

Real-Life and Conversion Graphs

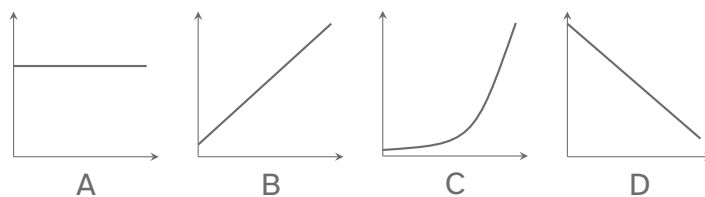
Solutions

For AQA GCSE Mathematics (8300) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (1 mark)

Here are four graphs.



Circle the graph that shows a constant rate of increase.

Options: A, B, C, D

A constant rate of change gives a straight line.

“Increase” means the line goes up from left to right.

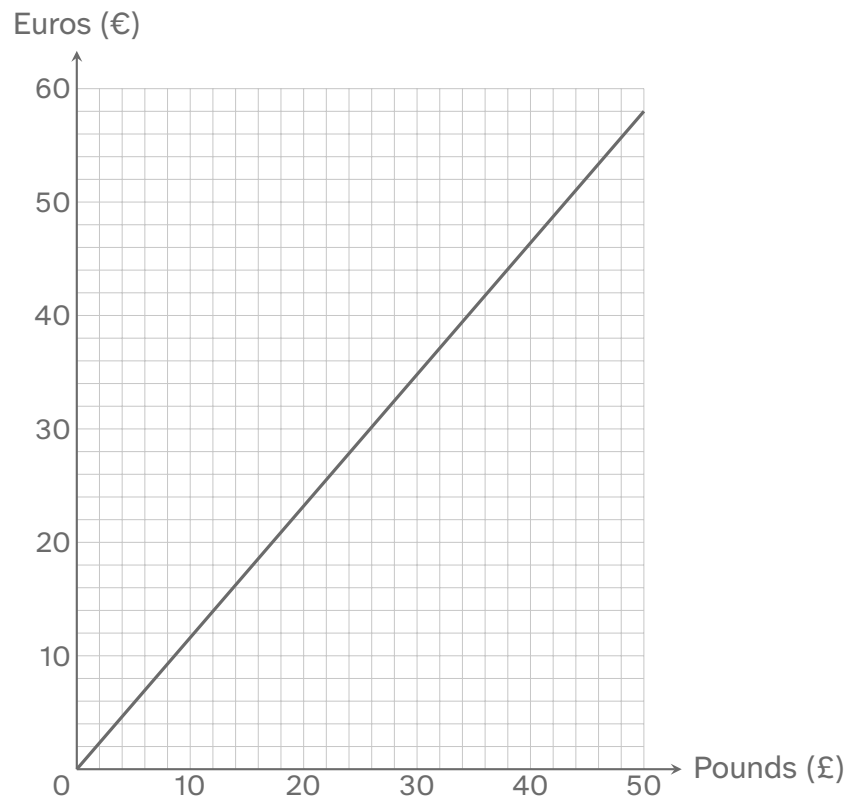
A is flat (no change), C is a curve (the rate changes) and D goes down.

So the answer is B.

Answer: B

2 (4 marks)

You can use this graph to convert between pounds (£) and euros (€).



- (a) Use the graph to convert £30 to euros.

Find £30 on the horizontal axis.

Go up to the line, then across to the euros axis.

This reads about €35.

Answer: €35 (accept 34 to 36)

- (b) Use the graph to convert €50 to pounds.

Find €50 on the vertical axis.

Go across to the line, then down to the pounds axis.

This reads about £43.

Answer: £43 (accept 42 to 44)

Tip: Check which axis you start from. Euros are on the vertical axis, so go **across** from €50, then down.

- (c) Use the graph to convert £200 to euros.

£200 is off the graph, so use a value you can read and scale up.

From the graph, £50 = €58.

$200 \div 50 = 4$, so £200 is 4 times £50.

$4 \times 58 = 232$, so £200 = €232.

Answer: €232 (accept 228 to 236)

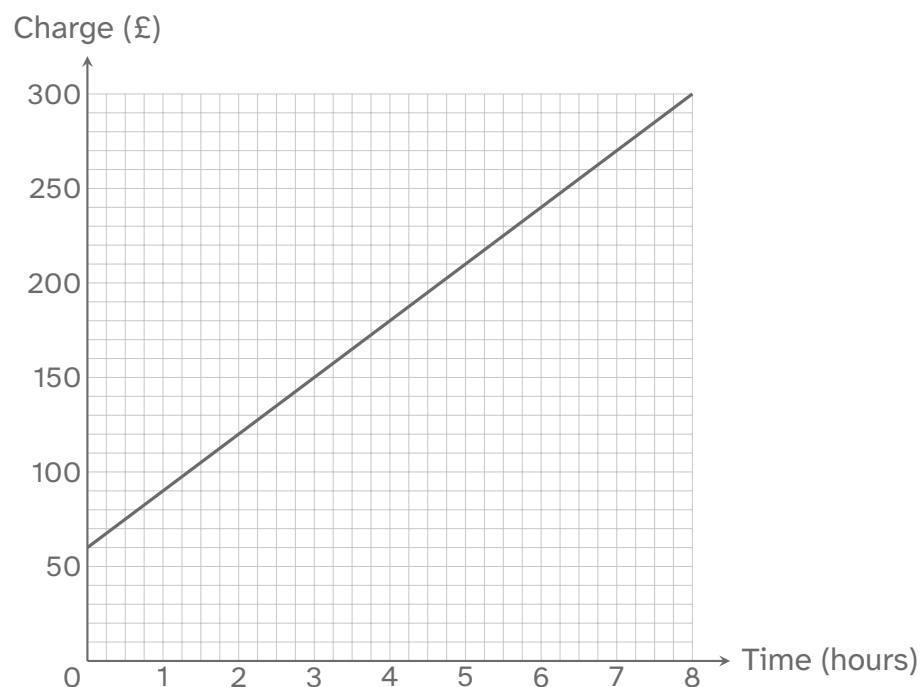
Tip: Scale up from a reading at the top end of the graph, like £50. Scaling up a small reading (e.g. £10) makes any reading error much bigger.

Marks: 1 mark for scaling up a correct reading, e.g. 4×58 . 1 mark for an answer from 228 to 236.

3 (4 marks)

Dev is a plumber. He charges a call-out fee and then an amount for each hour he works.

The graph shows his total charge for jobs of up to 8 hours.



- (a) Use the graph to find the charge for a job that takes 5 hours.

Find 5 hours on the horizontal axis.

Go up to the line, then across to the charge axis.

This reads £210.

Answer: £210

- (b) Megan's bill was £150
How long did her job take?

Find £150 on the charge axis.

Go across to the line, then down to the time axis.

This reads 3 hours.

Answer: 3 hours

Tip: Start from the **charge** axis this time, because you know the charge and want the time.

- (c) Rashid is a different plumber.
He charges £40 for each hour and has no call-out fee.

Megan says,

“Rashid is always cheaper.”

Is Megan correct?

You must show your working.

From the graph, Dev's call-out fee is £60 (the charge at 0 hours).

Dev's charge goes up by $300 - 60 = £240$ in 8 hours, so he charges $240 \div 8 = £30$ per hour.

Try a long job, e.g. 8 hours:

Dev: £300 (from the graph)

Rashid: $40 \times 8 = £320$

For 8 hours Rashid is more expensive, so Megan is not correct.

(Rashid is cheaper for jobs shorter than 6 hours; they charge the same, £240, for 6 hours.)

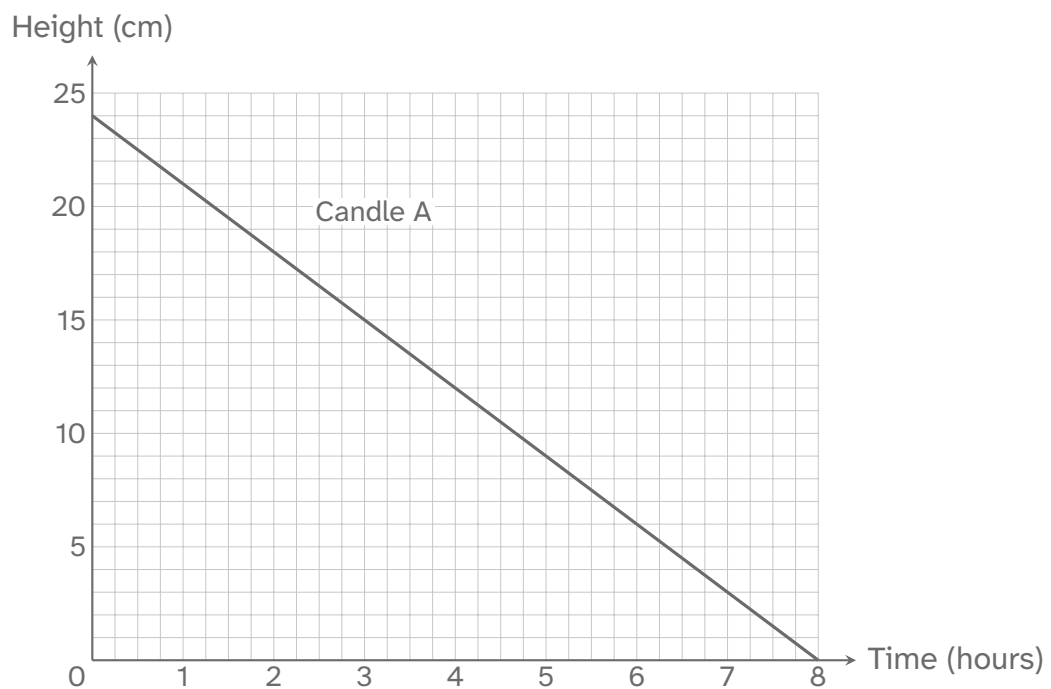
Answer: No, e.g. for 8 hours Dev charges £300 but Rashid charges £320

Tip: One example is enough to show that “always” is wrong. Rashid is cheaper for short jobs, so try a long job.

Marks: 1 mark for working out Rashid’s charge and reading Dev’s charge for the same time. 1 mark for No with a correct comparison.

4 (4 marks)

Candle A is lit. The graph shows how its height changes.



- (a) Use the graph to find the height of candle A after 6 hours.

Find 6 hours on the time axis.

Go up to the line for candle A, then across to the height axis.

This reads 6 cm.

Answer: 6 cm

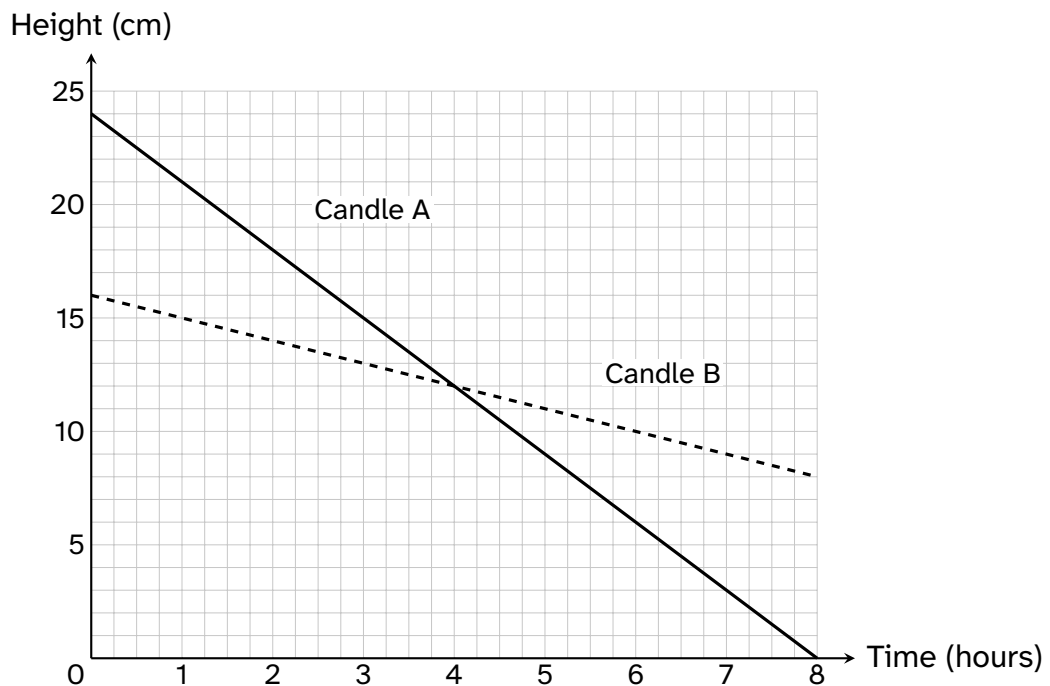
- (b) Candle B is 16 cm tall before it is lit.
It is lit at the same time as candle A.
Its height goes down by 1 cm every hour.

On the grid, draw a graph to show the height of candle B for the first 8 hours.

At 0 hours candle B is 16 cm tall.

After 8 hours it has gone down by $8 \times 1 = 8$ cm, so it is $16 - 8 = 8$ cm tall.

Join (0, 16) to (8, 8) with a ruler (shown dashed).



Marks: 2 marks for a correct line from (0, 16) to (8, 8). 1 mark for a line starting at 16 cm or a line with the correct slope.

- (c) Use your graphs to find the time when the two candles are the same height.

The candles are the same height where the two lines cross.

The lines cross at 4 hours (both candles are 12 cm tall).

Check: A: $24 - 3 \times 4 = 12$, B: $16 - 4 = 12$ ✓

Answer: 4 hours

5 (4 marks)

The graph shows the depth of water in a bath.



- (a) Describe what happens to the depth of water between 10 and 15 minutes.

Between 10 and 15 minutes the line is horizontal.

So the depth does not change. It stays at 40 cm.

Answer: It stays the same (40 cm)

- (b) Work out the rate at which the bath fills in the first 10 minutes.
Give your answer in cm per minute.

In the first 10 minutes, the depth goes from 0 to 40 cm.

Rate = change in depth $\div$ time

$$40 \div 10 = 4 \text{ cm per minute}$$

Answer: 4 cm per minute

Marks: 1 mark for $40 \div 10$. 1 mark for 4.

- (c) Is the bath emptying faster or slower than it filled?
Give a reason for your answer.

Emptying: from 15 to 25 minutes the depth drops from 40 to 20 cm.

That is 20 cm in 10 minutes, so $20 \div 10 = 2$ cm per minute.

2 cm per minute is slower than 4 cm per minute.

(You can also see this because the line is less steep.)

Answer: Slower: 2 cm/min compared with 4 cm/min

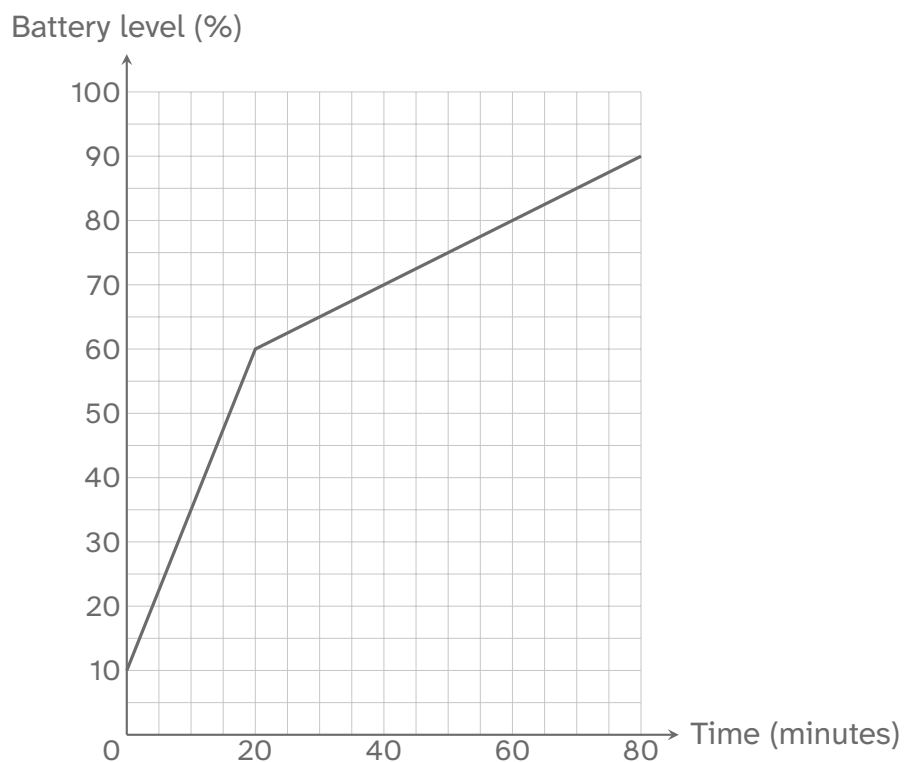
6 (4 marks)

Priya charges her phone.

For the first 20 minutes the phone uses fast charging.

After that it uses slow charging.

The graph shows the battery level of her phone.



- (a) How many times faster is the fast charging than the slow charging?

Fast charging: from 0 to 20 minutes the level goes from 10% to 60%.

That is 50% in 20 minutes, so $50 \div 20 = 2.5\%$ per minute.

Slow charging: from 20 to 80 minutes the level goes from 60% to 90%.

That is 30% in 60 minutes, so $30 \div 60 = 0.5\%$ per minute.

$2.5 \div 0.5 = 5$, so fast charging is 5 times faster.

Answer: 5 times faster

Tip: Use the change in battery level for each part, not the level itself. $60 \div 20$ is wrong because the battery started at 10%, not 0%.

Marks: 1 mark for $50 \div 20$ (2.5). 1 mark for $30 \div 60$ (0.5). 1 mark for 5.

(b) How long does it take for the battery level to go from 35% to 70%?

Go across from 35% to the graph, then down: 10 minutes.

Go across from 70% to the graph, then down: 40 minutes.

$40 - 10 = 30$ minutes

Answer: 30 minutes