

**www.m4ths.com – GCSE –
Rearranging Equations**

(1) Solve the following equations for x :

(a) $2x - 1 = 5$

(b) $\frac{2x-1}{3} = 5$

(c) $5(2x-1) = 15$

(d) $5(2x-1) = 10(3x+1)$

(e) $2x^2 - 1 = 17$

(f) $(2x-1)^3 = 27$

(2) The equation $v = u + at$ is used to find the velocity of an object. Currently v is the subject of the equation.

(a) Make u the subject.

(b) Make a the subject.

(c) Make t the subject.

(3) Make x the subject of the following equations:

(a) $y = 2x$

(b) $\frac{x}{2} = y$

(c) $\frac{x}{z} = y$

(d) $\frac{y}{x} = z$

(e) $\frac{x}{z} = z$

(f) $\frac{x}{3} - 1 = y$

(g) $1 - \frac{x}{3} = y$

(h) $2(x-1) = y$

(i) $2(3x-1) = y$

(j) $2(3x-1) = y+1$

(k) $y-3 = 2(3x-1)$

(l) $y-2(3x-1) = 1$

(m) $\frac{y-1}{x} = 5$

(n) $\frac{y-1}{x+1} = 5$

(o) $\frac{y^2-1}{x+1} = 5$

(p) $\frac{y-1}{x^2+1} = 5$

(4) Make p the subject of the following equations:

(a) $q-3 = p^2$

(b) $q-3 = p^3$

(c) $q-3 = \sqrt{p}$

(d) $q-3 = \frac{2}{5}p^3$

(e) $2(p+q) = 3$

(f) $2(p-q) = 3$

(g) $2(q-p) = 3$

(h) $\frac{2(q-p)}{5} = 3$

(i) $2(p+q) = 5q-1$

(j) $2(p^2+q) = 5q-1$

(k) $2(\sqrt{p}+q) = 5q-1$

(l) $\frac{\sqrt{p}+q}{2} = \frac{5q-1}{4}$

(m) $\frac{\sqrt{p}+q}{2} = \frac{5q-1}{6}$

(n) $\frac{\sqrt{p}+q}{3} = \frac{5q-1}{4}$

(5) The equation $v^2 = u^2 + 2as$ is used in physics.

(a) Write down the subject of the equation.

(b) Make v the subject of the equation and explain why there are two possible answers.

(c) Make u^2 the subject of the equation.

(d) Hence make u the subject of the equation.

(e) Make a the subject of the equation.

(f) State, without any further working, what the equation would be when s is the subject.

(6) Make a the subject of the following equations:

(a) $3a+b = a+2b$

(b) $\frac{3a+b}{2} = a+2b$

(c) $\frac{3a+b}{2} = \frac{a+2b}{5}$

(d) $2(a+3b) = a-b$

(e) $2(ab-c) = a-b$

(f) $2(a-c) = b+ad$

(g) $c(a-d) = b+ad$

(h) $d(a-d) = b-3ac$

(i) $d(a-d) = c(b-3ac)$

(7) Make x the subject of the following equations:

(a) $\frac{x}{3} - \frac{1}{z} = y$

(b) $\frac{1}{x} - \frac{1}{z} = y$

(c) $\frac{1}{x} - \frac{1}{z} = \frac{1}{y}$

(8) The circumference of a circle is given as $C = 2\pi r$ and the area is given as $A = \pi r^2$.

(a) Express r in terms of C .

(b) Express r in terms of A .

(c) Express C in terms of A .

(9) (a) Sketch a right cylinder with a height h and radius r .

(a) Write an expression for its volume (V) in terms of h and r .

(b) Given the volume of the cylinder is 200 express (i) h in terms of r (ii) r in terms of h .

(10) The surface area of a sphere is given as $S = 4\pi r^2$

and the volume as $V = \frac{4}{3}\pi r^3$.

(a) Express r in terms of S explaining why only the positive expression is valid.

(b) Express r in terms of V .

(11) The equation $s = ut + \frac{1}{2}at^2$

is used to find the displacement of a particle. By completing the square make t the subject of the equation.

(12) Show the solutions to the equation $ax^2 + bx + c = 0$ are

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$