

## Variation.

You should be able to: Calculate direct variation in various situations.

Variation is the algebra form of proportion. At General Level you will only work with direct variation.

Example 1: This distance walked by a man varies directly with the number of minutes he walked.

- Write this is variation form
- Make it into an equation.
- If the man walked for 240 metres in 3 minutes, find k.
- Find how far he can walk in 5 minutes.

a)  $D \propto T$

a) This means D varies directly with T. Meaning that as D increases so does T.

b)  $D = kT$

b) We now make it into an equation and introduce a constant that we call k.

c)

$$D = kT$$
$$240 = k \times 3$$
$$k = \frac{240}{3}$$
$$k = 80$$

c) Here we are given a condition when the two quantities match up, and the goal is to find k.

d)

$$D = 80T$$
$$D = 80 \times 5$$
$$D = 400\text{m}$$

d) Now we use k in the formula. We are given a time, it is our goal to now find D.

Example 2: The tension  $T$  in a spring varies directly with the Extension ( $e$ )

- a) Find a formula connecting  $T$  &  $e$
- b) Find  $k$  when  $T = 27$  &  $e = 4.5$
- c) Find  $T$  when  $e = 5.8$

a)  $T \propto e$   
 $T = ke$

a) This means  $T$  varies directly with  $e$ . Meaning that as  $T$  increases so does  $e$ . We now make it into an equation and introduce a constant that we call  $k$ .

b)  $T = ke$   
 $27 = k \times 4.5$   
 $k = \frac{27}{4.5}$   
 $k = 6$

b) Here we are given a condition when the two quantities match up, and the goal is to find  $k$ .

c)  $T = 6e$   
 $T = 6 \times 5.8$   
 $T = 34.8$

d) Now we use  $k$  in the formula. We are given the value of  $e$  it is our goal to now find  $T$ .



