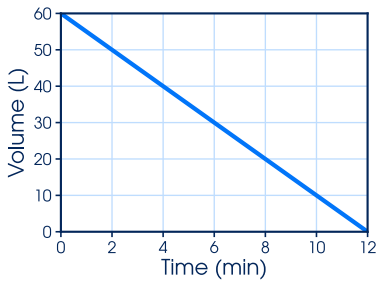
GCSE HIGHER · REVISION MAT 2

Rates of change from graphs

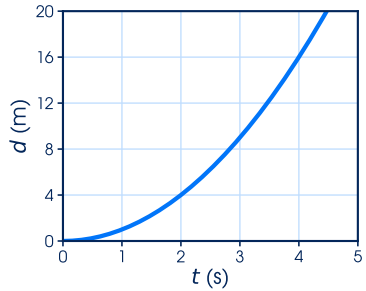
1 Find the rate at which the tank empties.



2 Find the average rate of change of $y = x^3$ between $x = 0$ and $x = 2$.

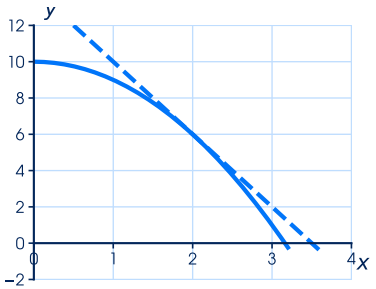
3 Explain the difference between an average rate of change and an instantaneous rate of change.

4 The graph shows $d = t^2$.



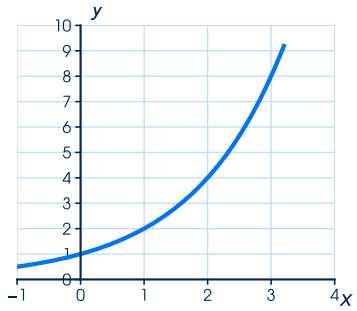
Find the average speed between $t = 1$ and $t = 4$.

5 A tangent is drawn to $y = 10 - x^2$ at $x = 2$.



Show that the gradient at $x = 2$ is -4.

6 Draw a tangent to estimate the gradient of $y = 2^x$ at $x = 2$.



7 Explain what a negative gradient means on a temperature–time graph.

8 $h = 30t - 5t^2$

Estimate the speed at $t = 2$ using $t = 1.9$ and $t = 2.1$.

ANSWERS · REVISION MAT 2

Rates of change from graphs

1 $\frac{60}{12}$

5 litres per minute

2 $\frac{8 - 0}{2}$

4

3 **Average: gradient of a chord between two points. Instantaneous: gradient of the tangent at one point.**

4 $\frac{16 - 1}{3}$

5 m/s

5 Tangent passes through (1, 10) and (3, 2)

$\frac{-8}{2} = -4$

6 Tangent through (2, 4) with gradient about 2.8

≈ 2.8 (accept 2.5 to 3)

7 **The temperature is falling.**

8 $h(2.1) = 40.95$, $h(1.9) = 38.95$

$\frac{2}{0.2}$

≈ 10 m/s