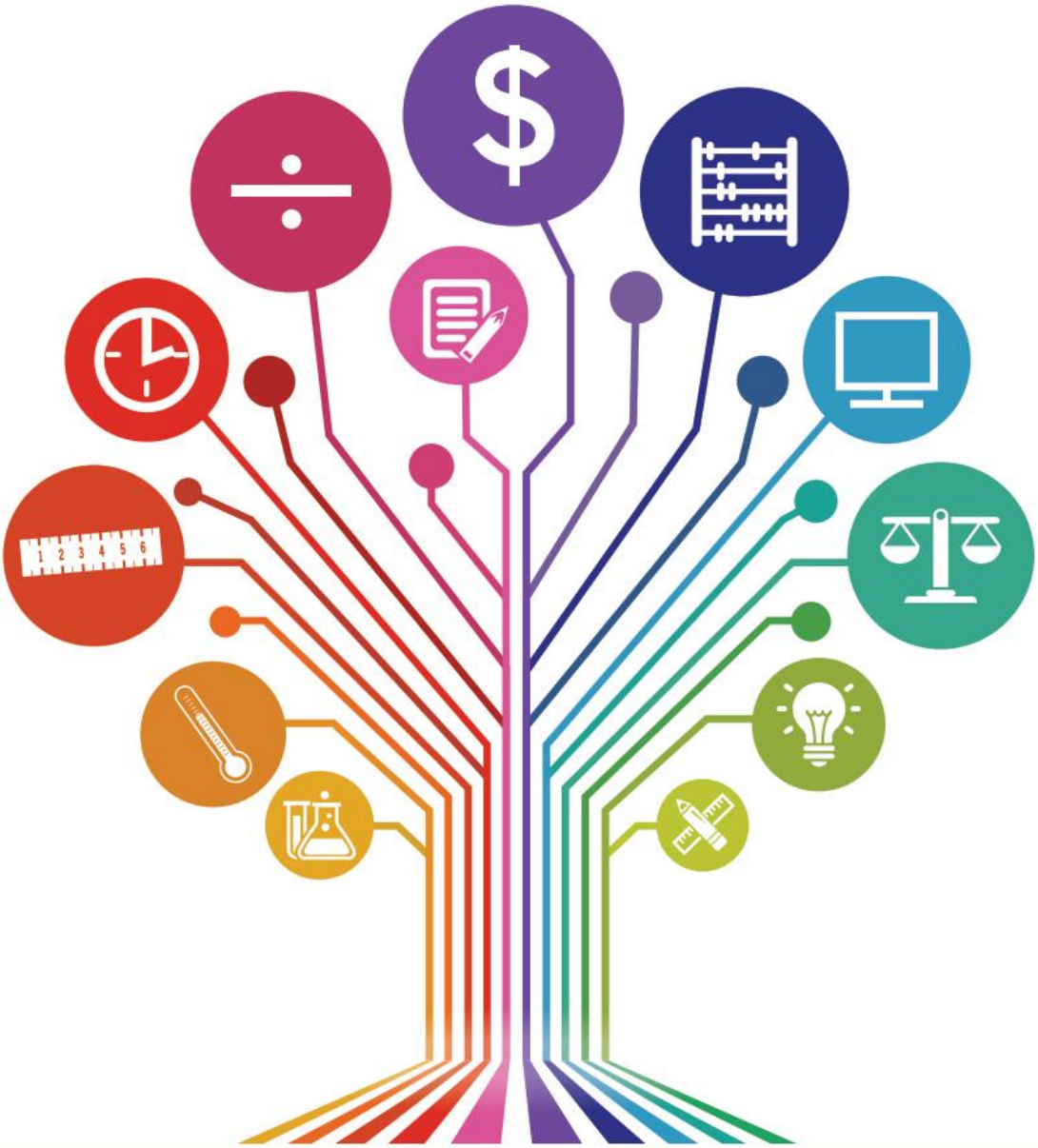
Fractions, percentages, decimals – basic



Learner guide

Working with numbers

Aspire learning resources

Pre-employment skills

Fractions, percentages, decimals – basic

Version 1.1

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Fractions, percentages, decimals – basic

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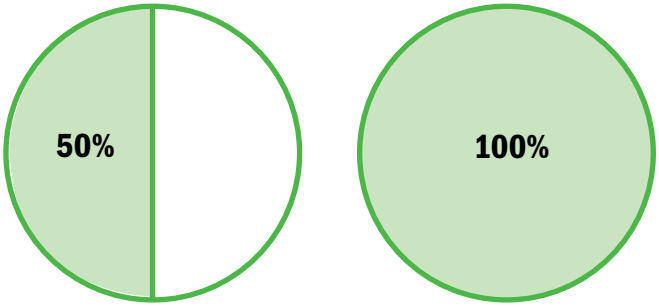
Contents

Percentages

A percentage is a number that means a part per hundred. 100 per cent is the total. It is the whole thing.

A shirt made of 100 per cent cotton is all cotton. A shirt made of 50 per cent cotton and 50 per cent silk is half cotton and half silk. This is because 50 is half of 100. A percentage less than 100 is part of the whole thing.

You may see percentages in the newspaper, at the bank, on clothing labels or on food labels. The symbol for percent is %.



Story

Sam is a gardener. He has a 16-year-old daughter, Maggie. She is having trouble at school. She hates percentages and fractions and doesn't understand them. She wants to give up maths. Sam knows that it is important to understand percentages. He uses them in his work and also with money. He wants to help Maggie even though he has a bit of difficulty with percentages himself. But he says to Maggie, 'It's important to understand percentages because you see them every day'.

Talking in percentages

Some percentages are very common such as 100%, 50% and 0%.

We already know that 100% is the whole thing and 50% is half.

0% means the same as 0. It means zero or nil.

Activity 1

What percentage are these?

1. All cotton

   _____

2. Half fare

   _____

3. Zero blood alcohol level

   _____

4. Chocolate is half sugar

   _____

Click to complete Activity 1

50% is one of two parts (or half)

When two people share something equally, each person has half.

They divide the whole into two parts.

Find 50% (half) of a number in your head. Half of 12 is 6, because 6 and 6 make 12.

For more difficult numbers, split the number into easier numbers to work with.

To find half of 70, split it into 60 and 10 (60 + 10 = 70).

Half of 60 is 30, and half of 10 is 5.

30 + 5 = 35

So half (50%) of 70 is 35.

Activity 2

Find 50% (half) of each of these:

1. 50% of a $20 lunch

   _____

2. 50% of a $60 electricity bill

   _____

3. 50% of an $11 parking fee

   _____

4. 50% of a $30 office stationery bill

   _____

Click to complete Activity 2

25% is one of four parts

Look at the circle below. It is cut into 4 parts. The whole circle is 100%.

Each part is 25%. Shade one part to show 25%.

To find 25% of a number, divide the whole number by 4. Or, divide the whole number in half and then in half again.

Activity 3

A shop is having a sale. Work out 50% and 25% of each of these items.

The first one is done for you.

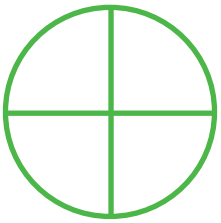
Item	50%	25%
$80 shoes	$40	$20
$60 shirt		
$100 pants		
$70 bag		

Click to complete Activity 3

75% is three of four parts

Look at the circle below. It is cut into 4 parts. The whole circle is 100%.

Each part is 25%. To show 75%, shade three parts (25 + 25 + 25 = 75).



To find 75% of a number, first find half (50%) and half again (25%).

Then, add these numbers together.

So what is 75% of 200?

First find half (50%):	Half of 200 = 100
Then find half again (25%):	Half again = 50
Then add these numbers together:	100 + 50 = 150

So 75% of 200 = 150.

Activity 4

You are sharing a taxi and must pay 75% of the total when you get out. How much will you pay for each of the following amounts? The first one has been done for you.

Note: First work out 50%, then 25%, then add these numbers together to find 75%.

Amount	50%	25%	75%
$60	$30	$15	$45
$24			
$30			
$20			

Click to complete Activity 4

Another way to think about percentages

You can also think about a percentage as a number in every 100.

100 **in every 100** is 100%

50 **in every 100** or 50 cents **in every 100** cents is 50%

25% is 25 **in every 100**

And 90% is 90 **in every 100**

Percentages are easy when you are talking about 100.

Activity 5

What percentage is each of these?

1. $20 interest on every $100

   _____

2. 50 cents in the dollar

   _____

3. 25 cents taken off for every dollar

   _____

4. Out of every 100 people, 90 like the idea

   _____

Click to complete Activity 5

Activity 6

Find the following amounts.

1. 50% share of a $600 bill

2. 50% discount on $150 shoes

3. 25% discount on an $80 shirt

4. 25% attendance out of 200 people

5. 75% of a taxi fare of $40

6. 75% of 1 litre (1000 ml)

7. 15% discount on $200

8. 35% interest on $200

Note: Numbers 7 and 8 are tricky. See if you can work it out or ask your trainer for help.

Click to complete Activity 6

Fractions and percentages

A fraction is part of a whole. Half is a common fraction.

For example, if two people share a cake, they have half each. Both halves are the same size. Half is written as ½. Two halves make a whole. So two halves also equal 1. Two halves can also be written as ²⁄₂.

If you want to find half of a number, you divide it by two. One half is the same as 50%.

Story

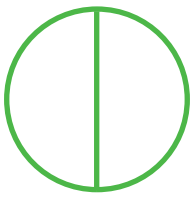
Sam drives Maggie to school. Again she talks about her maths. Maggie points to her maths book and says, 'I don't know how to do it. Why is a quarter 25%? I don't know why we have to do this stuff'.

Sam sees a question in Maggie's book, which she got wrong. The question is: ½ + ½ = ... Maggie had written ¾.

Sam thinks about this. Then he says to her, 'A half and a half make a whole, which is 1. Let's think about how to explain that'.

Simple fractions

Two people want to share a pizza. They cut it into two parts the same size. Each person has a half.



You can say that one is divided into two parts or, in maths, we say:

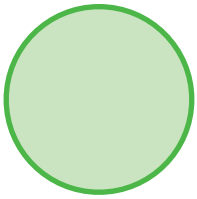
1 ÷ 2 = ½

One half is ½

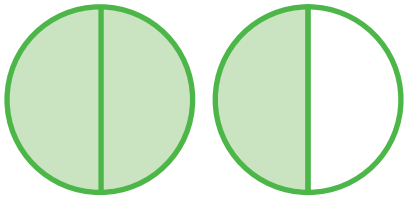
The number 1 in ½ means one part (of the whole).

The number 2 in ½ means the whole is cut into two parts.

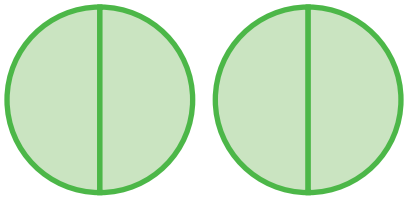
Two halves is written ²⁄₂ or just 1, because ½ + ½ = 1 whole.



Three halves are ³⁄₂, or one whole and a half, or 1½.



Four halves are ⁴⁄₂ or 2 wholes.



Tip

Start at the top when you say or write a fraction.

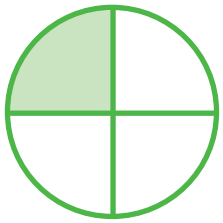
So, one half is written with a 1 on top of a 2.

½

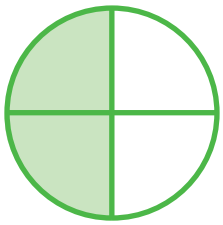
One quarter is ¼

The number 1 in ¼ means 1 part of the whole.

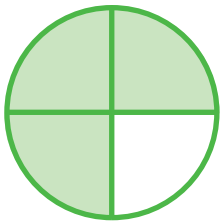
The number 4 in ¼ means the whole is cut into 4 parts.



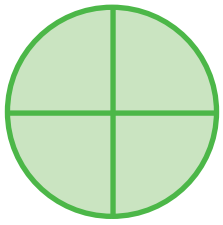
Two quarters is written ²⁄₄. Can you see that it is also ½?



Three quarters is written ¾.

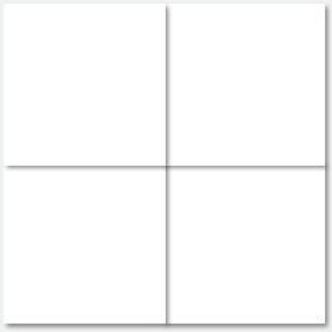


Four quarters is written ⁴⁄₄ or just 1.



Activity 7

Fold a square piece of paper into quarters.



Each part must be the same size and is ¼ of the whole piece of paper.

One piece is called ¼.

1. What do you call two parts?

_____

2. What do you call three parts?

_____

3. What do you call four parts?

_____

4. What do you think five parts are called?

_____

5. What are six parts called?

_____

Note: Ask your trainer if you need help with questions 4 and 5.

Click to complete Activity 7

Fractions and percentages together

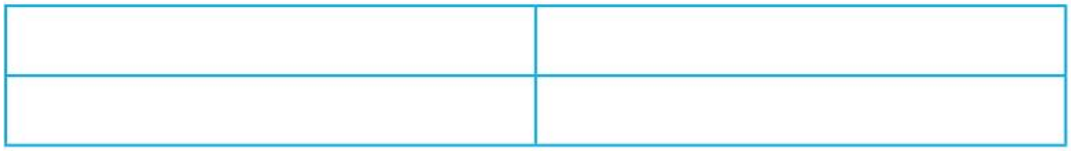
You can talk about a part as a percentage or a fraction of the whole.

Look at the strip below.

Each of the parts is half (½) of the whole strip.

Each of the parts is 50% of the whole strip, which is 100%.

Look at the box below.

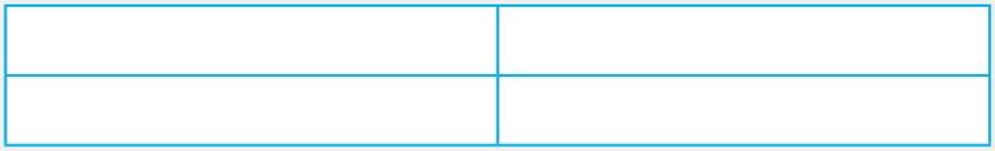


Each of the parts is one quarter (¼) of the whole box.

Each of the parts is 25% of the whole box, which is 100%.

Activity 8

One part of this box is ¼ of the whole. One part is also 25% of the whole.



1. Two parts are _____ or _____ of the whole.
2. Two parts are _____% of the whole.
3. Three parts are _____ of the whole.
4. Three parts are ____ % of the whole.
5. Four parts are _____ or ____.
6. Four parts are _____% of the whole.

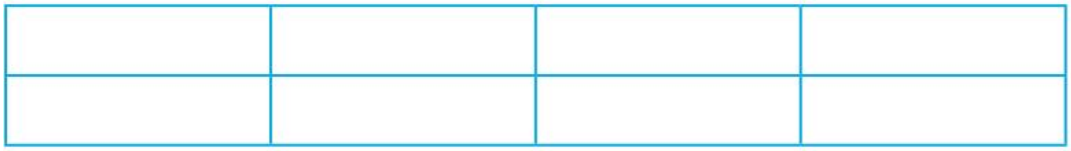
Click to complete Activity 8

More fractions

One eighth is ⅛.

To cut a chocolate bar into 8 parts, first cut it into 4 parts.

Then cut each part in half. Now you have 8 parts.



Each part is ⅛ (one eighth) of the whole chocolate bar.

Two parts are ⅜ of the whole chocolate bar. Can you see that ⅜ is also ¼?

Activity 9

Use the chocolate bar diagram above to complete the following sentences.

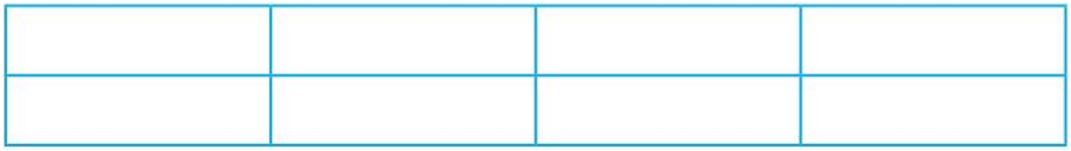
1. Three parts are _____ of the chocolate bar.
2. Four parts are _____ or _____ of the chocolate bar.
3. Five parts are _____ of the chocolate bar.
4. Six parts are _____ or _____ of the chocolate bar.
5. Seven parts are _____ of the chocolate bar.
6. Eight parts are _____ or _____of the chocolate bar.

Click to complete Activity 9

To find ⅛ as a percentage, first cut the whole into quarters. You know that each quarter is 25% of the whole.

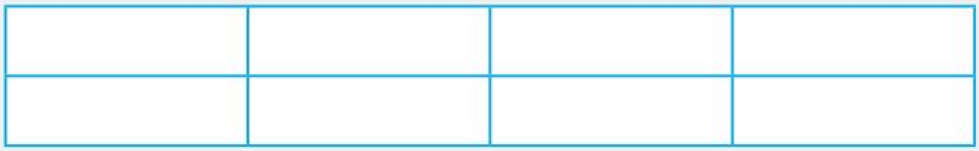
Now cut each quarter in half. Half of each quarter is an eighth. Half of 25% is 12½%, or 12.5%.

So ⅛ is 12.5%.



Activity 10

Use this diagram to complete the following table.



What are these parts as fractions and percentages?

Number of parts	Fraction	Percentage
1		12½%
2		
3		
4		
5		
6		
7		
8		

Note: Ask your trainer if you need help.

Click to complete Activity 10

One third is ⅓

Look at the strip below. The whole strip is divided into 3 parts. Each part is ⅓ of the whole.

One part is ⅓.

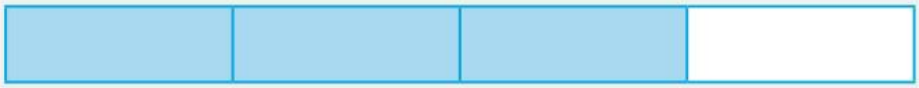
Two parts are ⅔.

Three parts are ⅗ or the whole strip.

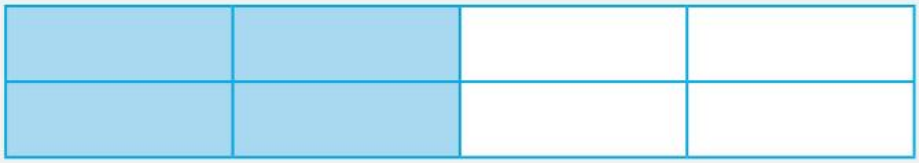
Activity 11

Write the shaded parts as a fraction and a percentage for each of the following diagrams.

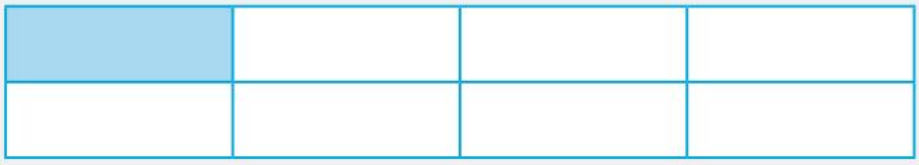
1. This is _____ or _____ and _____%



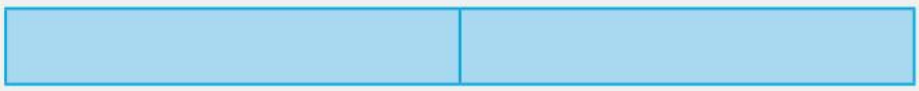
2. This is _____ and _____ %



3. This is _____ or _____ and _____%



4. This is _____ and _____ %



5. This is _____ or _____ and _____%

Click to complete Activity 11

Decimals

You may have heard that Australian money and measurements, like 1 metre and 2 litres, use decimal numbers. This means they are related to the number 10. Decimal numbers use a decimal point, which looks like a full stop.

$2.00 is two dollars exactly – see the zeroes after the decimal point.

$1.50 is one dollar and 50 cents. 50 cents is part of a dollar.

The numbers after the decimal point are called decimal fractions.

Story

Sam is buying a 1.25 litre bottle of water at lunchtime. His friend James says that Sam should buy the 1.5 litre bottle instead because it's bigger. Sam asks James what 1.25 and 1.5 mean as he's not sure.

James explains that 1.5 litres is 1½ litres, because .5 is the same as ½.

And 1.25 litres is 1¼ litres, because .25 is the same as ¼.

James then tells Sam that there are 1000 ml (millilitres) in one litre. So the 1.5 litre bottle is 1000 ml plus 500 ml – that's 1500 ml in total.

The 1.25 litre bottle is 1000 ml plus 250 ml – that's 1250 ml in total.

Sam says, 'So, the 1.5 litre bottle is bigger than the 1.25 litre bottle. I think I'll buy the 1.5 litre bottle and we can share it!'

Decimal fractions

Look at the strip below. The strip equals 1 or one whole.

Leave it like this with no divisions, please.

Now, look at the strip when it is cut into 10 parts. Each part is 0.1 of the whole.

0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1.0

So, two parts is 0.1 + 0.1, which equals 0.2.

Each part of the strip is a decimal fraction.

Activity 12

You know that there are 100 cents in one dollar. Look at the strip below. The whole strip equals 100c (cents) or one dollar.

See if you can count along the line to make $1.00. Start on the left. If $0.10 is the same as 10 cents, what the decimal number for 20 cents? The answer is $0.20.

Fill in the missing numbers on both sides of the line, counting by lots of 10 cents or 0.1.

10c 100c

$0.10 $1.00

Click to complete Activity 12

Using a calculator

Have you used a calculator before? Calculators use decimal numbers.

Sometimes the decimal point is hard to see, but it is there. Look carefully.

Take a calculator and key in 1.50, then press +. You should see that the number has lost the 0 and is now 1.5.

1.50 is the same as 1.5.

Activity 13

Use a calculator to do these sums. Write down the answers.

Make sure you add a 0 to the end of your answers if needed to make the money amount clear.

1. $3.95 + $0.55 = _____
2. $10.00 – $6.95 = _____
3. $0.85 × 10 = _____
4. $10.00 ÷ 20 = _____

Click to complete Activity 13

Remember

+ means plus, total, add

– means take away, minus, subtract

× means times, multiply

÷ means divide, share

= means equals, makes, is

Activity 14

Can you work out each of these sums? Use a calculator to find your answers and write them below.

1. The total cost of $4.50 eggs, $8.90 meat and $10.95 chicken

_____

2. The total when you add $18.55 and 45 cents

_____

3. The change from $50.00 when you spend $36.05

_____

4. The cost of 5 drinks, which each cost $2.50

_____

5. A $163.00 bill shared between 5 people

_____

Click to complete Activity 14

Fractions, percentages and decimals

We now know that a half can be written ½, 0.5, 0.50 or 50%. They all mean the same amount of a number – the same amount of money, of a line, of an apple or of a pizza.

½ is a fraction

0.5 is a decimal fraction

50% is a percentage

The whole amount is 100% for percentages. The whole for fractions and decimals is 1.

Story

Sam's wife Lauren has a part-time job in a hospital. For many years she was paid by the hour as a casual worker. This year she has been put on a 0.5 contract and is now paid half the full-time wage and works half the hours.

Lauren tells Sam she is happy about this because she now gets 50% of the wages and 50% of full-time leave.

Sam says, 'Why do you talk about a 0.5 contract when it's 50% you're talking about?' Lauren says, 'Both 0.5 and 50% mean the same amount, which is half'.

Different names for the same part

One strip is cut into two parts.

On your calculator, divide 1 into 2 parts: 1 ÷ 2 = 0.5

Each part can be called ½, 0.5 or 50%.

Now add the two parts together: 0.5 + 0.5 = 1

½ + ½ = 1

50% + 50% = 100%

Activity 15

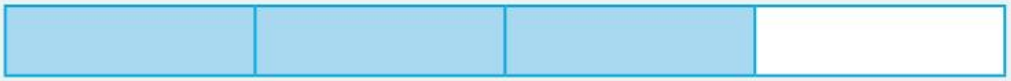
One quarter

One strip cut into four parts.

1. On your calculator divide 1 into 4 parts: 1 ÷ 4 = _____
2. Each piece is called ¼ or 0._____ or _____ %.

Three quarters

This strip is cut into four parts or quarters. Three parts are shaded.



3. The shaded part is called ¾ or 0._____ or _____%.
4. The unshaded part is called _____ or _____ or _____%.
5. Complete this table by filling in the missing numbers or words.

Words	Fractions	Percentage	Decimal
Three quarters			
		100%	
			0.25
	1 ½		
		50%	

Click to complete Activity 15

What you have learnt

Put a ✓ in the box when you have learnt these things.

- ☐ A percentage is a number that means a part per hundred. 100% is the whole thing. A percentage less than 100% is part of the whole thing.
- ☐ The symbol for percentage or percent is %.
- ☐ A fraction is also part of a whole and is written with one number on top of another number; for example, half = ½.
- ☐ Decimal numbers are related to the number 10 and use a decimal point; for example, 1.5, 2.75 or 89.25.
- ☐ The numbers after a decimal point are called decimal fractions.
- ☐ Percentages, fractions and decimals are different ways of writing the same amount; for example, 50% is the same as ½ and also 0.5.

Check your learning

Answer the following questions.

A cinema has 100 seats.

1. If the cinema is half full, how many people are in the cinema?

_____

2. What percentage of tickets have been sold?

_____

200 people work at a factory. In winter 25% are away with the flu.

3. How many people are away?

_____

4. How many people are at work?

_____

5. What percentage of people are at work?

_____

6. Fill in the gaps in the following table.

Name	Fraction	Percentage
One quarter		
	1½	
		75%
One whole		

7. Complete the following table.

Words	Fraction
One third	
Two thirds	
Two halves	
Three out of eight parts	
Five quarters	

8. Draw a diagram and shade in the amounts for each fraction in question 4.

Fraction	Diagram
⅓	
⅔	
⅔ or 1	
⅜	
¾ or 1¼	

Use a calculator to find the answers to the following questions.

9. The change from $5 when you spend $1.75 = _____
10. The total cost of 15 cans at 85 cents each = _____
11. The cost of 1 plant if it is $50 for 8 = _____
12. A bag of 6 rolls cost $3.90. The cost of 1 roll is = _____
13. The total of 95 cents and $3.50 = _____

Complete these sentences using the answers given in the box.

	0.75	0.5	75
three quarters	25	100	50
	1.5	half	

14. Sam measures 0.5 metre of wood. The wood is _____ a metre long.
15. Overtime rates are time and a half. Pay is _____ times normal pay.
16. A wine bottle holds 750 ml or three quarters of a litre or _____ litres.
17. Half a litre is 500 ml or _____ litres.
18. 25 cents is _____ % of a dollar.
19. Shared taxi rides are 75% of the amount on the meter or _____.
20. 25% of the plants died. That means _____ % of the plants lived.
21. All the seeds came up. It was a _____ % success rate.
22. Rain this month is only half normal. It is _____ %.

Click to complete

Answers

Answers to activities

Activity 1

Answer to Question 1

100%

Answer to Question 2

50%

Answer to Question 3

0%

Answer to Question 4

50%

Activity 2

Answer to Question 1

$10

Answer to Question 2

$30

Answer to Question 3

$5.50

Answer to Question 4

$15

Activity 3

Item	50%	25%
$80 shoes	$40	$20
$60 shirt	$30	$15
$100 pants	$50	$25
$70 bag	$35	$17.50

Activity 4

Amount	50%	25%	75%
$60	$30	$15	$45
$24	$12	$6	$18
$30	$15	$7.50	$22.50
$20	$10	$5	$15

Activity 5

Answer to Question 1

20%

Answer to Question 2

50%

Answer to Question 3

25%

Answer to Question 4

90%

Activity 6

Answer to Question 1

$300

Answer to Question 2

$75

Answer to Question 3

$20

Answer to Question 4

50 people

Answer to Question 5

$30

Answer to Question 6

750 ml

Answer to Question 7

$30

Answer to Question 8

$70

Activity 7

Answer to Question 1

¾ or ½

Answer to Question 2

¾

Answer to Question 3

¼ or 1 whole

Answer to Question 4

¾ or 1 ¼

Answer to Question 5

¾ or 1 ¾ or 1 ½

Activity 8

Answer to Question 1

¾ or ½

Answer to Question 2

50%

Answer to Question 3

¾

Answer to Question 4

75%

Answer to Question 5

¼ or 1 whole

Answer to Question 6

100%

Activity 9

Answer to Question 1

⅜

Answer to Question 2

⅝ or ½

Answer to Question 3

⅝

Answer to Question 4

⅚ or ¾

Answer to Question 5

⅞

Answer to Question 6

⅜ or 1 whole

Activity 10

Number of parts	Fraction	Percentage
1	⅛	12½%
2	⅜	25%
3	⅜	37½%
4	⅝ or ½	50%
5	⅝	62½%
6	⅚ or ¾	75%
7	⅞	87½%
8	⅜ or 1 whole	100%

Activity 11

Answer to Question 1

2/4 or 1/2 and 50%

Answer to Question 2

3/4 and 75%

Answer to Question 3

4/8 or 1/2 and 50%

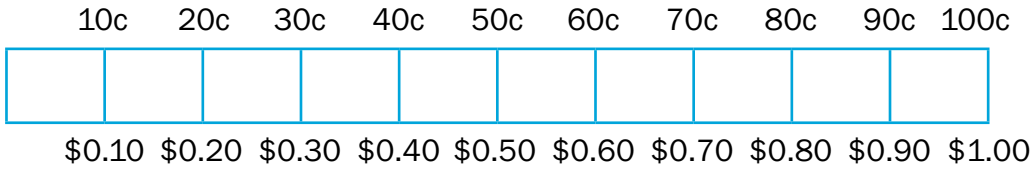
Answer to Question 4

1/8 and 12.5%

Answer to Question 5

2/2 or 1 whole and 100%

Activity 12



Activity 13

Answer to Question 1

$4.50

Answer to Question 2

$3.05

Answer to Question 3

$8.50

Answer to Question 4

$0.50

Activity 14

Answer to Question 1

$24.35

Answer to Question 2

$19.00

Answer to Question 3

$13.95

Answer to Question 4

$12.50

Answer to Question 5

$32.60

Activity 15

Answer to Question 1

0.25

Answer to Question 2

0.25 or 25%

Answer to Question 3

0.75 or 75%

Answer to Question 4

¼ or 0.25 or 25%

Answer to Question 5

Words	Fractions	Percentage	Decimal
Three quarters	¾	75%	0.75
One whole	1/1	100%	1.0
One quarter	¼	25%	0.25
One and one half	1 ½	150%	1.5
Half	½	50%	0.5

Answers to Check your learning

Answer to Question 1

50 people

Answer to Question 2

50%

Answer to Question 3

50 people

Answer to Question 4

150 people

Answer to Question 5

75%

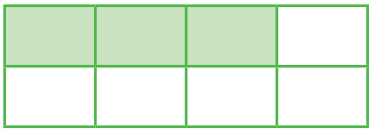
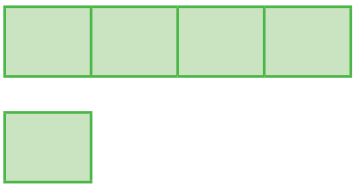
Answer to Question 6

Name	Fraction	Percentage
One quarter	¼	25%
One and one half	1½	150%
Three quarters	¾	75%
One whole	1	100%

Answer to Question 7

Words	Fraction
One third	⅓
Two thirds	⅔
Two halves	½ or 1
Three out of eight parts	⅜
Five quarters	¼ or 1¼

Answer to Question 8

Fraction	Diagram
⅓	
⅔	
½ or 1	
⅜	
¾ or 1¼	

Answer to Question 9

$3.25

Answer to Question 10

$12.75

Answer to Question 11

$6.25

Answer to Question 12

$0.65

Answer to Question 13

$4.45

Answer to Question 14

half

Answer to Question 15

1.5

Answer to Question 16

0.75

Answer to Question 17

0.5

Answer to Question 18

25

Answer to Question 19

three quarters

Answer to Question 20

75

Answer to Question 21

100

Answer to Question 22

50

