Inverse Proportion Equations (Harder)

Starter

1. **(Review of previous material)** The quantity y is ***directly*** proportional to the ***square root*** of x. When $x = 16, y = 48$.
   (a) Find a formula for y in terms of x, having calculated the constant of proportionality.
   (b) Find x when $y = 95$. Give your answer to 3 s.f.

2. **(Review of last lesson)**
   The quantity A is ***inversely*** proportional to B. When $A = 15, B = 5$.
   (a) Find a formula for A in terms of B, having calculated the constant of proportionality.
   (b) Find B when $A = 25$.

Notes

Directly proportional quantities can have linear ($y = kx$) and non-linear relationships (e.g. $y = kx^3$). Inversely proportional quantities are similar.

N.B. The basic method to solve the problems is still the same.

E.g. 1 A quantity y is ***inversely*** proportional to the ***cube*** of x. When $y = 12.5, x = 2$.
(a) Find a formula for y in terms of x, having calculated the constant of proportionality.
(b) What is the value of y when $x = 5$?

Working: (a) $y \propto \frac{1}{x^3} \Rightarrow y = \frac{k}{x^3}$

When $y = 12.5, x = 2$***:***

$$12.5 = \frac{k}{2^3}$$
$$12.5 \times 2^3 = k$$
$$k = 100$$
$$y = \frac{100}{x^3}$$

(b) …

E.g. 2 A quantity m is ***inversely*** proportional to the ***square root*** of t. When $t = 4, m = 4$. The constant of proportionality is a positive integer. What is the value of t when $m = 2$?
Hint: you need to find the formula involving m and t.

E.g. 3 The air pressure, P, from an electric pump is ***inversely*** proportional to the ***square*** of the radius, r, of the tube to the pump. A tube of radius 10 mm creates 20 units of air pressure.
(a) How much pressure will a tube of radius 15 mm create?
(b) If an air-bed is to be pumped up using a maximum of 30 units of air pressure, what radius of tube should be used?

Video: Inverse proportion

Solutions to Starter and E.g.s

Exercise

9-1 class textbook:	p149 E5.3 Qu 1, 3-10
A*-G class textbook:	p138 E5.4 Qu 2, 4-11
9-1 homework book:	p53 E5.3 Qu 1-6
A*-G homework book:	p39 E5.4 Qu 4-7

Summary

Directly proportional quantities can have linear ($y = kx$) and non-linear relationships (e.g. $y = kx^3$). Inversely proportional quantities are similar.
The basic method to solve the problems is still the same.

Homework book answers (only available during a lockdown)