

When y is a function of x , the gradient of a graph of y against x tells you how the y -measurement is changing per unit x -measurement.

The rate of change of y with respect to x
can be written $\frac{dy}{dx}$

Key point

See Ch7.2

For more on distance-time graphs.

The gradient of a distance-time graph is a measure of the rate of change of distance (r) with respect to time (t), this is called **velocity** (v).

$$v = \frac{dr}{dt}$$

Key point

If v metres per second represents velocity and t seconds represents time, then the gradient, $\frac{dv}{dt}$, is a measure of the rate at which velocity is changing with time, in metres per second per second.

The rate of change of velocity is called **acceleration**, $a = \frac{dv}{dt}$

Key point

See Ch7.4

For more on acceleration as a derivative.

Acceleration is the derivative of a derivative, which is called the **second derivative**.

A similar notation is used for the second derivative, $f''(x)$, as for the first derivative, $f'(x)$

$$y = f(x) \Rightarrow \frac{dy}{dx} = f'(x) \Rightarrow \frac{d^2y}{dx^2} = f''(x)$$

Key point