

### Worked example

Using equation 1

A cyclist starting from rest with uniform acceleration can reach a velocity of  $20\text{ m/s}$  in 25 seconds. Calculate her acceleration.

Given

Initial velocity  $u = 0\text{ m/s}$

Final velocity  $v = 20\text{ m/s}$

Time taken  $t = 25\text{ s}$

$$a = \frac{v - u}{t} = \frac{20 - 0}{25} = 0.8 \text{ m/s}^2$$

using equation 5

A train accelerates uniformly from rest at  $0.2\text{ m/s}^2$  over a distance of  $1\text{ km}$ .

Calculate the final velocity it reaches.

$u = 0$  (starts from rest)

$a = 0.2 \text{ m/s}^2$

$s = 1 \text{ km} = 1000\text{ m}$

Note: use equation 5 for  $v$  when know  $s$  but not  $t$ .

$$v^2 = u^2 + 2as$$

$$= 0 + 2(0.2\text{ m/s}^2) \times 1000\text{ m}$$

$$= 400 \text{ m}^2 \text{ s}^{-2}$$

Final velocity,  $v = 20\text{ m/s}$