Better Tuition Academy

YEAR 12 MATHEMATICS STANDARD

LEARN AND PRACTISE



Year 12 Mathematics Standard: Term 1

Student pack. Term 1: ratios, rates and linear models

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Sample, Better Tuition Academy

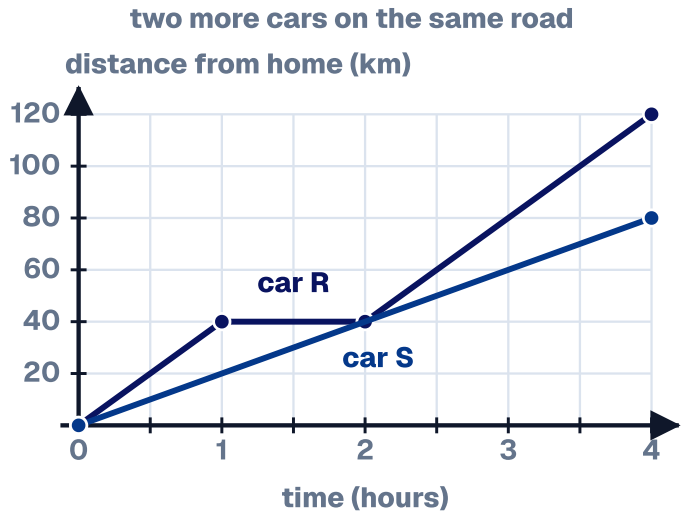
5 (a) Which section of this journey shows the fastest travel? (b) Which section shows the car stopped? (c) Which section shows it coming home? (d) Find the speed of the fastest section.



1 mark

Answer

6 Cars R and S leave the same place at the same time along the same road. (a) Find car S's speed. (b) What happens to car R between 1 and 2 hours? (c) When are the cars level, and how far from the start? (d) Which car is further from the start after 4 hours?

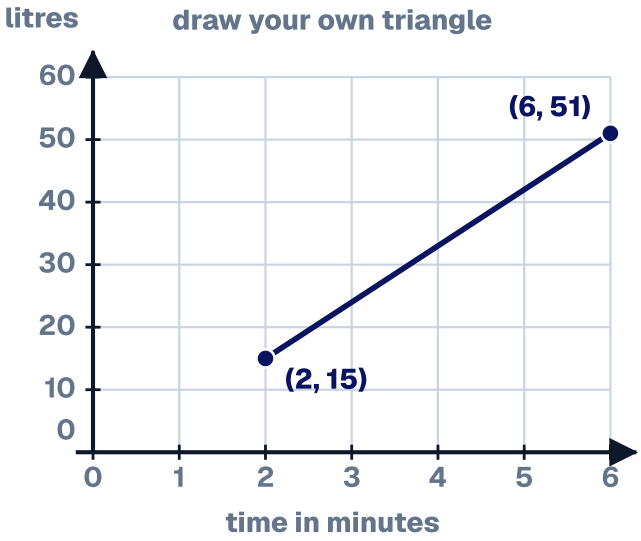


1 mark

Answer

Sample, Better Tuition Academy

5 A second trough is filling. Its graph is a straight line through $(2, 15)$ and $(6, 51)$, with volume in litres and time in minutes. Find the rate, and state the units.



1 mark

6 A second tank's graph has two pieces: from $(0, 8)$ to $(5, 48)$, then from $(5, 48)$ to $(9, 16)$, in litres against minutes. Find the rate of each piece and say what changed at 5 minutes.

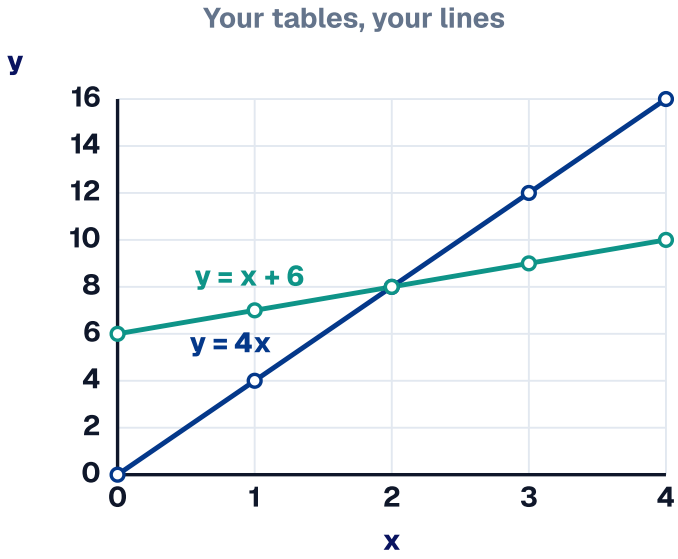


1 mark

Answer

Sample, Better Tuition Academy

16 Solve the pair $y = 4x$ and $y = x + 6$ graphically, using a table of values for $x = 0$ to $x = 4$.



1 mark

Answer

Exit check 3 questions on your own, 3 marks

1 A line crosses the y-axis at $(0, 6)$ and is flat all the way across. What is its equation?

A $x = 6$ B $y = 6x$
C $y = 6$

2 A delivery service uses the model $C = 15n + 40$, where C is the cost in dollars for n parcels. What does it cost to send 6 parcels?

A 55 dollars B 130 dollars
C 330 dollars

3 The line $3x + 4y = 24$ cuts the x-axis at the point $(a, 0)$. Find the value of a.

A -8 B 6
C 8 D 24

How did I go?

I can decide from a table of values whether a relationship is linear.

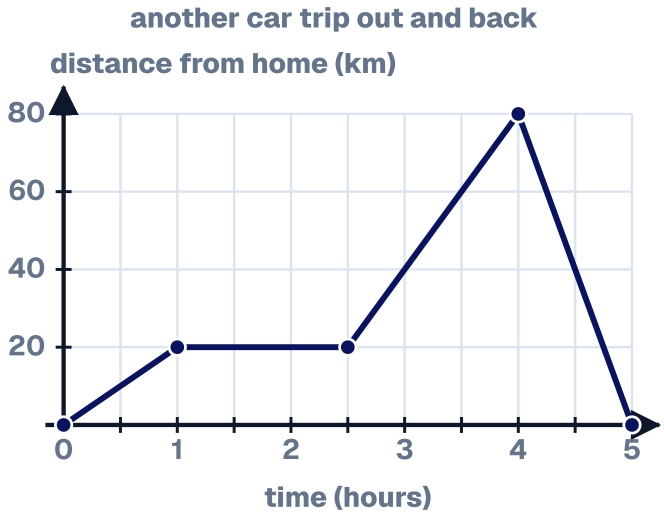
I can find the gradient of a line from two points on it, and say what it means as a rate.

I can rearrange an equation into the form $y = mx + c$ ready for substituting.

I can substitute one equation into the other, expand the brackets and solve for one letter.

Sample, Better Tuition Academy

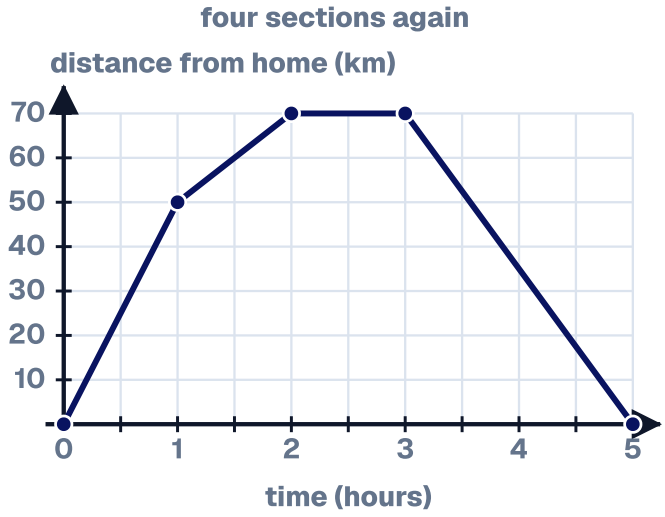
4 Describe each of the four sections of this car trip in words, then say how far from home the car got and when.



1 mark

Answer. The first section rises, so the car is **moving away from home**, reaching 20 km after 1 hour. The second section is flat from 1 hour to 2.5 hours, so the car is **stopped** for $\mathbf{1.5}$ hours. The third section rises much more steeply, so the car is **moving away faster**. The fourth section falls to 0 km, so the car is **coming home**. The highest point of the line is $\mathbf{80}$ km from home, reached after $\mathbf{4}$ hours.

5 (a) Which section of this journey shows the fastest travel? (b) Which section shows the car stopped? (c) Which section shows it coming home? (d) Find the speed of the fastest section.

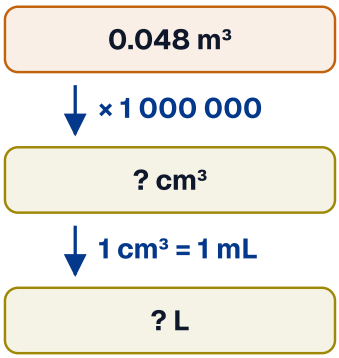


1 mark

Answer. (a) The **first** section is the steepest, so it shows the fastest travel. (b) The **third** section is horizontal, so it shows the car stopped. (c) The **fourth** section falls, so it shows the car coming home. (d) The first section runs from $(0, 0)$ to $(1, 50)$, so it covers $50 - 0 = 50$ km in $1 - 0 = 1$ hour, giving $50 \div 1 = \mathbf{50}$ km/h.

Sample, Better Tuition Academy

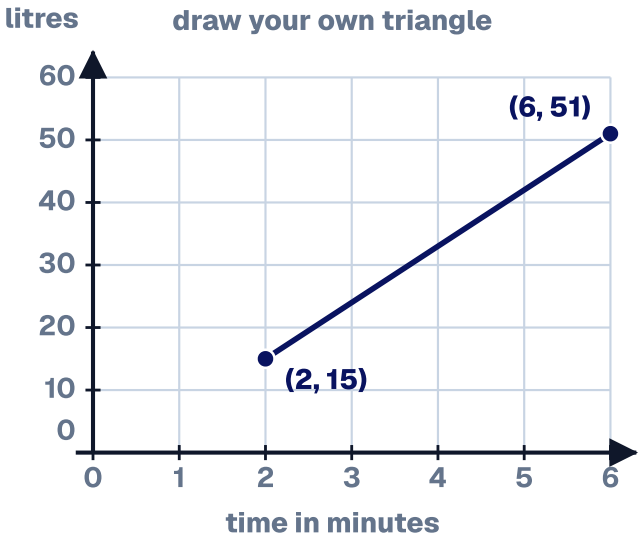
4 An esky has an internal volume of $0.048\ \text{m}^3$. Find (a) that volume in cubic centimetres, (b) the capacity in litres, (c) the capacity in kilolitres.



1 mark

Answer.
(a) $0.048 \times 1\,000\,000 = \mathbf{48\,000}\ \text{cm}^3$. (b) Cross the bridge: $1\ \text{cm}^3 = 1\ \text{mL}$, so that is $48\,000$ mL, and $48\,000 \div 1000 = \mathbf{48}\ \text{L}$. (c) $48 \div 1000 = \mathbf{0.048}\ \text{kL}$. Check with $1\ \text{m}^3 = 1\ \text{kL}$: the volume in m^3 and the capacity in kL are the same number ✓

5 A second trough is filling. Its graph is a straight line through $(2, 15)$ and $(6, 51)$, with volume in litres and time in minutes. Find the rate, and state the units.



1 mark

Answer.
The two points are $(2, 15)$ and $(6, 51)$. The rise is $51 - 15 = \mathbf{36}$ litres and the run is $6 - 2 = \mathbf{4}$ minutes, so the rate is $36 \div 4 = \mathbf{9}\ \text{L/min}$.

Sample, Better Tuition Academy