

Direct and Inverse proportion

Direct proportion

1. A car travels 135 miles on 15 litres of petrol. How many miles will the car travel if it uses 25 litres?
2. The force F on a mass is directly proportional to its acceleration, a
When $a = 250$, $F = 675$
 - a. Find a formula for F in terms of a
 - b. Find F when $a = 460$
3. y is directly proportional to x .
 $y = 50$ when $x = 10$.
 - a. Find the value of y when $x = 25$
 - b. Find the value of x when $y = 65$
4. The speed v of a rocket is directly proportional to the time t it travels. After 3 seconds its speed is 150 metres per second (m/s). How long after take-off will the speed reach 550 m/s ?
5. c is directly proportional to m . If $c = 100$ when $m = 34$,
 - a. Find the value of c when $m = 13$
 - b. Find the value of m when $c = 65$
6. The resistance R of a wire is directly proportional to the length l of the wire
When $l = 60$, $R = 750$
 - a. Find R when $l = 100$
 - b. Find l when $R = 1000$
7. The mass m of a liquid in a cylindrical container is proportional to the square of the radius, r
When $r = 9$, $m = 25$
 - a. Write an equation to show how m varies with r
 - b. Find m when $r = 3$
 - c. Find r when $m = 60$
8. y is directly proportional to x^2 . If $y = 25$ when $x = 5$.
 - a. Find the value of y when $x = 12$
 - b. Find the value of x when $y = 64$

9. The mass of a solid sphere, M is proportional to its radius, R cubed
When $R = 6$, $M = 7560$
- Find a formula for M in terms of R
 - Find the value of M when $R = 5$
10. The amount of energy (E) released when matter is converted to energy is proportional to mass of the object (m)
- When $E = 2 \times 10^{16}$ Joules, $m = 0.222$ kg
- Find a formula for E in terms of m giving your answer in standard form
 - Calculate the mass, in kg, when $E = 2$ million Joules

Inverse proportion

- $y \propto \frac{1}{x}$ When $y = 25$, $x = 10$
 - Write the relation between y and x
 - Find y when $x = 4$
- The resistance R , ohms, of a wire is inversely proportional to the cross sectional area A , m^2
When $A = 0.1$, $R = 150$
 - Find R when $A = 0.09$
 - Find A when $R = 18$
- The Force F (Newtons) between two point charges is inversely proportional to the square of the distance, d , metres between them
When $F = 2 \times 10^{-10}$ N, $d = 1 \times 10^{-3}$ m
 - Find an expression for F in terms of d
 - Calculate F when $d = 3 \times 10^{-2}$ m
- The time taken to be served in a restaurant, T minutes is inversely proportional to the no. of waiters working, W . It takes 20 minutes to be served when there are 12 waiters.
 - How long does it take to get served when there are 20 waiters?
- $D \propto \frac{1}{V^3}$
 $D = 5$ when $V = 2$
 - Find D when $V = 1.2$
 - Find V when $D = 11.6$