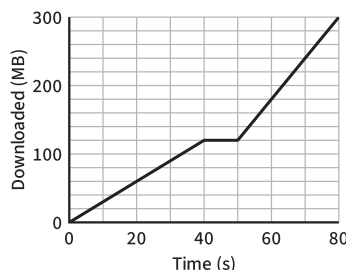


1 Rates from graphs

A file downloads.

- Find the rate in the first 40 s, in MB per second.
- Find the average rate over all 80 s.

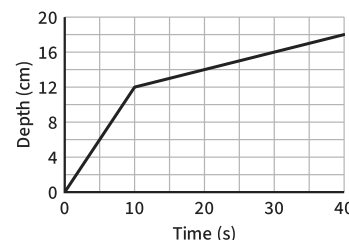


- a) $120 \div 40 = 3$ MB per second
b) $300 \div 80 = 3.75$ MB per second

2 Rates from graphs

Water is poured into a vase at a steady rate.

- Find the rate the depth rises in the first 10 seconds.
- Is the vase wider at the bottom or the top? Explain.

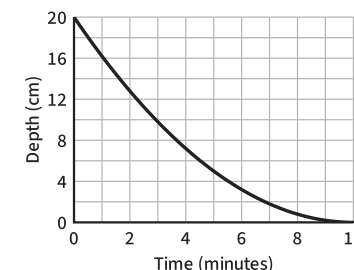


- a) $12 \div 10 = 1.2$ cm/s
b) the top: the depth then rises slower, 0.2 cm/s

3 Gradient of a curve

A tank drains.

- Draw a tangent to estimate the rate the depth falls at 4 minutes.
- When is it falling fastest? Why?

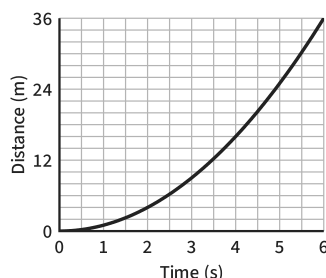


- a) about 2.4 cm per minute (2 to 2.8)
b) at the start: the curve is steepest there

4 Gradient of a curve

A go-kart's distance.

- Find its average speed from 2 to 5 seconds.
- Sam says its speed at 4 s is $16 \div 4 = 4$ m/s. Explain his mistake.



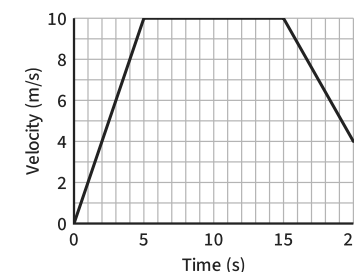
- a) $21 \div 3 = 7$ m/s b) $16 \div 4$ is the average
the tangent at 4 s gives about 8 m/s (7 to 9)

Pre-calculus revision mat answers

5 Area under a graph

A scooter's ride.

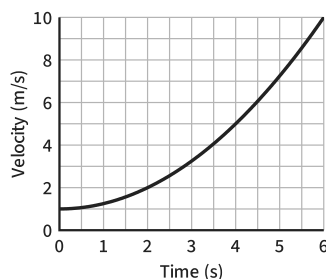
- Find the total distance it travels.
- At what time has it travelled 100 m?



- a) $25 + 100 + 35 = 160$ m
b) 25 m by 5 s, $75 \div 10 = 7.5$: 12.5 s

6 Area under a graph

- Estimate the distance in 6 seconds, using 3 strips of equal width.
- Find the average speed from your estimate, to 3 significant figures.

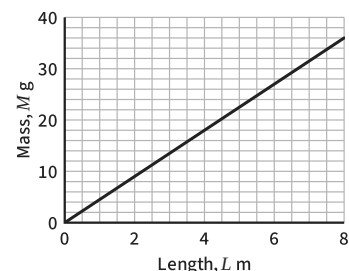


- a) $3 + 7 + 15 = 25$ m
b) $25 \div 6 = 4.17$ m/s

7 Direct proportion graphs

Mass is directly proportional to length.

- Find M in terms of L .
- Find the length of 1 kg of wire, to the nearest metre.

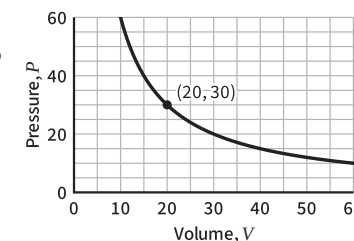


- a) $36 \div 8 = 4.5$, $M = 4.5L$
b) $1000 \div 4.5 = 222.2$, so 222 m

8 Inverse proportion graphs

The pressure of a gas is inversely proportional to its volume.

- Find P when $V = 50$.
- Find V when $P = 80$.



- a) $P = \frac{600}{V}$, $600 \div 50 = 12$
b) $600 \div 80 = 7.5$