase syndrome (DSPS)

**Mark allocation:** 1 mark

- 1 mark for providing the key term or its acronym

**Question 1b.ii.****Sample response**

Aaron would need to be exposed to an intense but safe amount of light early in the morning (e.g. 6–8 am) to prevent melatonin release and resynchronise his sleep cycle. This would advance Aaron's circadian rhythm to an earlier time so that he will be sleepier earlier and wake up earlier.

**Mark allocation:** 3 marks

- 1 mark for correct identification of when Aaron needs to be exposed to light and an explanation of bright light therapy
- 1 mark for an explanation that the sleep–wake cycle will shift earlier
- 1 mark for stating that this will make Aaron feel tired earlier

**Question 2a.****Sample response**

Adults require 7–8 hours of sleep per night. Adults suffering from partial sleep deprivation are not getting the amount of sleep they require on a regular basis. This would impair their cognitive functioning; for example, they may have poor attention or trouble concentrating.

**Mark allocation:** 3 marks

- 1 mark for stating that adults require 7–8 hours of sleep per night
- 1 mark for explaining that partial sleep deprivation means that the sufferer is not getting the amount of sleep that they require (which is linked to cognitive functioning)
- 1 mark for stating at least one example of an impairment of cognitive functioning (e.g. lapses in attention, poor concentration, impaired problem solving, impaired decision-making, errors in judgement, irrational thinking, impaired learning or impaired memory)

**Question 2b.****Sample response**

Eating and drinking patterns may become less regular with a newborn, as parents' lives are upended. Ongoing habits around eating and drinking can impact our sleep-wake cycle, so if parents are eating at odd times (especially just before bed), this may make it harder for them to sleep.

**Mark allocation:** 2 marks

- 1 mark for noting that caring for a newborn may cause disruption to parents' eating patterns
- 1 mark for indicating that eating (and drinking) patterns can have an impact on sleep

**Question 2c.****Sample response**

A mobile phone emits blue light, which can suppress melatonin release. If there is less melatonin released the parent will feel less tired. Thus, while a parent may feel it is convenient to check their phone to monitor their infant, they may be inhibiting their own ability to sleep.

**Mark allocation:** 2 marks

- 1 mark for linking mobile phone use to blue light exposure
- 1 mark for linking this behaviour/exposure to melatonin suppression and inhibited sleep

**Question 3a.****Sample response**

When Karl is in REM sleep the electrooculograph (EOG) would detect, amplify and record high levels of electrical activity.

**Mark allocation:** 1 mark

- 1 mark for identifying that the EOG would show high levels of electrical activity

**Note:** This occurs due to high levels of movement. However, EOGs display electrical activity, not movement.

**Question 3b.****Sample response**

Shift work disorder is a type of circadian phase disorder as it results in sleep disruption due to a mismatch between a person's internal sleep-wake cycle and the external environment's day-night cycle. Karl works night shift, and therefore he needs to be awake and alert at a time when he would normally be sleeping. Shift work disorder is characterised by reduced total sleep time and excessive daytime sleepiness. This is seen in the sleep study as Karl recorded, on average, 5.2 hours of sleep each night, which is lower than the average amount required for an adult (7–8 hours). In addition, Karl's average daytime sleepiness rating was 4.3 out of 5, which indicates high levels of daytime sleepiness.

**Mark allocation: 3 marks**

- 1 mark for explaining why Karl's shift work disorder is a type of circadian phase disorder; for example, Karl needs to sleep during the day and this does not fit well with his external environment
- 1 mark for each piece of evidence to support Karl's diagnosis of shift work disorder (up to 2 marks); for example:
  - › lowered total amount of sleep time – an average of 5.2 hours of sleep each night
  - › excessive daytime sleepiness – a rating of 4.3 out of 5 for average daytime sleepiness
  - › lowered sleep quality – a rating of 1.8 out of 5 for average sleep quality
  - › trouble falling asleep – an average of 92.5 minutes taken to fall asleep each night

**Question 3c.****Sample response**

Subjective measurements are collected through personal observations of behaviour. Karl was asked to record personal observations in his sleep diary. This included the quality of his sleep and the amount of daytime sleepiness he experienced. Sleep diaries are a limited measure because it is difficult to compare Karl's responses to those of other people, because his responses reflect only his own perspective and may be biased.

**Mark allocation: 2 marks**

- 1 mark for defining a subjective measurement
- 1 mark for explaining that a sleep diary is of limited use because it cannot be generalised (this is due to subjectivity and because some of the information is qualitative) or due to the fact that it relies on individual's memory, which is impaired while sleeping

**Question 3d.****Sample response**

Karl should use the bright light just before his shift starts or during his shift in the evening. This would signal his brain (specifically the suprachiasmatic nucleus) to delay the release of melatonin, a hormone that makes us drowsy. If the release of melatonin at night was prevented, then Karl would be more awake and alert during his night shift. As a result, Karl's melatonin would be released in the morning when he is home, which should make it easier for him to fall asleep and improve his sleep quantity and quality during the day.

**Mark allocation: 3 marks**

- 1 mark for correctly identifying that the bright light exposure should be used in the evening at the start of Karl's shift or during his shift
- 1 mark for explaining that this would delay the release of melatonin, a hormone associated with drowsiness, thereby shifting his sleep phase
- 1 mark for linking this to his daytime sleeping habits and explaining that melatonin would be released in the morning, which would make it easier for him to fall asleep and improve his sleep quantity and quality during the day

**Question 3e.****Sample response**

Two affective effects could be anxiety and mood swings, and two cognitive effects could be difficulty concentrating and difficulty making decisions.

**Mark allocation: 4 marks**

- 1 mark each for any two of the following affective effects (up to 2 marks): increased irritability, frustration, sadness or mood swings
- 1 mark each for any two of the following cognitive effects (up to 2 marks): difficulty concentrating, difficulty making decisions, disordered thinking, illogical thinking, difficulty problem solving, difficulty recalling some information

**Question 4****Sample response**

One full night of sleep deprivation (24 hours or more) has equivalent effects on cognition to having a BAC of 0.10. Although Adam might not be drunk in the morning, it would be advisable for him not to drive, because he would be seven times more likely to have an accident. This is due to cognitive impairments that would occur while he was driving, such as forgetting road rules and having trouble making decisions.

**Mark allocation: 2 marks**

- 1 mark for correctly stating that one full night of sleep deprivation has similar effects on cognition as having a BAC of 0.10
- 1 mark for stating that Adam would have cognitive impairments such as:
  - › trouble with problem-solving or making decisions
  - › impaired memory
  - › impaired logic and reasoning
  - › impaired vision
  - › any other valid impairment related to driving

**TIP**

» Remember that a legal BAC of 0.05 has similar affective and cognitive effects to being sleep deprived for 17 hours, and that 24 hours of sleep deprivation results in similar effects to having a BAC of 0.10.

**Question 5****Sample response**

Thomas is an adolescent, so his sleep–wake cycle is delayed due to the delayed release of melatonin, the sleep hormone, and thus he may be experiencing delayed sleep phase syndrome. This delay usually means adolescents cannot fall asleep until around 1–2 hours later than adults like his father. Therefore, the sleep–wake cycle is also delayed in waking up adolescents by approximately 1–2 hours. On top of this, Thomas also requires more sleep than his father. Adolescents require 9–10 hours per day, whereas adults require approximately 7–8 hours; therefore, Thomas sleeps in later to get his required hours of sleep.

**Mark allocation: 3 marks**

- 1 mark for identifying the delayed sleep–wake cycle in adolescents as delayed sleep–phase syndrome
- 1 mark for explaining that the delayed release of melatonin makes it more difficult for adolescents to sleep at night and therefore they sleep in later in the morning
- 1 mark for accurately identifying both daily sleep durations: 9–10 hours for Thomas and 7–8 hours for Mike

## Question 6

### Sample response

Sleep is a psychological construct because its experience includes features that are not directly observable and must instead be inferred from other measurements. In the case of sleep, while we can 'see' that someone is asleep, we need to use a combination of self-reports (e.g. sleep diaries), physiological measures such as EEGs, and monitoring behaviours during sleep (via video monitoring) to understand what is occurring for the individual.

### Mark allocation: 2 marks

- 1 mark for stating that the experience within sleep is not directly observable
- 1 mark for referring to using one or more of self-reports, physiological measurements such as EEG, or video monitoring for behaviour

## Question 7a.

### Sample response

This measure is electroencephalography (EEG). It works by detecting, amplifying and recording the electrical activity of the brain in the form of brain waves.

### Mark allocation: 2 marks

- 1 mark for stating electroencephalography (EEG)
- 1 mark for providing the correct explanation of how it works

## Question 7b.

### Sample response

An EEG would show beta-like waves (high frequency, low amplitude) during Chloe's REM sleep, but would likely show low frequency, high amplitude waves (delta waves) during her NREM Stage 3 sleep.

### Mark allocation: 2 marks

- 1 mark for stating that EEG shows beta-like waves during REM
- 1 mark for describing theta/delta waves that would be recorded on an EEG during NREM Stage 3

**Question 7c.****Sample response**

Chloe is a teenager, which is an age when delayed sleep phase syndrome, a circadian rhythm disorder, is known to occur due to biological changes in the body. The hormone that regulates the sleep-wake cycle is melatonin (released from the pineal gland). This is regulated by the suprachiasmatic nucleus in Chloe's brain as it responds to various stimuli. Because of puberty, Chloe's suprachiasmatic nucleus causes melatonin to be released later (by 1–2 hours) than during childhood or adulthood. She therefore does not feel tired or in need of sleep until later in the evening.

**Mark allocation:** 4 marks

- 1 mark for identifying that Chloe is a teenager/undergoing puberty, an age when circadian rhythm disorder is common
- 1 mark for stating that the release of melatonin induces sleep
- 1 mark for naming the suprachiasmatic nucleus as the regulating brain structure
- 1 mark for linking the delayed release of melatonin (by 1–2 hours) in teenagers to the scenario (Chloe does not feel tired until later in the evening)

**Question 7d.****Sample response**

The diaries would record the time of sleep onset, where Anna's sleep onset is likely to be much earlier than Chloe's, and also time of waking, which is also likely to be earlier for Anna than for Chloe.

**Mark allocation:** 2 marks

- 1 mark for each of two comparisons (must state measurement and difference between Anna and Chloe for a mark). Options can include time of sleep onset, time of waking, duration of sleep (likely longer for Anna), quality of sleep (Anna likely to record higher quality).

**Question 7e.****Sample response**

The specialist may instruct Chloe to avoid using her phone or other technology in the hour before going to bed, as blue light from the phone may prevent melatonin release and cause her to feel less tired. She should develop a more consistent routine for bedtime and waking time to allow her circadian rhythm to remain stable.

**Mark allocation:** 2 marks

- 1 mark for avoiding mobile phone use before bed (as this is clearly a factor in the scenario) because it releases blue light, which impairs sleep
- 1 mark for outlining one other relevant piece of sleep hygiene advice (avoid caffeine in the evening, avoid exercise late at night, consistent routine around bed, reduce light levels before bed, only use bed/bedroom for sleep, etc.)

**Question 7f.****Sample response**

video monitoring

**Mark allocation:** 1 mark

- 1 mark for naming the key term: video monitoring

**Question 8a.****Sample response**

At 12 am, Glenda is likely to be in REM sleep, as the EEG shows high-frequency, low-amplitude waves, similar to beta waves. At 1 am, Glenda is likely to be in NREM Stage 3 sleep, as the EEG shows low-frequency, high-amplitude waves such as delta waves.

**Mark allocation:** 4 marks

- 1 mark for identifying the 12 am reading as REM sleep
- 1 mark for describing the 12 am reading as high-frequency, low-amplitude waves **OR** beta-like waves
- 1 mark for identifying the 1 am reading as NREM Stage 3 sleep (must be precise, as the EEG shows delta waves)
- 1 mark for describing the 1 am reading as low-frequency, high-amplitude waves **OR** delta waves

**Question 8b.****Sample response**

One physiological phenomenon at 12 am would be rapid eye movement, and one psychological phenomenon is likely to be dreaming.

**Mark allocation:** 2 marks

- 1 mark for describing a valid physiological phenomenon (rapid eye movement, high electrical activity in muscles that move the eye, or body muscle paralysis)
- 1 mark for describing a valid psychological phenomenon (dreaming)

## Question 9

### Sample response

#### Possible measurements during a sleep study

During a sleep study, various measurements are conducted to assess physiological activity during different stages of sleep. One key measurement involves an electroencephalograph (EEG), which detects, amplifies and records electrical activity of the brain, through brainwaves. In REM sleep, brainwaves are typically high in frequency and low in amplitude, while in NREM sleep, they range from high-frequency, low-amplitude patterns to low-frequency, high-amplitude patterns. Measurements from an electro-oculograph (EOG) are also commonly used in sleep studies. This device detects, amplifies and records the electrical activity of muscles responsible for eye movement. During REM sleep, when rapid eye movements and dreaming occurs, the EOG typically shows high levels of electrical activity. Electromyographs (EMG) detect, amplify and record electrical activity of muscles in the body. In REM sleep, the EMG generally indicates very low electrical activity, due to the virtual muscle paralysis that occurs during dreaming.

Video monitoring is also likely to occur during a sleep study. Sleep specialists use infra-red video recorders to observe behaviours such as sleepwalking, sleep talking, restless leg movements, and other notable actions that may occur during sleep.

#### Shift Work Disorder

Circadian rhythms are a type of biological rhythm that follows a 24-hour cycle and involves changes in bodily functions. The human sleep-wake cycle is an example of a circadian rhythm. The suprachiasmatic nucleus (SCN) in the brain regulates our sleep-wake cycle by acting as an internal body clock. It responds to the amount of external light available and uses this to guide the pineal gland on the amount of melatonin that needs to be released. For example, when light levels in the environment are low, the eyes detect this and send an excitatory message to the SCN. This stimulates the pineal gland to release more melatonin. Melatonin is a hormone that makes people feel drowsy and helps induce sleep.

Shift work involves working during hours that fall outside the typical waking period, such as nighttime or early mornings, or rotating shifts. This means shift workers need to be awake and alert at times when melatonin levels are naturally higher, and must go to sleep when melatonin levels are naturally lower. While some people adapt to this schedule with minimal difficulty, a small percentage experience Shift Work Disorder (SWD). This occurs when an individual's daily functioning is significantly impaired as a result of the misalignment between their internal circadian rhythm and their work schedule. This can result in sleep deprivation, mood changes, irritability and other challenges.

#### Patient X susceptibility to SWD

On average, individuals working night shifts tend to get approximately two hours less sleep than needed. At 25 years old, Patient X requires 7 to 8 hours of sleep each night. If this requirement is not met, sleep debt can accumulate, often leading to both psychological and physical changes.

Initially, Patient X appeared to adapt reasonably well to night shift work. However, there is now evidence of sleep deprivation, manifesting in affective symptoms such as frustration and irritability, as well as cognitive impairments, including difficulties with problem-solving and reasoning. Behavioural changes are also evident, particularly an increased consumption of alcohol. This suggests that the ongoing misalignment between Patient X's internal sleep-wake cycle and the external environment is negatively impacting his daily functioning, making him more vulnerable to developing SWD.

**How to improve sleep habits:**

Bright light therapy (BLT) involves timed exposure to intense, but safe amounts to artificial/natural light to resynchronise an individual's sleep-wake cycle by activating their SCN and modifying the release of melatonin. For Patient X, who works night shifts, it is recommended that BLT be administered in the evening before starting work. This would reduce the release of melatonin in the evening, helping him to remain alert at work. It will also enable his internal body clock to re-synchronise with the sleep-wake cycle required for his work schedule.

Sleep hygiene encompasses habits and behaviours that promote better sleep quality, quantity and timing. When Patient X finishes his night shift in the morning, he should wear sunglasses to minimize exposure to sunlight, which can interfere with melatonin production and delay sleep onset. Additionally, he should avoid using devices like iPads or other electronics that emit blue light, which impairs melatonin release. Patient X should also abstain from drinking alcohol, as substances like this have been shown to delay the onset of REM sleep, which is vital for achieving mental rejuvenation and overall wellbeing.

**Mark allocation:** 10 marks

**Note:** This question would be marked holistically using the following criteria.

• **8–10 marks**

- › Student discusses at least three devices that can be used to measure sleep and what information that would provide about the different stages of sleep.
- › Student explains shift work disorder and why it occurs, with appropriate use of psychological terminology, including circadian rhythms, the SCN and pineal gland, melatonin levels and symptoms of shift work disorder.
- › Student justifies why the patient would be susceptible to developing shift work disorder, using evidence from the scenario.
- › Student outlines how bright light therapy would be used to assist the patient and refers to habits that could be changed to improve sleep patterns in the patient.
- › Student's response is written coherently and fluently, integrating each point.
- › Student considers format of information sheet and maintains patient confidentiality.

• **5–7 marks**

- › Student outlines at least three devices that can be used to measure sleep and what information that would provide about the different stages of sleep.
- › Student explains shift work disorder and why it occurs, with appropriate use of psychological terminology, including circadian rhythms, the SCN and pineal gland and melatonin levels.

- › Student briefly explains why the patient would be susceptible to developing shift work disorder, using evidence from the scenario.
- › Student outlines how bright light therapy would be used to assist the patient and at least one habit that could be changed to improve sleep patterns in the patient.
- › Student's response is written coherently but may not integrate separate elements.
- **3–4 marks**
  - › Student describes at least two devices that can be used to measure sleep.
  - › Student explains shift work disorder, with minimal reference to key terminology.
  - › Student states why the patient would be susceptible to developing shift work disorder.
  - › Students briefly explain how bright light therapy would be used to assist the patient.
  - › Student's response is written fairly coherently but lacks organisation.
- **1–2 marks**
  - › Student's response lacks detail and only briefly discusses some of the criteria.
- **0 marks**
  - › The question has not been meaningfully attempted.

## Unit 4 | Area of Study 2 What influences mental wellbeing?

### Multiple-choice

#### Question 1

Answer: **C**

#### Explanatory notes

Option C is correct because the cause of anxiety is not always apparent. For example, someone may feel anxious while flying but there is no specific reason why. The cause of a phobic response is generally known: Alex knows that he is fearful of large bodies of water as a result of almost drowning as a small child.



#### TIP

» In multiple-choice questions, watch out for options with words such as 'only' or 'never'. Concepts in Psychology are rarely 100% certain and therefore these options are often incorrect.

#### Question 2

Answer: **B**

#### Explanatory notes

Option A is incorrect; Alex's belief is a factor that contributes to the perpetuation of the phobia, but is not a phobia itself (a phobia involves a wider range of characteristics).

Option B is correct because catastrophic thinking involves overestimating and exaggerating the worst possible outcomes to situations even though they are unlikely to occur.

Option C is incorrect because memory bias refers to the distorting influences of present knowledge, beliefs and feelings on the recollection of previous experiences. Alex is not experiencing a memory bias because he has never fallen over in the bath before.

Option D is incorrect because an attention bias refers to paying attention to stimuli that reinforce Alex's phobia.

**Question 3**

*Answer: B*

**Explanatory notes**

Option B is correct because GABA agonists do not increase the level of GABA in the brain. Instead, GABA agonists mimic the effect of GABA and stimulate the inhibitory effects of GABA on the postsynaptic neuron by binding the GABA receptor and altering its shape, making it easier for GABA to bind and inhibit the post-synaptic neuron.

**Question 4**

*Answer: C*

**Explanatory notes**

Option C is correct because it involves removal of the unpleasant symptoms Fiona experiences, and this would increase the likelihood of her experiencing the phobia and behaving the same way again in future.

**Question 5**

*Answer: C*

**Explanatory notes**

Option A is incorrect because, based on this information, we cannot conclusively say that Penelope is suffering from clinical anxiety or depression. We also do not know the timeline for her behaviours. For a mental health disorder to be considered, the behaviours need to be present for a prolonged period or involve significant impairment to function.

Option B is incorrect because a dependency on stimulants (coffee) and depressants (wine) can be dysfunctional; we therefore cannot say that Penelope is mentally healthy and that she has a high sense of wellbeing.

Option C is correct because Penelope is showing a change in her habits to attempt to cope with her anxiety and sleeping issues. At the moment, her symptoms are mild.

Option D is incorrect because it does not refer to where Penelope would be sitting on the mental wellbeing continuum.

**Question 6**

**Answer: C**

**Explanatory notes**

Option C is correct because one difference between a phobia and anxiety is that phobias are a diagnosable mental disorder, whereas anxiety can vary along the mental wellbeing continuum. Anxiety can progress from a mental health problem to a mental disorder if not treated or managed properly.

**Question 7**

**Answer: B**

**Explanatory notes**

Options A and C are incorrect because classical conditioning is considered a precipitating, not a perpetuating, factor.

Option B is correct because classical conditioning involves the repeated association between a conditioned stimulus and an unconditioned stimulus, which precipitates a phobic response. The conditioned stimulus triggers or leads to the onset of the phobia. In this case, the conditioned stimulus was birds and the unconditioned stimulus was being swooped by the magpie.

Option D is incorrect because the association in classical conditioning is formed between two stimuli, which then allows the conditioned stimulus to lead to a conditioned response. The association is not between a stimulus and a response.

**Question 8**

**Answer: A**

**Explanatory notes**

Option A is correct because Richard has been conditioned to fear birds. This is a result of the repeated association between birds (which were previously a neutral stimulus) and being swooped by a magpie (unconditioned stimulus), which caused him fear and pain (conditioned response).

**Question 9**

**Answer: C**

**Explanatory notes**

Option C is correct because memory bias involves distorted recollections of events that perpetuate fear. For Richard, this would involve remembering getting swooped by the magpie that injured him.

**Question 10**

*Answer: C*

**Explanatory notes**

Option C is correct because the cognitive part of cognitive behavioural therapy would involve trying to change Richard's thoughts into more realistic, helpful thoughts. Looking up statistics about bird attacks would enable Richard to understand that the likelihood of being attacked is minimal.

**Question 11**

*Answer: C*

**Explanatory notes**

Option C is correct because joining a support group is a social protective factor, using cognitive behavioural strategies is a psychological protective factor and adequate sleep is a biological protective factor.

**Question 12**

*Answer: A*

**Explanatory notes**

A cognitive bias is an individual's distorted negative memory about a certain situation or stimulus. Individuals suffering from phobias usually exaggerate the negative consequences associated with their phobic stimulus and underestimate their ability to cope. This can include a person believing that the worst possible outcome is very likely to occur, despite the chances of it being very remote. Therefore, option A is correct.

Options B and C are incorrect because although they reflect distorted thinking, they do not relate to flying, as stated in the question.

Option D is incorrect because it relates to a feeling Pradyumna has, rather than a false belief.

**Question 13**

**Answer: A**

**Explanatory notes**

Social support from family and friends is a protective factor in mental health. The example referred to in this question is psychoeducation, which is when family and friends are provided with information about an individual's phobia and their symptoms. They could then help Pradyumna by 'challenging his unrealistic thinking' such as by discussing the safety of flying with him when he expresses his fears. Therefore, Option A is correct.

Option B is incorrect because while it does accurately define psychoeducation, it does not outline how his family could use it to help him.

Option C is incorrect because it does not address the phobia at all.

Option D is incorrect because it would facilitate avoidance behaviour, which is the opposite of what psychoeducation suggests.

**Question 14**

**Answer: C**

**Explanatory notes**

Options A and B are incorrect because they do not indicate aspects of Sophie 'coping/managing change and uncertainty'.

Option C is correct because it shows that when Sophie cannot express enough breastmilk, she has a different solution to make sure her child is well fed.

Option D is incorrect because it does not show resilience; it is an example of Sophie masking her true feelings.

**Question 15**

**Answer: D**

**Explanatory notes**

Option A is incorrect because it shows masking behaviour rather than a level of functioning.

Option B is incorrect because it does not demonstrate high functioning.

Option C is incorrect because being a single parent has no bearing on a person's level of functioning around caring for a child and/or themselves.

Option D is correct because it shows one element of what Sophie is doing that is necessary to successfully care for her daughter and is thus characteristic of a high level of functioning.

**Question 16**

*Answer: B*

**Explanatory notes**

Option A is incorrect because it is referring to use of mnemonics to share information between generations.

Option B is correct because it is the most accurate answer.

Options C and D are incorrect because these are cultural, protective factors that enhance mental wellbeing.

**Question 17**

*Answer: B*

**Explanatory notes**

Option A is incorrect because Elena's love of cooking makes it likely that she receives adequate nutrition.

Option B is correct because Elena often stays up all night to finish assignments, so it is likely that she is not getting adequate sleep.

Option C is incorrect because Elena receives social support from her partner and friends.

Option D is incorrect because the psychologist is teaching Elena about mindfulness, so it is likely that she uses mindfulness meditation.

**Question 18**

*Answer: B*

**Explanatory notes**

Option A is incorrect because it does not represent meaningful social support (although it may still be welcomed).

Option B is the correct answer.

Option C is incorrect because it seems more like a threat than social support.

Option D is not correct because it is not support in any measure.

**Question 19**

*Answer: C*

**Explanatory notes**

Options A and D are incorrect because they refer to self-determination.

Option B is incorrect because it focuses on individual experiences, as opposed to the overarching and intergenerational nature of cultural continuity.

Option C is correct.

**Question 20**

*Answer: A*

**Explanatory notes**

Option A is correct.

Option B is incorrect. This is a freedom that each individual has, no matter what their cultural background, but the question asks about communities, not individuals.

Option C is incorrect because it suggests the opposite of self-determination.

Option D is incorrect because it mixes cultural continuity with protective factors for mental health, and doesn't refer to self-determination.

**Question 21**

*Answer: B*

**Explanatory notes**

Options A and D are incorrect because the event didn't focus on illnesses and injuries in the community.

Option B is correct.

Option C is incorrect because it is unlikely that the event was focusing on spirituality.

**Question 22**

*Answer: C*

**Explanatory notes**

Options A and B are incorrect because they are not example of cultural determinants.

Option C is correct.

Option D is incorrect because passing down knowledge is not directly related to self-determination.

## Short-answer and extended-answer

### Question 1a.

#### Sample response

Glutamate **OR** gamma-amino butyric acid (GABA)

**Note:** Both are acceptable for different reasons. A lack of GABA or a GABA dysfunction may have been a predisposing factor for Indy. However, given that a phobia is a learned response to a stimulus, it may be considered that glutamate would have been involved in the process of long-term potentiation of the phobic response.

**Mark allocation:** 1 mark

- 1 mark for glutamate or GABA

### Question 1b.

#### Sample response

The antecedent for Indy is nurses. Avoidance of nurses makes Indy feel better but this behaviour perpetuates the phobia. Perpetuation occurs through operant conditioning. Indy has been negatively reinforced by her avoidance behaviours. When she avoids nurses she does not experience fear of the nurses and hence avoids the unpleasant consequence. The likelihood of her repeating these behaviours increases.

Unfortunately, avoidance also prevents Indy from learning that the phobia may not be as frightening or overwhelming as she thinks. Avoidance of nurses may also impair Indy's overall physical and mental wellbeing if she does not seek help from a nurse when she is unwell.

**Mark allocation:** 7 marks

- This may be marked holistically. However, a suggested marking guide is also provided below.
  - › 1 mark for stating that perpetuation occurs through operant conditioning
  - › 1 mark for stating that the antecedent is nurses (or possibly hospitals or medical clinics)
  - › 1 mark for stating that, while the avoidance of nurses makes Indy feel better, this perpetuates the phobia. Indy's avoidant behaviour is the B in the three-phase model of operant conditioning. Avoiding clinics or hospitals or only seeing doctors are examples of avoidance behaviours.
  - › 1 mark for discussing Indy's negative reinforcement. When she avoids nurses, she does not experience fear, and therefore she avoids the unpleasant consequence (the third phase of the three-phase model).
  - › 1 mark for discussing the likelihood of Indy repeating the behaviour. For example, Indy is negatively reinforced, which means that the likelihood of her repeating her avoidance behaviours increases.
  - › 1 mark for stating that avoidance may not be good because it prevents her from learning that the phobia may not be as frightening or overwhelming as she thinks
  - › 1 mark for stating that avoidance of nurses may impair Indy's overall physical and mental wellbeing (e.g. not seeking help from a nurse when she is unwell in the future)

**Question 1c.****Sample response**

A biological intervention could be breathing retraining. Breathing retraining involves identifying unhelpful breathing techniques, for example taking short, shallow breaths. Individuals are then taught to consciously slow down their breathing to ensure they are taking slow, deep breaths to reduce their level of physiological arousal. Breathing retraining reduces heart and breathing rates (which are often elevated by the flight-or-fight-or-freeze response) and helps relax muscles.

A psychological evidence-based intervention is cognitive behavioural therapy (CBT). A major assumption underlying CBT is that the way people *feel* and *behave* is largely a product of what they *think*. Therefore, CBT combines cognitive therapy and behavioural therapy, in this case to change the thoughts and avoidance behaviours of Indy with nurses. The key would be to help Indy identify and challenge any unhelpful thoughts she has about nurses, and then identify more helpful balanced thoughts. As a behavioural component of CBT, Indy could identify her avoidance behaviours and try to overcome these slowly by decreasing this behaviour or even showing more approach behaviours.

**Mark allocation:** 4 marks

- Any two of the following (name and explanation) are acceptable for full marks.
  - › 1 mark for biological: benzodiazepines
  - › 1 mark for an explanation: such as, Indy has anxiety, which is associated with low levels of GABA. Benzodiazepines are medications that mimic the action of GABA in the system. This should help lower Indy's anxiety or stress response.

**OR**

- › 1 mark for biological: breathing retraining
- › 1 mark for an explanation: such as, breathing retraining involves teaching Indy to identify unhelpful breathing patterns and adopt correct breathing patterns by consciously taking slow, deep breaths. This will help to reduce heart rate and relax muscles, which are often elevated by the flight-or-fight-or-freeze response.

**OR**

- › 1 mark for psychological: cognitive behavioural therapy (CBT)
- › 1 mark for explaining the cognitive component of CBT: helping Indy identify and challenge any unhelpful thoughts she has about nurses, then identify more helpful balanced thoughts. As a behavioural component of CBT, Indy could identify her avoidance behaviours and try to overcome these slowly by decreasing this behaviour or even showing more approach behaviours.

**OR**

- › 1 mark for psychological: systematic desensitisation
- › 1 mark for an explanation: such as, Indy would first be taught relaxation techniques. Then she would create a fear hierarchy with her therapist of most frightening situation (e.g. speaking to or touching a nurse) to least frightening (e.g. a picture of a

nurse). Indy would then be progressively exposed to each stimulus on the hierarchy (starting with the least scary event) while pairing it with a relaxation technique. When relaxation is achieved, Indy would progress to the next level of the hierarchy and continue until she reaches the most frightening experience. This continues until her fear response towards nurses is replaced with a relaxation response towards them.

**OR**

- › 1 mark for social: psychoeducation of family members and supporters of Indy
- › 1 mark for an explanation: such as, Indy's family and friends may be encouraging or reinforcing her avoidance behaviours out of concern for her (especially because it may be distressing for them to observe her fear response to nurses). This is counterproductive because they may be contributing to her phobia unintentionally. Therefore, it would be important to educate Indy's family and friends about her phobia. They also should be taught to challenge Indy's unrealistic thoughts and not encourage her avoidance behaviours.

**Question 2a.****Sample response**

Catastrophic thinking

**Mark allocation:** 1 mark

- 1 mark for identifying that she was experiencing catastrophic thinking

**Question 2b.****Sample response**

Long-term potentiation is the long-lasting strengthening of synaptic connections due to repeated activation of the same neural pathways that results in the enhanced functioning of the neurons. When Luna initially associated fear with birds, neural connections were formed. Now, whenever Luna thinks about birds being dangerous or has a negative experience with birds, these neural connections are strengthened, making Luna more likely to perceive birds as dangerous or scary.

**Mark allocation:** 3 marks

- 1 mark for a correct explanation of long-term potentiation
- 1 mark for explaining that when a fear response is initially formed, it results in a neural connection being formed
- 1 mark for explaining that Luna's repeated exposure to the birds will strengthen the neural connections and ultimately increase her feelings of fear

**Note:** A good answer will refer to the scenario in the question. A generic response will be able to receive 2 marks.

**Question 2c.****Sample response**

Before treatment, when Luna saw a bird (the conditioned stimulus), she became fearful (the conditioned response). She would also be taught a relaxation technique, such as breathing retraining (unconditioned stimulus) to produce feelings of relaxation (unconditioned response).

During treatment, Luna's psychiatrist helped her develop a fear hierarchy of birds (e.g. looking at a photo of a bird and watching a video of a bird). They progressively associated each item in the fear hierarchy (the conditioned stimulus) with a relaxation technique (the unconditioned stimulus), such as deep breathing, to produce a feeling of relaxation (the unconditioned response).

After conditioning and progressively presenting each item in the fear hierarchy, Luna stops showing fear in response to birds. Instead, birds (the conditioned stimulus) alone will now result in a relaxation response (the new conditioned response).

**Mark allocation: 5 marks**

- 1 mark for referring to the three stages of classical conditioning (before, during and after conditioning)
- 1 mark for stating that the conditioned stimulus will result in a conditioned response
- 1 mark for demonstrated knowledge of a fear hierarchy, including at least two examples
- 1 mark for an explanation that each item on the fear hierarchy must be systematically paired with a relaxation technique (unconditioned stimulus)
- 1 mark for explaining that the pairing will continue until the conditioned stimulus now produces a conditioned relaxation response

**Note:** Students must refer to the scenario in the question to get full marks.

**Question 3a.****Sample response**

Devorah is suffering from a phobia rather than anxiety. This is because she experiences a severe and irrational fear in response to a specific stimulus (wasps). This is different to anxiety, which is a general state of worry or uneasiness that may not have a specific trigger.

**Mark allocation: 3 marks**

- 1 mark for stating that Devorah is suffering from a phobia
- 2 marks for providing two different pieces of supporting evidence from the scenario that Devorah is suffering from a phobia, such as the following statements:
  - › Her fear is severe and irrational.
  - › Her fear is specific to flying insects.
  - › Her fear is impairing her functioning (e.g. she no longer leaves the house or sees her friends).

**Question 3b.****Sample response**

Phase 1: antecedent

Explanation: the stimulus of seeing a flying insect

Phase 2: behaviour

Explanation: Devorah not leaving her house

Phase 3: consequence

Explanation: Devorah would feel relieved and her level of fear would decrease due to not leaving the house. This is negative reinforcement, increasing the chance of her repeating the avoidance behaviour in the future and thus perpetuating her phobia.

**Mark allocation:** 6 marks

- 1 mark for identifying antecedent, behaviour and consequence (up to 3 marks)
- 1 mark for providing an example of an antecedent from the scenario, such as 'seeing a flying insect', or 'thinking about flying insects'
- 1 mark for providing an example of a behaviour from the scenario, such as not leaving her house or not socialising with her friends (avoidance behaviour)
- 1 mark for providing an example of a consequence from the scenario, such as feeling relief, having her anxiety or fear of wasps reduced etc. and identifying that the consequence would be negative reinforcement, thus increasing the likelihood of her avoidance behaviour again in the future (perpetuation)

**TIP**

- » **When explaining consequences of operant conditioning, be sure to identify the type of consequence in the scenario and what its effect on future behaviour would be. For example, negative punishment decreases the likelihood of the behaviour occurring again as a result of having a pleasant stimulus removed, or negative reinforcement increases the likelihood of the behaviour occurring again because an unpleasant stimulus has been removed.**

**Question 3c.****Sample response**

Cognitive behavioural therapy (CBT) uses learning principles to help people change unhelpful or unhealthy thought processes, feelings and behaviour. The psychologist would start by identifying and challenging Devorah's faulty thoughts about wasps. For example, the psychologist could provide statistics about how many people are injured from wasp attacks each year. This would help Devorah to overcome her irrational thoughts and replace them with more realistic ones. It will be easier for Devorah to adopt helpful behaviours when her thoughts about wasps are more rational. The psychologist would also help Devorah to modify unhelpful avoidance behaviours. This could include using relaxation training (e.g. breathing retraining, or meditation) when she needs to leave the house. This would help Devorah to stop avoiding the things she enjoys, such as catching up with friends.

**Mark allocation: 5 marks**

- 1 mark for describing the cognitive component of CBT, including challenging or changing faulty thinking patterns or irrational thoughts and replacing them with more realistic ones
- 1 mark for providing an example of how the psychologist would help Devorah implement the cognitive component of the CBT
- 1 mark for describing the behavioural component of CBT, including modifying unhelpful behaviours or eliminating avoidance behaviours
- 1 mark for providing an example of how the psychologist would help Devorah implement the behavioural component CBT – for example, teaching relaxation techniques and being exposed to the feared stimulus in a safe or relaxing environment (systematic desensitisation)
- 1 mark for making it clear that it is easier to adopt helpful behaviours when thoughts are more rational

**Question 4a.****Sample response**

Internal factor: substance use  
External factor: social support

**Mark allocation:** 2 marks

- 1 mark for correctly identifying an internal biological or psychological factor
  - › biological factors include genes, gender balances or imbalances in specific neurotransmitters, substance use, physiological responses to medication, brain and nervous system functioning, hormonal activities, flight-or-fight-or-freeze response, and other bodily responses to stress
  - › psychological factors include cognition, beliefs and attitudes, our skills interacting with others, prior learning, perceptions of ourselves and others, how we understand and experience emotions, how we respond to and manage stress, how we reconstruct memories, and how we learn, make decisions and solve problems
- 1 mark for correctly identifying an external factor
  - › external factors include school- and work-related factors, the quality of interpersonal relationships, the amount and type of support available from others when needed, exposure to stressors, level of education, employment history, level of income, housing situation, risks of violence, access to health care and other community resources, exposure to social stigma, and specific cultural influences such as our values and traditions

**Question 4b.****Sample response**

Having a high level of resilience would improve May's ability to respond to, and overcome, stressors. It would also help her restore a level of positive functioning. This would help her to cope with the breakdown of her relationship, allowing her to bounce back and feel more positive about the situation. This can be seen as May continuing to go to work and being able to socialise, rather than isolating herself and ruminating about the situation.

**Mark allocation:** 2 marks

- 1 mark for stating why a high level of resilience would be beneficial for May; for example, because it would improve her ability to cope with stressors and allow her to bounce back and restore positive functioning after setbacks
- 1 mark for referring to details of May's situation; for example, she is still going to work and socialising with friends, rather than isolating herself

**Question 5a.****Sample response**

A psychological risk factor for Joelle would be feeling sad, while a social risk factor would be missing her family at home.

**Mark allocation:** 2 marks

- 1 mark for identifying a psychological risk factor
- 1 mark for identifying a social risk factor

**Question 5b.****Sample response**

Connection to Country – Joelle is forced to live off Country at her boarding school, and only gets the chance to return on occasion; she is experiencing a 'longing for Country'.

Family and kinship – Joelle misses spending time with her close family and wider community on Country, where she can build a greater sense of self.

**Mark allocation:** 4 marks

- 1 mark for identifying an element of being (up to 2 marks). Students may choose from family and kinship, community, mind and emotions, or Country as relevant elements of being that are shown to impact Joelle in this scenario.
- 1 mark for explaining how an identified element of being is challenged for Joelle, using evidence from the scenario (up to 2 marks)

**Question 6****Sample response**

Cultural determinants such as cultural continuity and self-determination allow for culture and identity to be maintained and passed down through generations, and for communities to make their own policy decisions about healthcare that help to overcome disadvantage and act as protective factors for mental health.

**Mark allocation:** 2 marks

- 1 mark for referring to cultural continuity and benefit to health
- 1 mark for referring to self-determination and support for health

**Question 7a.i.****Sample response**

adequate nutrition and hydration

**Mark allocation:** 1 mark

- 1 mark for providing the key terms

**Question 7a.ii.****Sample response**

In order to maintain adequate nutrition and hydration, the twins should make sure they don't skip meals such as breakfast, and eat a variety of foods for nutritional balance. Adequate nutrition and hydration helps to keep physiological functioning at a normal level, and maintain mood and motivation.

**Mark allocation:** 2 marks

- 1 mark for a specific recommendation that supports adequate nutrition and hydration
- 1 mark for explaining how this suggestion maintains mental health

**Question 7b.****Sample response**

In mindfulness meditation, the individual focuses on specific sensations such as breathing, and accepts all thoughts and feelings without judgement. Mindfulness can therefore enable an individual to focus on the immediate moment and sensations. For Connor and Clara, being in a mindful state may allow them to block out worries about winning, losing or broader consequences, and focus their attention on their immediate performance in the game.

**Mark allocation:** 3 marks

- 1 mark for explaining mindfulness meditation
- 1 mark for stating how mindfulness meditation can be used to focus on the present and the acceptance of all thoughts and feelings
- 1 mark for linking to the scenario

**Question 8****Sample response**

Mental wellbeing is often represented on a continuum because mental wellbeing is dynamic, and our level of mental health changes over time. It is likely that Amit is towards the middle of the wellbeing continuum. This is because at this point, she is still balancing her home and work commitments; however, it is clear that she is struggling, as she wakes up crying most mornings.

**Mark allocation: 3 marks**

- 1 mark for explaining why mental wellbeing is represented on a continuum, e.g changes over time, no clear division between different levels of wellbeing
- 1 mark for stating where Amit would be found on the continuum
- 1 mark for justifying where Amit was placed on the continuum, using evidence from the scenario

**Question 9a.****Sample response**

Getting hit by a ball when playing cricket with his brother acted as a specific environmental trigger for Patrick. This is because repeatedly getting hit by the ball would have caused Patrick pain and initiated multiple sympathetic nervous system responses, resulting in Patrick forming a negative association with cricket.

**Mark allocation: 2 marks**

- 1 mark for identifying the social risk factor as a specific environmental trigger
- 1 mark for explaining how playing cricket with Jack precipitated the onset of Patrick's fear of cricket

**Question 9b.****Sample response**

When Patrick's friend started talking about playing cricket, it is likely that Patrick started to take short, shallow breaths. This can cause an imbalance in oxygen and carbon dioxide levels in his blood.

Breathing retraining would help Patrick to identify his faulty breathing habits and replace them with more helpful ones that involve him consciously controlling his breathing and taking slow, deep breaths. This would restore the oxygen and carbon dioxide levels and lower his arousal/anxiety levels.

**Mark allocation: 3 marks**

- 1 mark for explaining the faulty breathing patterns Patrick was likely engaging in
- 1 mark for outlining how to improve breathing patterns
- 1 mark for explaining how this would help Patrick to cope when someone suggests a game of backyard cricket

**Question 9c.****Sample response**

Stigma, which refers to social disapproval, may cause Patrick to feel embarrassed because of his fear of cricket. This can reduce the likelihood of Patrick seeking treatment for his condition, hence perpetuating his phobia.

**Mark allocation: 2 marks**

- 1 mark for identifying the role of stigma as a social risk factor in this case
- 1 mark for explaining why stigma would lead to the perpetuation of Patrick's phobia due to not seeking treatment

## Question 10

### Sample response

The biopsychosocial model suggests that biological, psychological and social factors interact to influence physical and mental health. It is a useful framework for understanding the development, diagnosis and treatment of various conditions. In Lily's case, she experiences an intense, irrational and persistent fear of eye make-up, often leading to avoidance behaviours. This suggests that she is likely suffering from a specific phobia of eye make-up.

Risk factors for specific phobias are factors that increase the likelihood of developing such conditions. For Lily, one potential biological risk factor could be a family history of anxiety disorders, which may have genetically predisposed her to developing a phobia. A psychological risk factor that may have contributed to the persistence of Lily's condition is memory bias. This refers to the tendency to recall negative experiences more readily than positive or neutral ones. Lily might predominantly remember the distressing incidents of mascara getting in her eyes, reinforcing her fear of eye make-up.

Social risk factors, which originate outside the individual, also play a role in Lily's phobia. For instance, Paige's accidental application of mascara in Lily's eyes during childhood likely served as a specific environmental trigger for the onset of her fear. It would have acted as a precipitating factor as it likely triggered the onset of her condition. This is because when the product got in Lily's eyes it would have been very painful and upsetting for her. Another social risk factor for Lily would be the role of stigma as a barrier for accessing treatment. Stigma, or social disapproval, may have made Lily feel embarrassed about her phobia, fearing judgement or ridicule from others. This could perpetuate her condition by making her less likely to seek help or treatment, ultimately prolonging her condition.

Protective factors for specific phobias are factors that help individuals manage their condition and potentially overcome it. One social protective factor that could benefit Lily is psychoeducation. This would involve educating Lily's family and friends about her condition, including how her phobia developed, potential triggers, and the symptoms of her phobic response. By understanding her experiences, her loved ones would be better able to support her.

Lily's family and friends would then be taught how to challenge her unrealistic or irrational thoughts about eye make-up. For example, they could remind Lily that many people wear eye make-up every day without experiencing any negative consequences. They would also be trained in techniques to help reduce Lily's avoidance behaviours. For example, encourage Lily to let a professional make-up artist apply eye make-up on her as they are less likely to accidentally get mascara in her eyes. In addition, if Lily begins to experience physical symptoms of anxiety, such as fast, shallow breathing that leads to an imbalance in oxygen and carbon dioxide levels, she should be encouraged to practice breathing retraining. This involves consciously slowing down her breathing by taking slow, deep breaths. This can help lower arousal levels and feels of anxiety. Psychoeducation would also reduce any stigma that Lily's family might feel about her condition.

**Mark allocation:** 10 marks

**Note:** This question would be marked holistically using the following criteria.

• **8–10 marks**

- › Student discusses what is meant by the biopsychosocial model and why it is effective to use in the diagnosis and treatment of specific phobia. A lesser response does not link the model to specific phobias.
- › Student outlines the difference between risk and protective factors, in terms of Lily's specific phobia.
- › Student identifies and explains two social contributing factors for specific phobia, in terms of Lily. This should include a discussion of a specific environmental trigger acting as a precipitating factor as well as the role of stigma as a barrier for treatment as a perpetuating factor for Lily's condition.
- › Student provides a detailed explanation on the social protective factor of psychoeducation in terms of challenging unrealistic thoughts and not encouraging avoidance behaviours and provide examples throughout that relate to Lily's situation.
- › Student's response is written coherently and fluently, integrating each point.

• **5–7 marks**

- › Student provides a brief discussion on the biopsychosocial model, in terms of specific phobias.
- › Student briefly outlines the difference between risk and protective factors.
- › Student identifies and explains two social contributing factors for specific phobia, in relation to Lily.
- › Student provides an explanation on the social protective factor of psychoeducation.
- › Student's response is written coherently but may not integrate separate elements.

• **3–4 marks**

- › Student briefly refers to the biopsychosocial model.
- › Student identifies and explains at least one social risk factor for specific phobia.
- › Student identifies and briefly explains psychoeducation.
- › Student's response is written fairly coherently but lacks organisation.

• **1–2 marks**

- › Student's response lacks detail and only briefly discuss some of the criteria.

• **0 marks**

- › The question has not been meaningfully attempted.

## Unit 4 | Area of Study 3 How is scientific inquiry used to investigate mental processes and psychological functioning?

### Multiple-choice

#### Question 1

*Answer: D*

#### Explanatory notes

Option A is incorrect because the independent variable is stress (Marcus is investigating the impact of stress on recall) and the manipulations are learning words in 45 seconds and 15 seconds. The 15 seconds would have added time pressure that causes stress.

Option B is incorrect because it describes the dependent variable, not the independent variable, and the manipulation is not the number of words correctly recalled.

Option C is incorrect because the study was not measuring relearning, and the manipulation is not the number of words correctly recalled.

Option D is correct because the independent variable is stress, and the manipulation is learning words in 45 seconds and 15 seconds.

#### Question 2

*Answer: A*

#### Explanatory notes

Option A is correct because the same participants were involved in the experimental condition (45 seconds) and the control condition (15 seconds).

#### Question 3

*Answer: C*

#### Explanatory notes

Option C is correct because the researchers would have had to ensure that the mice were protected from harm throughout the experiment. This harm could be psychological distress or a physiological response.

**Question 4**

*Answer: C*

**Explanatory notes**

Option C is correct because only 12 participants who were already being treated for epilepsy volunteered for extra testing. Using only one or a few participants and studying them in-depth is characteristic of a case study.

**Question 5**

*Answer: A*

**Explanatory notes**

Option A is correct because a case study usually investigates only one or a few participants, because it involves rare phenomena. In this case, only 12 people were studied. Therefore, it is difficult to generalise the results to the population because it is unlikely that the sample will be representative of the population.

**Question 6**

*Answer: A*

**Explanatory notes**

Option A is correct because measuring the participant's neural activity was the variable that was observed to study the effect of the independent variable, which was being sleep deprived.

**Question 7**

*Answer: D*

**Explanatory notes**

Option D is correct because the mean can be influenced by extreme scores or outliers in the data, thus increasing or decreasing the mean and making it less accurate. If outliers were present, the median would be a more suitable measure of central tendency.



**TIP**

- » Remember that if outliers are present in the dataset, a better measure of central tendency is the median. The median is the middle value in the dataset and is less influenced by outliers.

**Question 8**

*Answer: C*

**Explanatory notes**

Option C is correct. The data Lauren collected is primary because she collected it herself by testing her own students. It is also quantitative because it is numerical data.

**Question 9**

*Answer: D*

**Explanatory notes**

Option D is correct because it is necessary to use percentage change to show improvement when using a within-subjects design, as you are comparing the results of the same people at different periods of time.

**Question 10**

*Answer: A*

**Explanatory notes**

Option A is correct because a rating scale involves students selecting a number to represent their attitude. Therefore, it is quantitative data. The teacher obtains this data directly from her students, which means it is primary data.

**Question 11**

*Answer: D*

**Explanatory notes**

An outlier is a score that sits clearly outside or away from the rest of the data points. In this case, all other data points are clustered between 5 and 20, which means that 50 is a clear outlier. Therefore, Option D is correct.

**Question 12**

**Answer: A**

**Explanatory notes**

Reproducibility is a measure of how consistent results are when conducted under changed conditions (e.g. different participants, experimenters). In this case, if Dr Hill replicates the study with different participants, this is a way to test reproducibility. Therefore, option A is correct.

Option C is incorrect because although it is accurate, it does not relate to reproducibility.

Option D is incorrect because it is describing repeatability, not reproducibility.

**Question 13**

**Answer: A**

**Explanatory notes**

Option A is correct because an extraneous variable is any variable (other than the independent variable) that can cause a change in the dependent variable, and therefore has an unwanted effect on the results.

Options B and D are incorrect because they refer to the dependent variable.

Option C is incorrect because it refers to the independent variable.

**Question 14**

**Answer: C**

**Explanatory notes**

Option C is correct because the best way for the doctor to obtain consent is from the patient directly. However, this would need to be done before Fran's symptoms progress or during a period of time in which she is thinking clearly and her memory is functioning properly.

**Question 15**

**Answer: D**

**Explanatory notes**

Option A is incorrect because it is acceptable to use students as research subjects as long as ethical guidelines are followed.

Option B is incorrect because only parents or guardians can give informed consent on the participants' behalf.

Deception in research studies is acceptable, as at times it may be the only way for the study to be carried out effectively. When necessary, some information about the study can be withheld, provided it does not cause distress to the participants, and they are debriefed afterwards. Therefore, option D is correct and option C is incorrect.

**Question 16**

*Answer: B*

**Explanatory notes**

Options A, C and D are incorrect because both methodologies have these features.

Option B is correct because correlational studies do involve variables, but there is no manipulation of variables and so a cause-and effect-relationship cannot be established between them.

**Question 17**

*Answer: B*

**Explanatory notes**

Option A is incorrect because there is no comparison between the experimental and control group.

Option B is correct because a research hypothesis should include four elements: the population from which the sample is drawn (secondary school students), the simple independent variable (studying alone or in supportive groups), the dependent variable (academic improvement) and a prediction of the direction of the effect.

Option C is incorrect because it lists the sample, rather than the population.

Option D is incorrect because no population is provided.

**Question 18**

*Answer: D*

**Explanatory notes**

Option A is incorrect because the 100 Year 9–12 students is the sample, not the population.

Option B is incorrect because the population and the sample cannot be the same.

Option C is incorrect because the suggested sample does not specify the number of students involved.

Option D is correct. A population is the entire group of people that we are interested in learning about. In research terms, the population is the larger group from which a sample has been drawn. The population is always larger than the sample.

**Question 19**

**Answer: C**

**Explanatory notes**

Option C is correct because Dr Brown did not use random or stratified sampling; both these techniques increase the likelihood of obtaining a representative sample. Because Dr Brown did not use these techniques, she may have a biased or unrepresentative sample and therefore cannot generalise the results to the wider population. The students from Sunnydown College may not be representative of all Year 9–12 English students.

**Question 20**

**Answer: C**

**Explanatory notes**

Option C is correct because there is a between-subjects component (supportive versus alone condition) and a within-subjects component (Semester 1 results versus Semester 2 results).

**Question 21**

**Answer: B**

**Explanatory notes**

Option A is incorrect because, while supportive group versus alone is the independent variable, the focus of the question is on the elements kept constant.

Option B is correct because an element deliberately kept the same between conditions is a controlled variable.

Option C is incorrect because a confounding variable is not kept the same between conditions.

Option D is incorrect because it refers to measurement errors, not variables.

**Question 22**

**Answer: C**

**Explanatory notes**

Option A is incorrect because a systematic error affects all the results. Only some of the students were getting private tutoring, so the results would not all be affected in the same way.

Options B and D are incorrect because they are not types of error.

Option C is correct because private tutoring may cause some of the results to differ from expected values.

**Question 23**

*Answer: B*

**Explanatory notes**

Option A is incorrect because it is an overreach. Dr Brown cannot claim that all students would benefit from supportive groups, as Year 9–10 students did not appear to benefit significantly, and younger year levels and students outside Sunnydown were not tested.

Option B is correct.

Option C is incorrect because VCE students did show a marked improvement.

Option D is incorrect because, although it is a valid statement regarding the need to test reproducibility of these results, it is not related to a conclusion.

**Question 24**

*Answer: C*

**Explanatory notes**

Option A is incorrect because it describes a longitudinal test of students' performance, not a reproduction of the study.

Option B is incorrect because it represents 'repeatability', not reproducibility.

Option C is correct because it describes the repetition of the study under differing conditions (different students and different subjects).

Option D is incorrect because it does not describe a controlled experiment.

**Short-answer****Question 1a.****Sample response**

It is hypothesised that children who write each item five times (or who use maintenance rehearsal) will have reduced memory recall (or lower test scores) than children who make up a story using all the items (or use elaborative rehearsal).

**Mark allocation: 2 marks**

- 2 marks for an appropriate research hypothesis

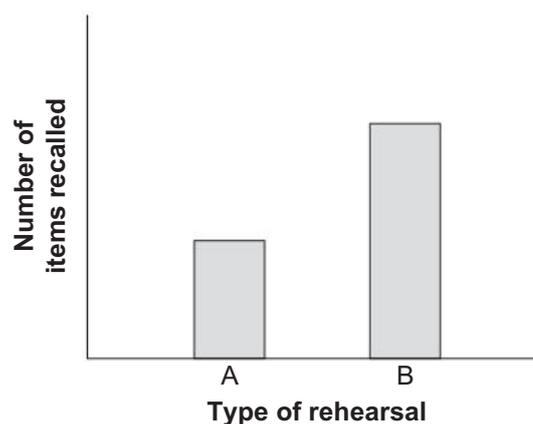
**Question 1b.****Sample response**

It is likely that Group B would recall more items than Group A. This is because participants in Group B were adding meaning to the items by making up a story with them. This would help them encode the information and move it from short-term memory into long-term memory. In contrast, participants in Group A were not adding meaning to the information and therefore they were less likely to move the information from short-term memory into long-term memory.

It is likely that Group A would recall more images than Group B. Group A would also be likely show a primacy effect (superior recall of the first few images) and a recency effect (superior recall of the last few images). In contrast, Group B would not show a recency effect because their recall was delayed by five minutes, which means the images would no longer be held in short-term memory.

**Mark allocation:** 3 marks

- 1 mark for stating that Group B would recall more images than Group A
- 1 mark for stating that Group B was using elaborative rehearsal or were adding meaning to the information and therefore they would be more likely to move the information from short-term memory into long-term memory
- 1 mark for stating that Group A was using maintenance rehearsal or were simply repeating the items and therefore they would be less likely to move the information into their long-term memory

**Question 1c.****Sample response****Mark allocation:** 3 marks

- 1 mark for labelling the x axis (type of rehearsal/learning method) and y axis (number of items recalled)
- 1 mark for drawing a bar graph with separate columns for Group A and Group B
- 1 mark for accuracy of graph

**Question 1d.****Sample response**

External validity refers to the extent to which the results of a study can be applied to similar individuals in different settings. Ms Mia's study would have low external validity, as her sample was unlikely to be representative of the population (children). This is because she only used two groups of children from one school in her study.

**Mark allocation:** 2 marks

- 1 mark for explaining the meaning of external validity
- 1 mark for stating that the results of Ms Mia's study would have low external validity due to her small sample size

**Question 1e.****Sample response**

All participants will undertake both conditions (exercising and not exercising) before completing a recall test.

**Mark allocation:** 1 mark

- 1 mark for stating that all participants will undertake both conditions before completing a recall test

**OR**

- 1 mark for stating that all participants will be in both the control (not exercising) and experimental (exercising) conditions (groups)

**Question 2a.****Sample response**

The aim of the study is to see whether approach coping strategies, avoidance strategies / exercise or a combination of the two can improve (reduce) stress levels in accounting staff.

**Mark allocation:** 1 mark

- 1 mark for referring to investigating the use of coping strategies for reducing stress levels

**Question 2b.****Sample response**

Between subjects design

**Mark allocation:** 1 mark

- 1 mark for correctly identifying between-subjects design

**Question 2c.****Sample response**

One advantage of a between-subjects design is that it is less time consuming than other experimental research designs. Both conditions can be run simultaneously, as there are different participants in each group.

**Note:** Both points are required for a mark ('time efficient' is not enough on its own). Other possible answers include that it is more time efficient because participants do not need to be pre-tested or there are no order effects because different participants are used in each condition.

**Mark allocation:** 1 mark

- 1 mark for outlining an advantage of using a between-subjects design

**Question 2d.****Sample response**

Justice refers to the moral obligation to ensure that there is fair consideration of competing claims; that there is no unfair burden on a particular group from an action; and that there is fair distribution and access to the benefits of an action. Jane needs to consider this because if her results indicate that one coping strategy is more effective, it is important for her to share this knowledge with participants in the other groups, so that all participants learn effective ways to manage their stress levels.

**Mark allocation:** 2 marks

- 1 mark for explaining justice as an ethical concept
- 1 mark for indicating why it would be important for Jane to consider justice in relation to her study

**Question 3a.****Sample response**

This method would have involved one-on-one verbal interviews with participants about their sleep patterns since the birth of their children, such as the number of hours they sleep, sleep quality, how refreshed they felt upon awakening and the number of times they woke up during the night. This represents a type of fieldwork study. This is a subjective process whereby participants record information from their point of view in a diary. This is influenced by their individual circumstances and characteristics and relies on their memory. The subjective nature of this method could lower the internal validity of the results, making it difficult to determine whether the independent variable (having children) caused the change in the dependent variable (amount of sleep).

**Mark allocation: 3 marks**

- 1 mark for stating that an interview is a type of fieldwork
- 1 mark for explaining what is meant by 'subjective in nature' in this context
- 1 mark for explaining that this could lower the internal validity of the data collected, such that it could be unclear whether the independent variable of having children was reducing the amount of sleep, rather than extraneous variables or biases in the data

**Question 3b.****Sample response**

The researchers used a very large sample size (4659 parents who had a child between 2008 and 2015), which increases the external validity of the results.

**Mark allocation: 3 marks**

- 1 mark for stating that the study has a large sample size
- 1 mark for explaining that a large sample size heightens the external validity of the results
- 1 mark for stating the population in the study – i.e. parents who had a child between 2008 and 2015

**Question 4a.****Sample response**

The dependent variable is the concentration ability of students, which is to be measured by the mean percentage difference in scores between the pre-assessment test and the Biology assessment test for each group.

**Mark allocation: 2 marks**

- 1 mark for identifying concentration ability as the dependent variable
- 1 mark for identifying the mean percentage difference in scores between the pre-assessment test and the Biology assessment test

**Question 4b.****Sample response**

-20% or 20% reduction in score

**Mark allocation:** 1 mark

- 1 mark for identifying a change of approximately -20% (allow +/- 2%); must include clear direction

**Question 4c.****Sample response**

A possible extraneous variable in this study could be the amount of sleep participants had. Participants in Group 1 may have slept longer than 3 hours. This may have caused them to get a higher score (%) in the Biology test.

**Mark allocation:** 2 marks

- 1 mark for giving an example of a possible extraneous variable in the study
- 1 mark for clearly stating the effect the chosen extraneous variable would have on the results

**Question 4d.i.****Sample response**

systematic error

**Mark allocation:** 1 mark

- 1 mark for providing the key term: systematic error

**Question 4d.ii.****Sample response**

This student's score is an outlier. Ms Hughes should remove this result from the dataset before calculating the mean.

**Mark allocation:** 2 marks

- 1 mark for providing the term 'outlier'
- 1 mark for stating that the outlier should be removed from the mean calculation

**Question 5a.****Sample response**

Because this study is investigating the effect of alcohol consumption on driving performance, it would be unethical (role of researcher/no harm principle) to conduct this experiment on the open road or in a real car, as this could be dangerous to the general public and to the participants.

**Mark allocation: 2 marks**

- 1 mark for referring to ethical principles limiting the study to a simulation (may specifically refer to beneficence, no harm principle or role of the researcher)
- 1 mark for referring to the danger posed for participants or the general public if conducted in a real car

**Question 5b.****Sample response**

Standard deviation would allow researchers to determine the level of variance or spread from the mean.

**Mark allocation: 1 mark**

- 1 mark for referring to standard deviation as a measure of how much the results vary around the mean value

**Question 5c.****Sample response**

The internal validity of this study would be high. This is because the data being collected (mean response time and number of departures from lane) was objective data. Objective data tends to be less susceptible to bias as it does not rely on personal opinions. This would make it more likely that the study was examining the impact of alcohol on future driving performance.

**Mark allocation: 3 marks**

- 1 mark for indicating that internal validity would be high (or moderate)
- 1 mark for showing knowledge of what internal validity refers to
- 1 mark for justifying response by explaining that the data that was collected was objective data, which is less likely to be biased

**Question 5d.****Sample response**

Individuals aged 18–25 who completed a simulated driving test while hungover/ after consuming alcohol had slower reaction times and made more lane exits than those in the control/no alcohol condition.

**OR**

It is not possible to draw a valid conclusion for drivers aged 18–25, because the impact of confounding variables (such as the lack of control over participants' blood alcohol concentration when driving, or sleeping hours during the previous night) reduced the internal validity of the study.

**Mark allocation: 3 marks**

- 1 mark for framing the conclusion around the participants of the research (people aged 18–25 or adult drivers)
- 1 mark for identifying the relationship between the independent variable (alcohol) and the dependent variable (lane exits and response time)
- 1 mark for providing a correct directional statement of conclusion (negative impact)

**OR**

- 1 mark for framing the conclusion around the participants of the research (people aged 18–25 or adult drivers)
- 1 mark for stating that there can be no valid conclusion and linking this to a valid reason (lack of control over potential confounding variable)
- 1 mark for identifying the variables that reduced the internal validity of the study

**Question 5e.****Sample response**

The external validity of the study is likely to be low (or moderate). There is no specific information about the sampling method; however, there were 52 participants, which is a relatively small sample in relation to the population of drivers. Hence the sample is likely to not be representative of the population. Sampling bias could be reduced with a larger sample. Researchers could also improve external validity by including older drivers in the sample.

**Mark allocation: 4 marks**

- 1 mark for stating that external validity was low
- 1 mark for indicating why external validity was reduced
- 1 mark for explaining that a larger sample would most likely give the researchers results that more accurately reflect drivers aged 18–25
- 1 mark for suggesting that researchers may also obtain a more representative sample of all drivers by having a more diverse group of participants (including older drivers)

**Question 5f.****Sample response**

In order to test repeatability, the research would have to be conducted again under the same or similar conditions (such as conducting it via a simulation, by the same researchers).

In order to test reproducibility, the research would have to be conducted again under changed conditions (such as a different researcher or as a controlled experiment instead of a simulation or with different participants).

**Mark allocation:** 2 marks

- 1 mark for a valid explanation of testing repeatability
- 1 mark for a valid explanation of testing reproducibility

**Note:** There must be some reference to the scenario for marks to be awarded (for example, simulation versus controlled experiment, as these are conditions shown). A generic response can be awarded a maximum of 1 mark.

**Question 5g.****Sample response**

Precision is a measure of how closely a set of measurement values agree with each other, whereas accuracy refers to how close a measurement is to the true/expected value of the quantity being measured.

**Mark allocation:** 1 mark

- 1 mark for drawing a valid distinction. The response must refer to both precision and accuracy.

## ● Acknowledgements

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