

Rates of Change

Essential information

- Average speed = $\frac{\text{total distance}}{\text{time taken}}$
- Instantaneous speed is given by the gradient of a distance-time graph at a particular time
- The gradient of the quadratic function

$$y = ax^2 + bx + c \text{ is given by } 2ax + b$$

- Using calculus notation, if $y = ax^2 + bx + c$, then its differential is

$$\frac{dy}{dx} = 2ax + b$$

- If $y = x^3$, $\frac{dy}{dx} = 3x^2$

- If $y = \frac{1}{x}$, $\frac{dy}{dx} = -\frac{1}{x^2}$

- The maximum (or minimum) of a function $f(x)$ is given by

$$\frac{df}{dx} = 0 \text{ (i.e. gradient is zero)}$$

