

2.10 Algebraic Manipulation

1. Make a the subject of each of the following formulae.

(a) $\frac{k(m+a)}{m} = \frac{4}{x}$

(b) $5(a-b) = 7$

(c) $v = m(a+c)$

(d) $y = \frac{7ab+k}{7-4a}$

(e) $z = \frac{5-2a}{3-a}$

(f) $x = \frac{7+3a}{a-4}$

(g) $y = \frac{x^2a-b}{a-4}$

(h) $z = \frac{4ab+5c+2}{2ax+5y}$

2. Make the letters in brackets the subject of the following formulae.

(a) $(x+p)a = q(2x-q)$ (x) (b) $\frac{an-5x}{3a-4x} = \frac{1}{3}$ (a)

(c) $a = \frac{2b+c}{b}$ (b) (d) $\frac{y-2x}{3y} = 2x-7$ (x)

(e) $T = \frac{4pr}{p+4s}$ (p) (f) $\frac{1}{v} + \frac{2}{u} = \frac{3}{f}$ (u)

(g) $x = \frac{y}{2-y}$ (y) (h) $x = \frac{x+y-2}{x-y+1}$ (y)

(i) $w = \frac{a-b}{ac-1}$ (a) (j) $y = \frac{ax+b}{cx+d}$ (x)

(k) $\frac{1}{v} = \frac{u}{f} - 1$ (f) (l) $xy-1 = 5(2x+3)$ (x)

(m) $\frac{F+40}{9} = \frac{c+40}{5}$ (c) (n) $P = \frac{ER}{k+R}$ (k)

(o) $k = \frac{2x-1}{x+4}$ (x) (p) $3h = k\left(\frac{x}{2} - y\right)$ (x)

(q) $P - mg = \frac{mv^2}{r}$ (m) (r) $c = \frac{nE}{k+na}$ (n)

(s) $\frac{3}{5} = \frac{y-4a}{y+7b}$ (y) (t) $\frac{a}{k} + h = \frac{b}{k}$ (k)

(u) $\frac{1}{a} + \frac{2}{b} = \frac{3}{c} + \frac{4}{d}$ (b)

3. Make a the subject of the following formulae.

(a) $\sqrt{a} = b$ (b) $\sqrt{2a} = b$ (c) $\sqrt{m+a} = b$

(d) $e = \sqrt{5a-8}$ (e) $\sqrt{\frac{a}{2}} = b$ (f) $l = \sqrt{\frac{k}{ma}}$

(g) $x = \sqrt{\frac{2a}{5c}}$ (h) $\sqrt{3a-2} = \sqrt{\frac{a}{b}}$ (i) $\sqrt{3a-2k} = z$

(j) $2a^2 = b-3$ (k) $3a^2 - 2 = 3c$ (l) $k = ba^2 + z$

(m) $b = \sqrt{\frac{a^2}{5c}}$ (n) $m = n + \frac{na^2}{b}$ (o) $A = 4\pi a^2$

(p) $\sqrt[3]{a-b} = c$

4. Make the letter in brackets the subject of the formula.

- (a) $a = \sqrt{a + 2b}$ (b) (b) $a^2 + b^2 = c^2$ (b)
- (c) $(x + y)^2 = x$ (y) (d) $e = \sqrt{3c - 7a}$ (c)
- (e) $x = 2w^2 + b$ (w) (f) $\sqrt[3]{y - 1} = z$ (y)
- (g) $\frac{a^2}{x^2} + \frac{b^2}{y^2} = 1$ (b) (h) $\sqrt[3]{2x^2 - 7} = \frac{y}{z}$ (x)
- (i) $t = \sqrt{\frac{4x^2}{m - 3}}$ (x) (j) $t^2 = \sqrt{\frac{m + 2}{m - 5}}$ (m)
- (k) $\frac{1}{a} - \frac{1}{b} = \frac{1}{c - 2}$ (c) (l) $y = \frac{nx}{a(4x - 3)}$ (x)

5. Find the value of x by making x the subject of each of the following.

- (a) $\frac{2}{5x} = \frac{4}{(x - 1)}$ (b) $\frac{5}{x} + \frac{1}{4} = \frac{3}{7}$
- (c) $\frac{2x}{2x + 3} = 2$ (d) $\frac{x + 2}{3} = \frac{2x - 1}{14}$
- (e) $\frac{3}{(x + 1)} + \frac{1}{(2x + 1)} = 0$ (f) $\frac{3x}{8} - \frac{x}{4} = \frac{1}{2}$