

IGCSE Mathematics Revision

Session 4

Proportion

set up problems involving direct or inverse proportion and relate algebraic solutions to graphical representation of the equations

To include only the following:

$$y \propto x, \quad y \propto 1/x, \quad y \propto x^2, \\ y \propto 1/x^2, \quad y \propto x^3, \quad y \propto \sqrt{x}$$

Expressions and Formulae

understand the process of manipulating formulae to change the subject where the subject may appear twice or a power of the subject occurs

$$v^2 = u^2 + 2gs;$$

make s the subject

$$m = \frac{1 + at}{1 - at};$$

make t the subject

$$V = \frac{4}{3} \pi r^3;$$

make r the subject

$$T = 2\pi \sqrt{\frac{l}{g}};$$

make l the subject

understand the meaning of surds

manipulate surds, including rationalising the denominator where the denominator is a pure surd

Express in the form $a\sqrt{2}$:

$$\frac{2}{\sqrt{8}}, \quad \sqrt{18} + 3\sqrt{2}$$

Express in the form $a + b\sqrt{2}$:

$$(3 + 5\sqrt{2})^2$$

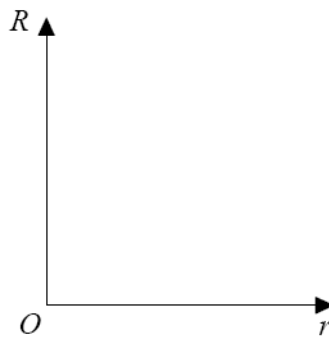
An electrician has wires of the same length made from the same material.
The electrical resistance, R ohms, of a wire is inversely proportional to the square of its radius, r mm.

When $r = 2$, $R = 0.9$

(a) (i) Express R in terms of r .

$R = \dots\dots\dots$

(ii) On the axes, sketch the graph of R against r .



(4)

One of the electrician's wires has a radius of 3 mm.

(b) Calculate the electrical resistance of this wire.

$\dots\dots\dots$ ohms
(1)

(Total 5 marks)

A ball is dropped from a tower.
After t seconds, the ball has fallen a distance x metres.

x is directly proportional to t^2 .

When $t = 2$, $x = 19.6$

(a) Find an equation connecting x and t .

.....
(3)

(b) Find the value of x when $t = 3$

$x =$
(2)

(c) Find how long the ball takes to fall 10 m.

..... seconds
(3)

(Total 8 marks)

Make W the subject of the formula $h = \sqrt{\frac{W}{I}}$

$$W = \dots\dots\dots$$

Make R the subject of the formula $A = \pi(R + r)(R - r)$

$$R = \dots\dots\dots$$

(Total 4 marks)

(a) Express $\frac{10}{\sqrt{5}}$ in the form $k\sqrt{5}$ where k is an integer.

.....
(2)

(b) Express $(5 + \sqrt{3})^2$ in the form $a + b\sqrt{3}$ where a and b are integers.

.....
(2)

(Total 4 marks)

$(1 + 3\sqrt{5})^2 = p + q\sqrt{5}$ where p and q are integers.
Find the value of p and the value of q .

$p =$

$q =$

(Total 2 marks)

$$R = \frac{3.6}{r^2} \quad 0.4$$

$$x = 4.9t^2 \quad 44.1 \quad 1.43$$

$$W = Ih^2 \quad R = \sqrt{\frac{A}{\pi} + r^2}$$

$$2\sqrt{5} \quad 28 + 10\sqrt{3} \quad p=46, q=6$$