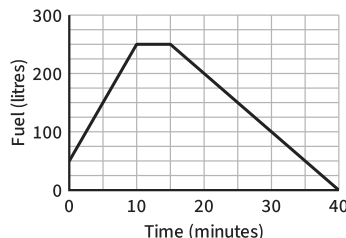


1 Rates from graphs

The fuel in a tank.

- Find the rate it fills, in litres per minute.
- How many times faster does it fill than empty?



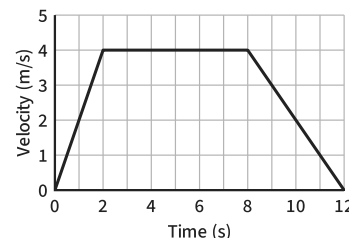
a) $200 \div 10 = 20$ litres per minute

b) empties at $250 \div 25 = 10$, so 2 times

2 Rates from graphs

A lift moves between floors.

- Find its acceleration in the first 2 seconds.
- Find the gradient of the last part. What does it show?



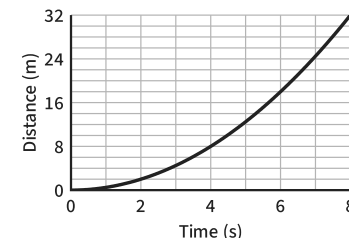
a) $4 \div 2 = 2 \text{ m/s}^2$

b) -1 : it slows by 1 m/s each second

3 Gradient of a curve

The distance a sledge travels.

- Draw a tangent to estimate its speed after 6 seconds.
- Find its average speed over the first 6 seconds.



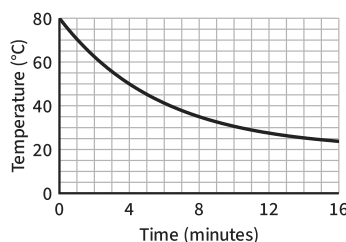
a) tangent at (6, 18): about 6 m/s

b) $18 \div 6 = 3 \text{ m/s}$

4 Gradient of a curve

A casserole cools.

- Find the average rate of change from 4 to 8 minutes.
- Is it cooling faster at 2 or at 10 minutes? Why?



a) $(35 - 50) \div 4 = -3.75 \text{ }^\circ\text{C per minute}$

b) at 2 minutes: the curve is steeper

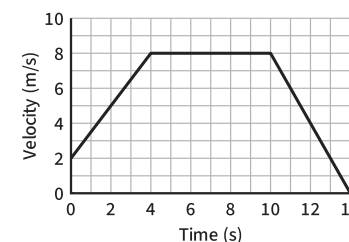
Pre-calculus revision mat answers

Higher A

5 Area under a graph

A cyclist's ride.

- Find the total distance the cyclist travels.
- Find the average speed for the ride.

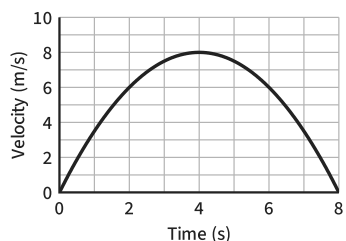


a) $20 + 48 + 16 = 84 \text{ m}$

b) $84 \div 14 = 6 \text{ m/s}$

6 Area under a graph

- Use 4 strips of equal width to estimate the distance travelled in 8 seconds.
- Is your answer an underestimate or an overestimate? Why?



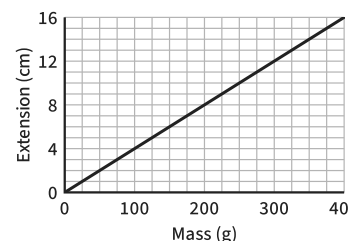
a) $6 + 14 + 14 + 6 = 40 \text{ m}$

b) under: the strips sit below the curve

7 Direct proportion graphs

A spring's extension is directly proportional to the mass on it.

- Find the gradient. What does it represent?
- Find the extension for a mass of 750 g.



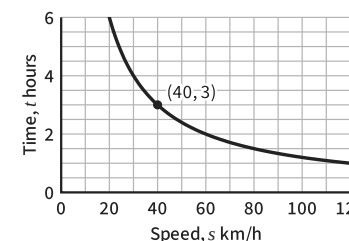
a) $12 \div 300 = 0.04$: cm of stretch for each gram

b) $750 \times 0.04 = 30 \text{ cm}$

8 Inverse proportion graphs

Journey time is inversely proportional to speed.

- Write a formula for t in terms of s .
- Find the speed for a time of 1 hour 36 minutes.



a) $t = \frac{120}{s}$ b) $120 \div 1.6 = 75 \text{ km/h}$