GCSE Maths: Real-life graphs and rates of change (Higher): worksheet

GCSE Maths - Straight-Line Graphs and Coordinates - Higher - Lesson 12.8

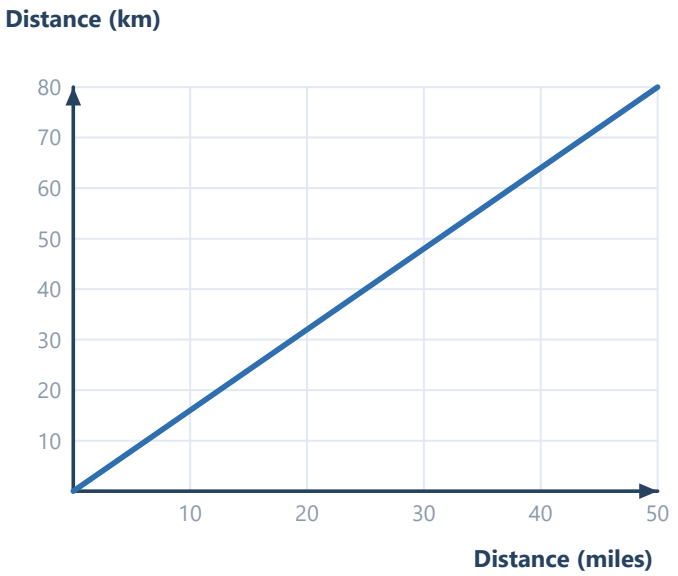
Name: _____ Date: _____ Score: _____

24 questions. Write your answers in the spaces. Answers and step-by-step help are free at **websink.site/gcse/maths/ch12-straight-line-graphs-coordinates/higher/real-life-graphs-and-rates-of-change/**

Exercise 12K Conversion graphs, rates and proportion

Calculator allowed

1 The graph converts between miles and kilometres. Use the graph to find (a) 30 miles in km, (b) 72 km in miles, (c) 25 miles in km.



(a) 30 miles in km

Answer: .....

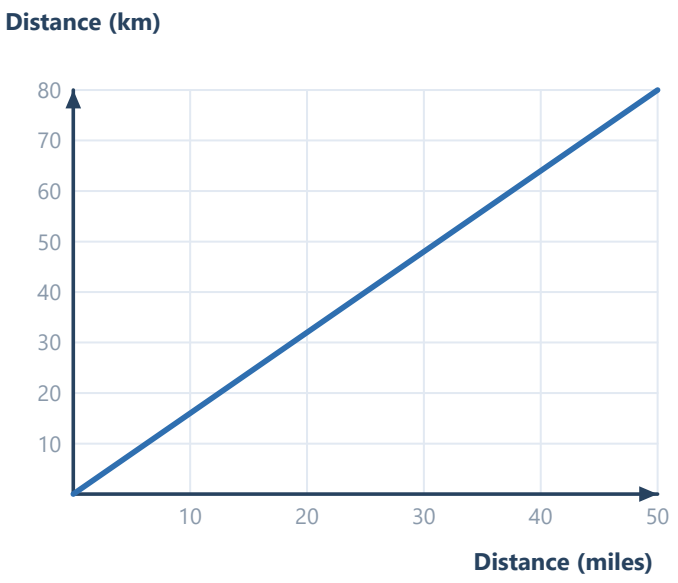
(b) 72 km in miles

Answer: .....

(c) 25 miles in km

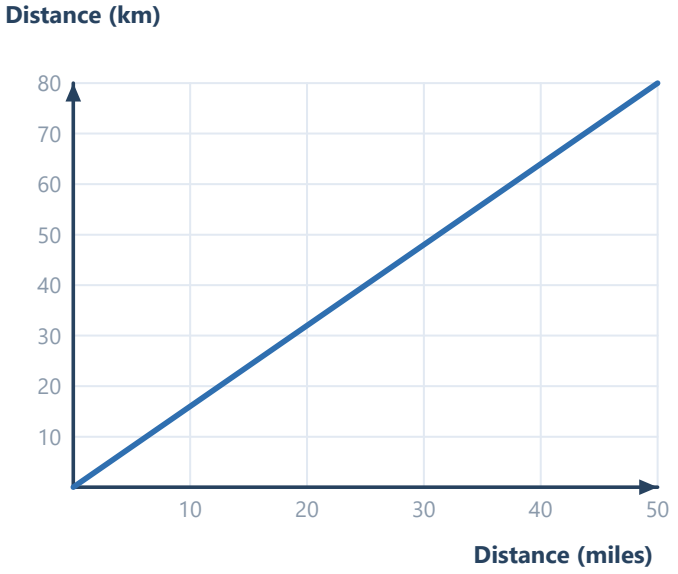
Answer: .....

2 Work out the gradient of the miles-to-km graph and explain what it tells you.



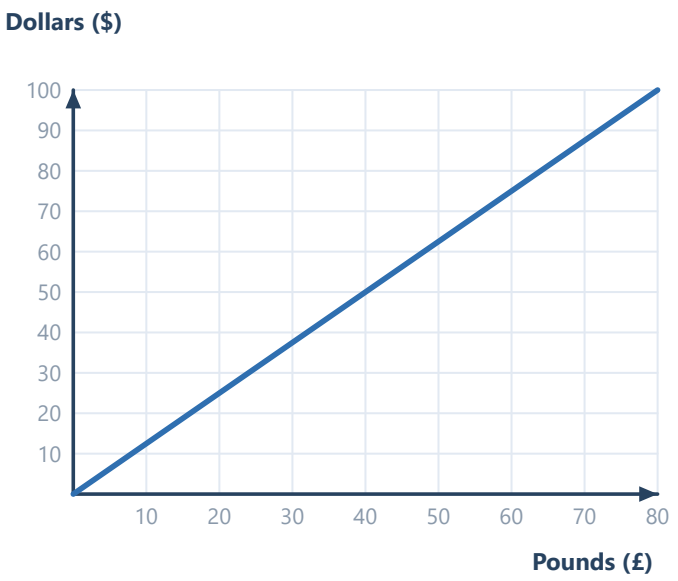
Answer:

3 Write down a formula for the number of kilometres, *k*, in terms of the number of miles, *m*.



Answer:

4 The graph converts between pounds (£) and US dollars ($). Use the graph to find (a) the number of dollars for £60, (b) the number of pounds for $50, (c) the number of dollars for £30.



(a) £60 in dollars

Answer:

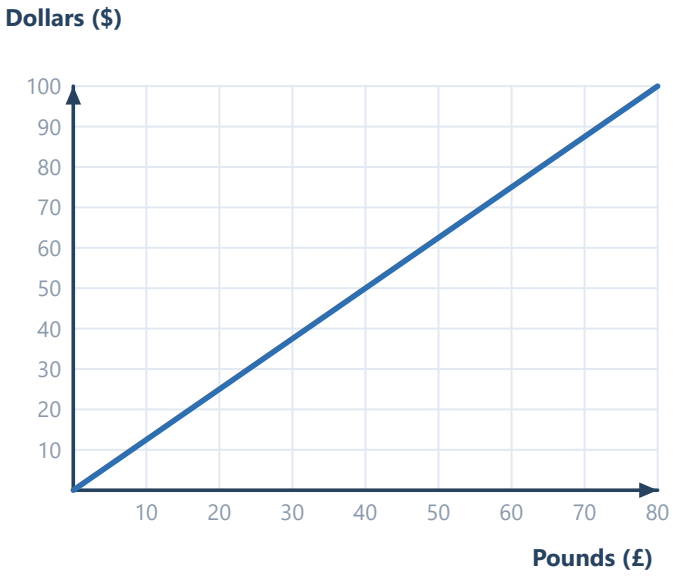
(b) $50 in pounds

Answer:

(c) £30 in dollars

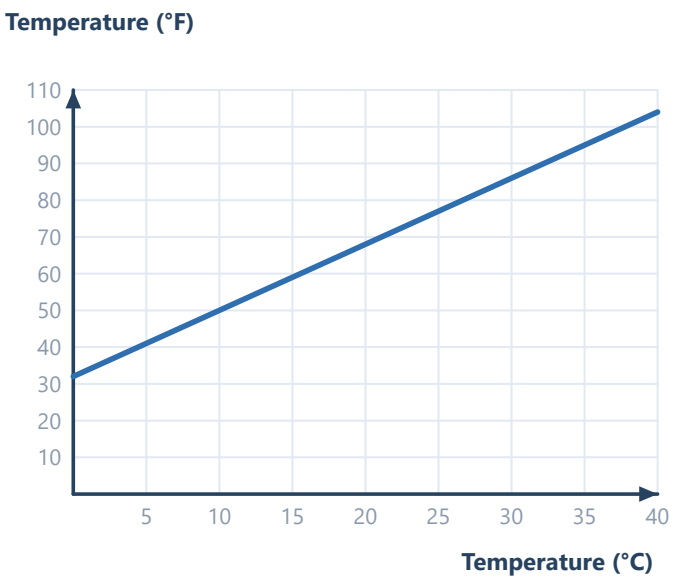
Answer:

5 Use the pounds-to-dollars graph to find a formula for the number of dollars, *D*, in terms of the number of pounds, *p*. Then use it to work out how many dollars you get for £45.



Answer:

6 The graph converts temperatures from degrees Celsius (°C) to degrees Fahrenheit (°F).



(a) Use the graph to convert 25°C to °F.

Answer:

(b) Use the graph to convert 86°F to °C.

Answer:

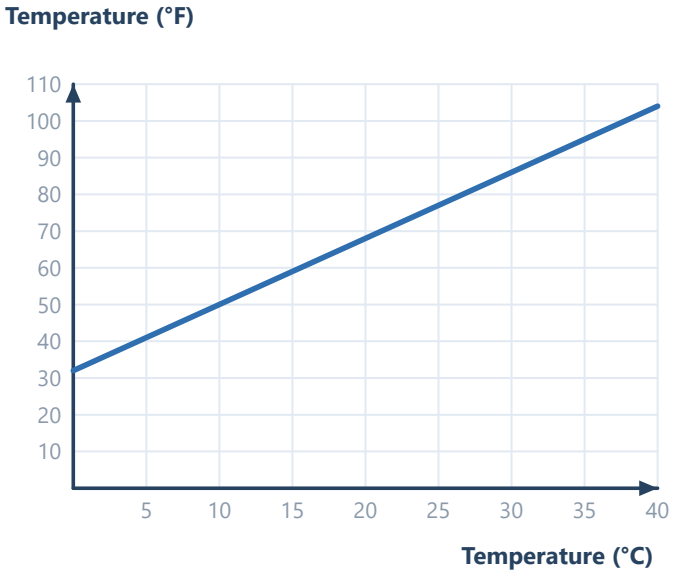
(c) What does the *y*-intercept of the graph tell you?

Answer:

(d) Work out the gradient and say what it means.

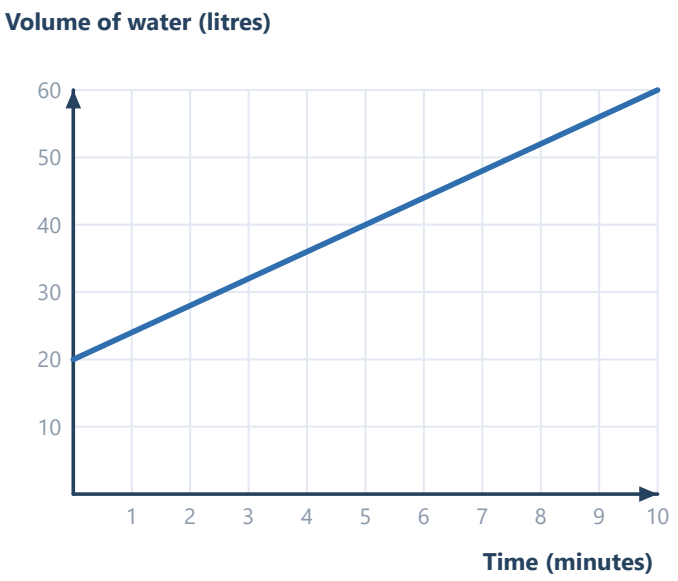
Answer:

7 **Use the temperature graph to find a formula for *F* in terms of *C*. Then work out the Fahrenheit temperature when it is 100°C.**



Answer:

8 **Water is poured into a tank. The graph shows the volume of water, *V* litres, after *t* minutes.**



(a) How much water was in the tank at the start?

Answer:

(b) Work out the gradient and say what it means.

Answer:

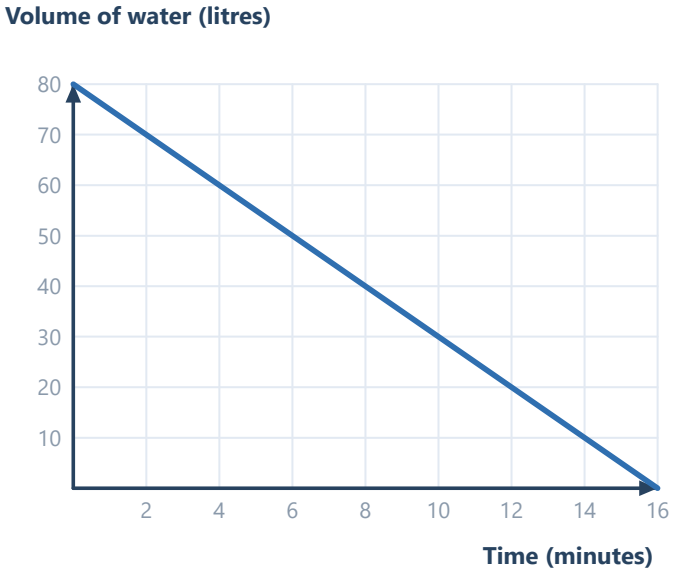
(c) Find a formula for V in terms of t.

Answer:

(d) How long does it take for the tank to hold 50 litres?

Answer:

9 **Water drains out of a tank. The graph shows the volume of water, V litres, after t minutes.**



(a) Work out the gradient. Why is it negative?

Answer:

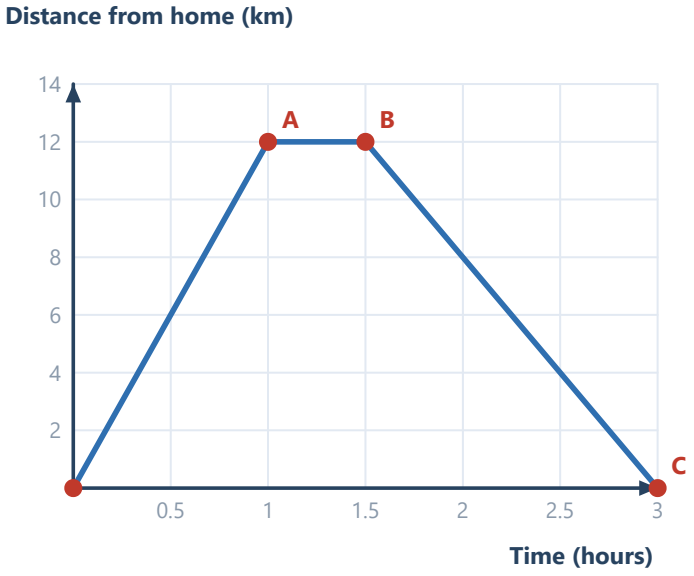
(b) After how many minutes is the tank empty?

Answer:

(c) How much water is left after 6 minutes? Use $V = 80 - 5t$.

Answer:

10 The distance–time graph shows a cycle ride from home. (a) Work out the speed during the first hour. (b) For how long did she rest? (c) Work out her speed on the way home. (d) How far from home was she after 2 hours?



(a) speed in the first hour

Answer:

(b) length of the rest

Answer:

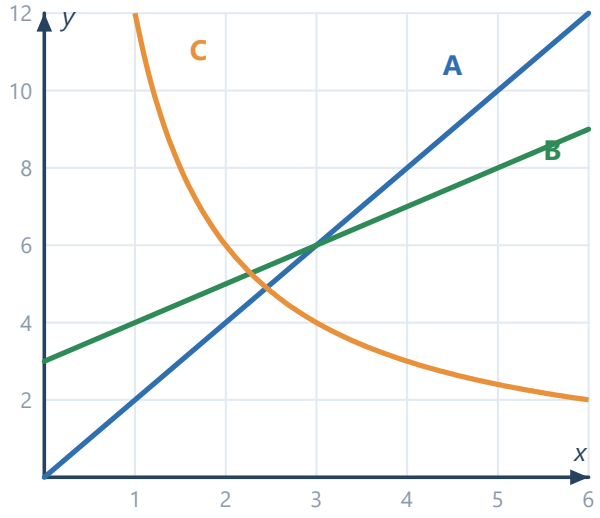
(c) speed on the way home

Answer:

(d) distance from home after 2 hours

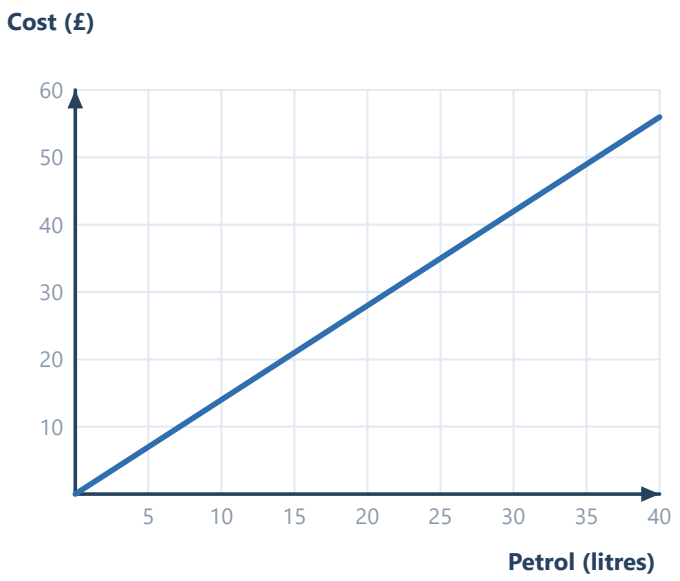
Answer:

11 The diagram shows three graphs A, B and C. Which graph shows that *y* is directly proportional to *x*? Give two reasons.



Answer:

12 The cost, £*C*, of petrol is directly proportional to the amount bought, *L* litres. The graph shows the relationship.



(a) Work out the gradient and say what it represents.

Answer:

(b) Use the graph to find the cost of 35 litres.

Answer:

(c) Write a formula for C in terms of L.

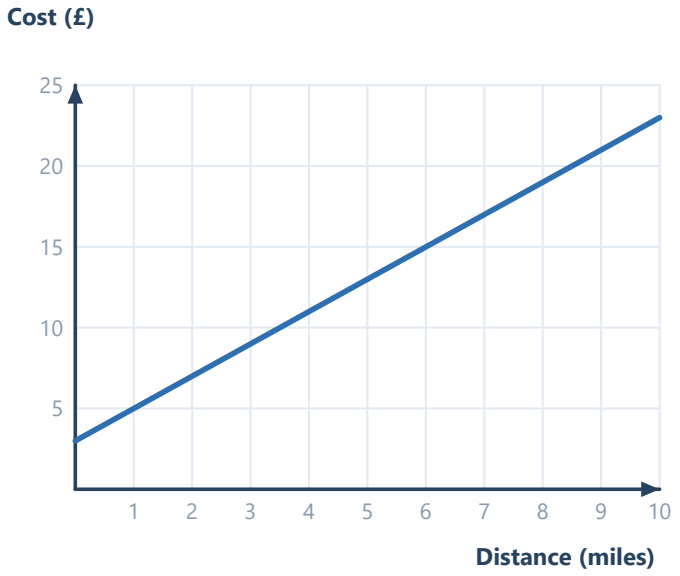
Answer:

13 **Explain why the graph that converts pounds to dollars goes through the origin, but the graph that converts °C to °F does not.**

Answer:

Exercise 12L Fares, tariffs and comparing lines Calculator allowed

1 **The graph shows the cost, £C, of a taxi journey of n miles.**



(a) Use the graph to find the cost of a 4-mile journey.

Answer:

(b) Use the graph to find how far you can travel for £15.

Answer:

(c) What does the y-intercept represent?

Answer:

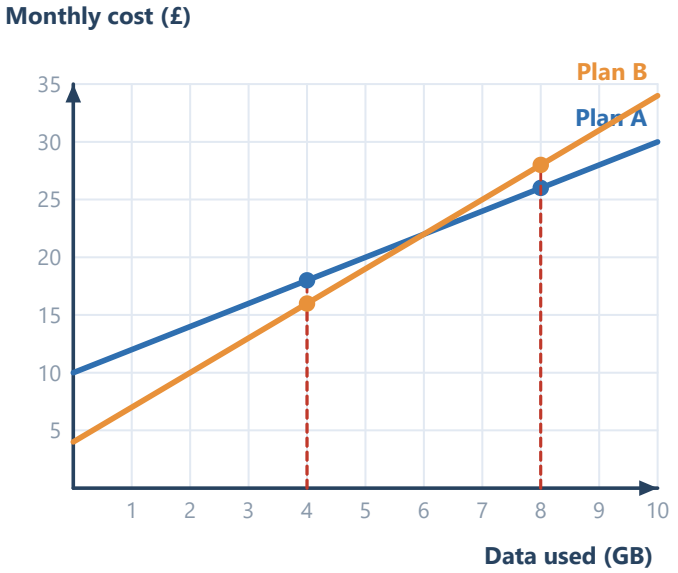
(d) Work out the gradient and say what it represents.

Answer:

(e) Write down a formula for C in terms of n.

Answer:

2 **Plan A costs £10 a month plus £2 for each GB of data. Plan B costs £4 a month plus £3 for each GB of data. Both lines are drawn on the graph.**



(a) Which plan is cheaper for 4 GB of data?

Answer:

(b) Which plan is cheaper for 8 GB of data?

Answer:

(c) For how much data do the two plans cost the same? What is the cost?

Answer:

3 **Use the formulas $C = 2g + 10$ (Plan A) and $C = 3g + 4$ (Plan B) to show algebraically that the plans cost the same for 6 GB of data.**

Answer:

4 **Aisha uses a lot of data each month. Which plan (A or B) should she choose? Use the gradients and y-intercepts to explain.**

Answer:

5 **A plumber charges a call-out fee of £40 plus £25 for each hour of work. Draw a graph to show the cost, £C, of a job lasting up to 5 hours. Use $C = 25h + 40$.**

Answer:

6 **A bike hire company charges £5 plus £3 for each hour. (a) Write a formula for the cost, £C, of hiring a bike for h hours. (b) Work out the cost of 4 hours. (c) Hannah pays £29. For how many hours did she hire the bike?**

(a) a formula for C

Answer:

(b) the cost of 4 hours

Answer:

(c) the number of hours for £29

Answer:

7 **To hire an electric scooter you pay £1 to unlock it and then 25p for each minute. Write a formula for the cost, £*C*, of a ride of *m* minutes, and work out the cost of an 18-minute ride.**

Answer:

8 **A water company charges a standing charge of £20 plus £1.80 for each cubic metre (m^3) of water used. (a) Write a formula for the cost, £*C*, of using *w* m^3. (b) Work out the cost of using 150 m^3. (c) A household's bill is £110. How much water did it use?**

(a) a formula for *C*

Answer:

(b) the cost of 150 m^3

Answer:

(c) the water used for £110

Answer:

9 **Car A leaves a town and travels at a steady 60 km/h. At the same moment car B, which is already 30 km ahead, travels in the same direction at a steady 40 km/h. After how many hours does car A catch up with car B, and how far from the town is that?**

Answer:

10 **A candle is lit. After 1 hour it is 20 cm tall and after 3 hours it is 14 cm tall. It burns at a steady rate. Find a formula for its height, *h* cm, after *t* hours, and work out when it burns out.**

Answer:

11 **The taxi graph does not go through the origin. Explain what this tells you, and what it would mean if the line did go through the origin.**

Answer:

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