

## Edexcel - Foundation

### Ratio, proportion and rates of change

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# 2022 GCSE Advance Information

## Sparx Topics & Key Questions

We are always looking for ways to support maths teachers and students. In order to help you and your year 11s this year we've pulled together a list of key questions which may be useful to practise with your students based on the exam board topic lists.

These 66 key questions are all taken from our library of over 45,000 high-quality questions in Sparx Maths. If you are a Sparx Maths School then your students can use the Topic Codes provided to search the full content library directly within the independent learning section of Sparx Maths to help target their revision.

Please note this is not an exhaustive topic guide it is simply designed to help you pull together some key questions to use to check for understanding in lessons, starters, or as worksheets with your learners.



Ratio, proportion, and rates of change	Topics	Sparx Topic Codes
<b><u>Conversion</u></b>	<u>Length, mass, time, area</u>	U388, U902, U248
	<u>Compound units</u>	U151, U256
	<u>Scale drawing</u>	U257
<b><u>Percentages</u></b>	<u>Percentage to fraction</u>	U888
	<u>Decimal to percentage</u>	U888
	<u>Percentage of an amount</u>	U554
	<u>Percentage increase/decrease</u>	U773, U278, U671
	<u>Percentage profit</u>	U671, U278
	<u>One quantity as a percentage of another</u>	U349
	<u>Depreciation</u>	U988
	<u>Reverse percentage</u>	U286
	<b><u>Ratio</u></b>	<u>Write as a ratio</u>
<u>Share in a ratio</u>		U577
<u>Use of ratio</u>		U753, U176, U577
<u>1:n form</u>		U687
<b><u>Proportion</u></b>	<u>Direct proportion</u>	U721, U640, U238
<b><u>Compound Measures</u></b>	<u>Speed</u>	U151

Ratio, proportion, and rates of change	Topics	Sparx Topic Codes
<u>Compound Measures</u>	<u>Average speed</u>	U151, U462

## Conversion - Length, mass, time, area

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### Converting units of length, mass and capacity

U388

Decide which of the given units would be the most appropriate to use for

- a) the height of a building: kilometres, metres or centimetres?
- b) the mass of a pencil: grams, tonnes or kilograms?
- c) the capacity of a bathtub: millilitres or litres?

Convert 3060 millimetres (mm) into

- a) centimetres (cm)
- b) metres (m)

### Reading, converting and calculating with time

U902

What time is 5 hours and 42 minutes before 4.06 pm?  
Give your answer using the 12 hour clock.

Calum's calendar is shown below.  
How many days after his first exam is his last exam?

June 2016						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
		1	2	3	4	5
				<b>First exam</b>		
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
		<b>Last exam</b>				
27	28	29	30			

Jessica is meeting a friend at 17:00 at Summer Park.  
To get there, she will catch a bus from Upper Bridge, which is a 10 minute walk from her home.

What is the latest time she can leave home to get there on time?

Bus timetable	Bus Station	15:15	15:45	16:15	16:45
	Upper Bridge	15:23	15:53	16:23	16:53
	Village Square	15:30	16:00	16:30	17:00
	Quay Place	15:38	16:08	16:38	17:08
	Lower Lock	15:41	16:11	16:41	17:11
	Summer Park	15:51	16:21	16:51	17:21
	Tech Centre	16:05	16:35	17:05	17:35

Fully convert 26 days into weeks and days.

A magic show starts at 17:11 and lasts for 156 minutes.

When does the show end?  
Give your answer using the 24 hour clock.

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**Converting units of area****U248**

What is  $6.3 \text{ mm}^2$  in  $\text{cm}^2$ ?

An environmental charity set a target to plant trees on  $9000 \text{ m}^2$  of land in July.  
In July, it planted trees on  $0.014 \text{ km}^2$  of land.

- a) What area of land did the charity plant trees on? Give your answer in  $\text{m}^2$ .
- b) Did it reach its target?

## Conversion - Compound units

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### Calculating with speed

U151

It takes a bus 1 hour and 30 minutes to travel 36 miles.

Calculate the average speed of the bus in mph.  
If your answer is a decimal, give it to 1 d.p.

### Calculating with rates

U256

A goat has a heart rate of 80 beats per minute (bpm).

How long would it take for the goat's heart to beat 10,000 times?  
Give your answer in hours and minutes.

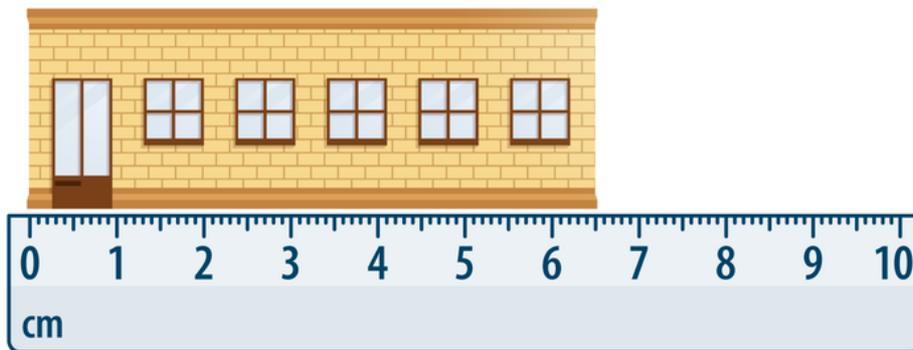
## Conversion - Scale drawing

### Drawing and interpreting scale diagrams

U257

In the scale drawing below, 1 cm represents 2 m.

- a) What is the width, in metres, of the building in real life?
- b) The real building is 4.6 m tall. What is the height of the drawing of the building, in centimetres?



The scale on a map is 1 : 200,000.

The length of a road on the map is 4 cm.

What is the length of the road in real life?  
Give your answer in **kilometres**.

## Percentages - Percentage to fraction

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Converting between fractions, decimals and percentages

U888

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What is  $\frac{64}{200}$  written as a decimal?

What is 132% written as a decimal?

Two new films, "Infinite Tracks" and "Paper Trains", were reviewed by four different magazines. The scores that each magazine gave each film are shown in the table below.

What score did "Earth Publications" give "Paper Trains"?  
Give your answer as a percentage.

		Film	
		Infinite Tracks	Paper Trains
Magazine	Media Express	$\frac{62}{100}$	$\frac{70}{100}$
	Earth Publications	$\frac{7}{20}$	$\frac{11}{20}$
	Red Carpet Review	$\frac{29}{50}$	$\frac{41}{50}$
	Cinema News	$\frac{2}{5}$	$\frac{3}{5}$

## Percentages - Decimal to percentage

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Converting between fractions, decimals and percentages

U888

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What is  $\frac{64}{200}$  written as a decimal?

What is 132% written as a decimal?

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## Percentages - Percentage of an amount

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### Finding percentages of amounts without a calculator

U554

Toby is driving 586 miles from Exeter to Aberdeen. How many miles has he travelled if he has completed 10% of his journey?

Calculate 6% of 5100

The table below shows the number of visitors to a theme park on each day last week.

70% of the visitors on Friday were children. How many children visited the theme park on Friday?

Day	Visitors
Monday	700
Tuesday	1400
Wednesday	2300
Thursday	1800
Friday	2600
Saturday	3500
Sunday	1100

What is 121% of 300?

What is 41% of 70 km?

Give your answer in kilometres (km).

**Percentages - Percentage increase/decrease****Percentage change without a calculator****U773**

The table below shows the amount that Louise paid in rent in different years.

Between 2014 and 2015, the amount of rent she paid increased by 30%.

How much rent did she pay in 2015?

Give your answer in pounds (£).

Year	Rent
2013	£3500
2014	£4000
2015	?

The table below shows how many drinks of different types a cafe sold yesterday.  
The cafe sold 60% fewer lemonades today than it did yesterday.

How many lemonades did the cafe sell today?

Drink	Number sold
Juice	550
Tea	800
Lemonade	300
Coffee	250

Finding the percentage an amount has been changed by

U278

If 130 increases to 182, what percentage increase is this?

Copy and complete the sentence below.

510 kg is \_\_\_\_% less than 750 kg.

## Percentage change with a calculator

U671

The number of drinks sold by a cafe on Saturday was  $37\%$  more than the number sold on Friday.

The cafe sold 500 drinks on Friday.  
How many drinks did the cafe sell on Saturday?

What value is  $67.4\%$  larger than 260?

The price of a necklace is **reduced** by  $8.5\%$  in a sale. The original price of the necklace was £54.

Work out the sale price of the necklace.  
Give your answer in pounds (£).



Original price = £54

Sale price = £

Increase £59 by  $7\%$

Give your answer in pounds (£).

**Decrease £67 by 26%**

Give your answer in pounds (£).

## Percentages - Percentage profit

### Percentage change with a calculator

U671

The number of drinks sold by a cafe on Saturday was  $37\%$  more than the number sold on Friday.

The cafe sold 500 drinks on Friday.  
How many drinks did the cafe sell on Saturday?

What value is  $67.4\%$  larger than 260?

The price of a necklace is **reduced** by  $8.5\%$  in a sale. The original price of the necklace was £54.

Work out the sale price of the necklace.  
Give your answer in pounds (£).



Original price = £54

Sale price = £

**Increase** £59 by 7%

Give your answer in pounds (£).

**Decrease** £67 by 26%

Give your answer in pounds (£).

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**Finding the percentage an amount has been changed by**

**U278**

If 130 increases to 182, what percentage increase is this?

Copy and complete the sentence below.

510 kg is \_\_\_\_\_% less than 750 kg.

## Percentages - One quantity as a percentage of another

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### Finding percentages of amounts with a calculator

U349

A computer costs £968. A tax of 16.5% is then added to the cost of the computer.

Work out the amount of **tax** that is added to the cost of the computer.

Give your answer in pounds (£).

## Percentages - Depreciation

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Growth and decay

U988

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At the end of 2010, a music website had 100,000 users.

The number of users grew at a rate of 40% per year until the end of 2015.

How many more users joined the website between the end of 2012 and the end of 2015?

The town of Arbridge currently has a population of 300,000.

Each year, the population of Arbridge will reduce by 7%.

How many fewer people will live in Arbridge in 5 years compared with now?  
Give your answer to 3 s.f.

## Percentages - Reverse percentage

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### Finding original values in percentage calculations

U286

135% of a value is 5265 kg.

What is the original value?  
Give your answer in kilograms (**kg**).

During a javelin throwing competition, Shannon achieves a new personal best distance by throwing the javelin **89.64 m**. This is an increase of 8% from her previous personal best distance.

Work out Shannon's previous personal best distance.  
Give your answer in metres (**m**).

The price of a book set has been **reduced** by 35%.

The new price is £49.40.

What was the original price of the book set? Give your answer in pounds (£).



## Ratio - Write as a ratio

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### Writing and simplifying ratios

U687

A garden contains 51 flowers.

18 of the flowers are sunflowers, 21 are petunias and the rest are lilies.

What is the ratio of sunflowers to petunias to lilies in its simplest form?

On a given day, a greengrocer sold 81 oranges and 43 melons.

Write the ratio of oranges to melons in the form  $1 : n$ .

Give any decimals in your answer to 2 d.p.

## Ratio - Share in a ratio

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Sharing amounts in a given ratio

U577

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Dry concrete can be made by mixing sand, gravel and cement in the ratio  $1 : 3 : 4$ . If you want  $1600 \text{ kg}$  of dry concrete, how much of each will you need? Give your answers in kilograms ( $\text{kg}$ ).

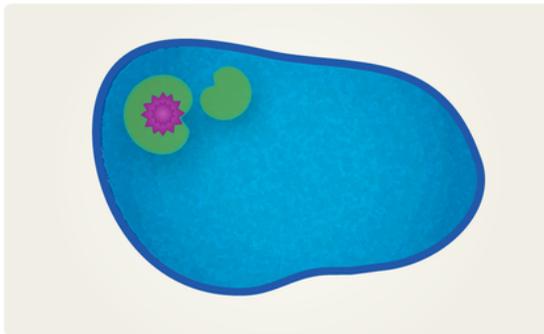
## Ratio - Use of ratio

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### Using equivalent ratios to find unknown amounts

U753

There are 15 leeches in this pond.  
How many **toads** are there?



The ratio of  
ducks to leeches to toads is  
**2:3:4**

### Converting between ratios, fractions and percentages

U176

$\frac{3}{8}$  of the animals in a pet shop are rabbits. What is the ratio of rabbits to other animals in the pet shop in its simplest form?

Beau and Esha shared a whole pizza. They shared the pizza in the ratio **7 : 13**. What percentage of the pizza did Beau eat?

## Sharing amounts in a given ratio

U577

Dry concrete can be made by mixing sand, gravel and cement in the ratio  $1 : 3 : 4$ . If you want  $1600 \text{ kg}$  of dry concrete, how much of each will you need? Give your answers in kilograms ( $\text{kg}$ ).

## Ratio - 1:n form

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### Writing and simplifying ratios

U687

A garden contains 51 flowers.

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What is the ratio of sunflowers to petunias to lilies in its simplest form?

On a given day, a greengrocer sold 81 oranges and 43 melons.

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Give any decimals in your answer to 2 d.p.

## Proportion - Direct proportion

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### Solving direct proportion word problems

U721

A carton of apple juice displays the nutritional information shown below.

How many grams of **sugar** are there in a 200 ml glass of juice?



The image shows a nutritional label for apple juice. At the top, there is a blue banner with three green apples on the left, the text 'Apple juice' in white, and '250 ml contains' below it. Below the banner is a table with three rows of nutritional information.

Carbohydrate		29.5 g
Sugar		25.5 g
Protein		0.3 g

Lois and Alexander bought petrol from different petrol stations.

- a) Was Lois's petrol or Alexander's petrol better value for money?
- b) How much would **30 litres** of petrol cost from the **cheaper** petrol station?  
Give your answer in pounds (£).

**Lois**

**£17.40 for 12 litres  
of petrol**



**Alexander**

**£22.80 for 19 litres  
of petrol**



Finn is stacking identical cube-shaped boxes. He stacks **7** boxes to make a tower that is **112 cm** tall. He adds **1** more box to the tower. How tall is the tower now? Give your answer in centimetres (cm).

### Interpreting direct proportion equations

**U640**

The number of minutes,  $n$ , that it takes to paint a wall is directly proportional to the area,  $a$ , of the wall in  $\text{m}^2$ .

The equation of proportionality is  $n = 3a$ .

Work out the area of a wall that takes **24 minutes** to paint.  
If your answer is a decimal, give it to 1 d.p.

$r$  and  $t$  are in direct proportion.

The equation of proportionality is  $r = 12t$ .

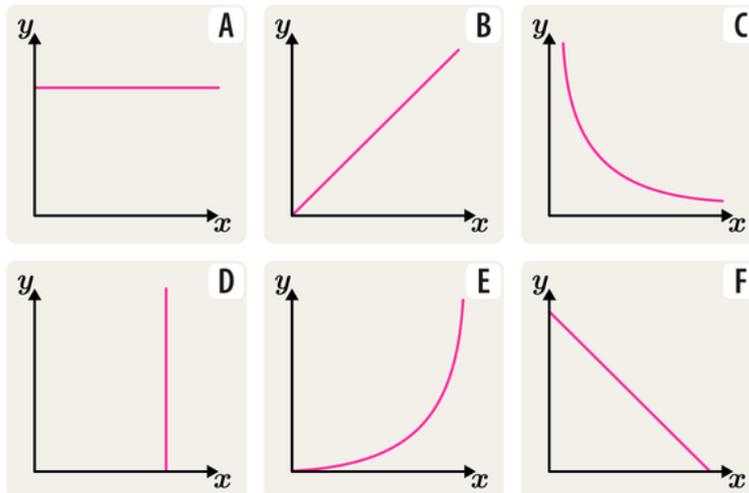
If  $t$  increases from 3 to 5, how much will  $r$  increase by?  
If your answer is a decimal, give it to 1 d.p.

### Graphs of direct and inverse proportion

U238

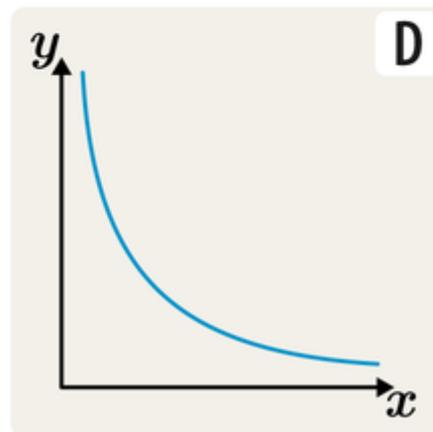
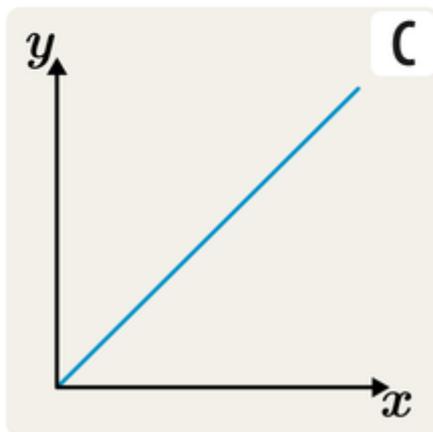
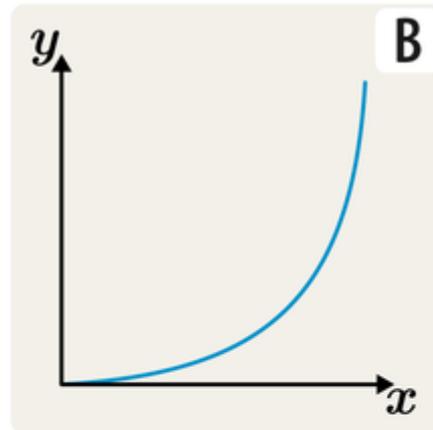
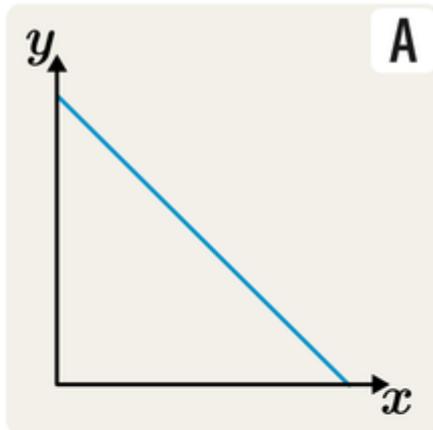
$$y \propto x$$

Which of the graphs below shows this relationship?



$y$  is inversely proportional to  $x$ .

Which of the graphs below shows this relationship?



## Compound Measures - Speed

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Calculating with speed

U151

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It takes a bus 1 hour and 30 minutes to travel 36 miles.

Calculate the average speed of the bus in mph.  
If your answer is a decimal, give it to 1 d.p.

## Compound Measures - Average speed

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Calculating with speed

U151

---

It takes a bus 1 hour and 30 minutes to travel 36 miles.

Calculate the average speed of the bus in mph.  
If your answer is a decimal, give it to 1 d.p.

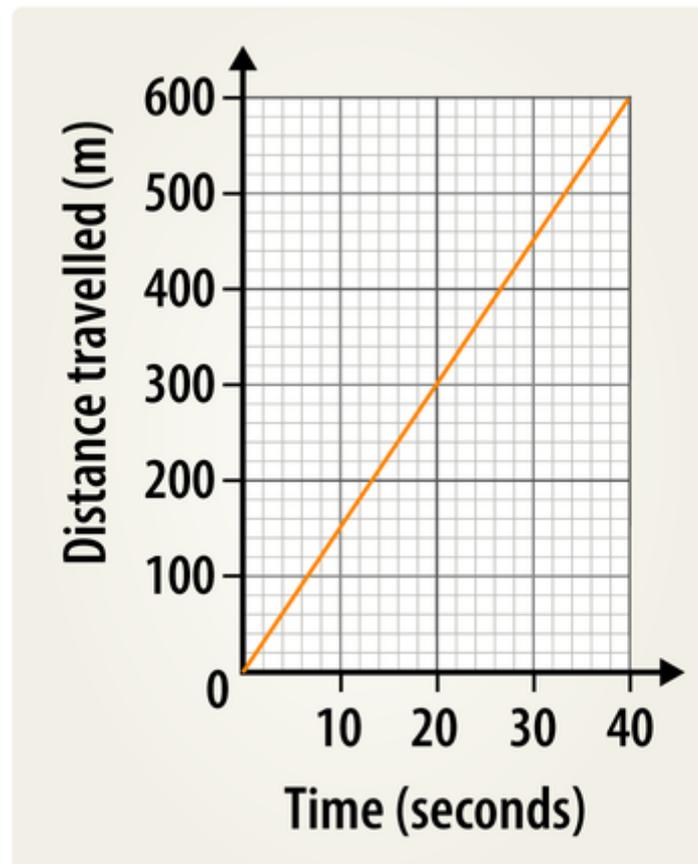
## Calculating speed from distance-time graphs

U462

This distance-time graph shows part of the journey of a train.

Calculate the speed of the train.

Give your answer in metres per second ( $\text{m/s}$ ) and give any decimal answers to 1 d.p.



This distance-time graph shows part of the journey of a bee travelling away from its hive.

Calculate the average speed of the bee for this part of the journey.

If your answer is a decimal, give it to 1 d.p.

