Changing the subject.

Rules

1   Changing the subject means that you change the letter that appears on its own.

2   You put the new subject on the left hand side of the equals sign.

Eg 1 $c + 12 = d$

$\therefore c + 12 - 12 = d - 12$

$\therefore c = d - 12$

A   Make c the subject of each of these equations

1    $c + 4 = d$ 2 $c + 7 = y$ 3 $c + 9 = k$ 4 $c + 12 = t$

5    $h = c + 16$ 6 $g = c + 24$ 7 $k = c + 87$ 8 $z = c + 804$

Eg 2

$$k = h - 17$$

$$\therefore k + 17 = h - 17 + 17$$

$$\therefore k + 17 = h$$

$$\therefore h = k + 17$$

B   Make **h** the subject of the equation.

1    $h - 4 = d$ 2 $h - 7 = y$ 3 $h - 9 = k$ 4 $h - 12 = t$

5    $k = h - 16$ 6 $g = h - 24$ 7 $k = h - 87$ 8 $z = h - 804$

C   Make **k** the subject of these questions.

1    $k - 8 = f$ 2 $k + 5 = t$ 3 $k + 12 = y$ 4 $k - 11 = j$

5    $k + 82 = w$ 6 $k - 16 = u$ 7 $k + 32 = p$ 4 $k - 23 = j$

Eg 3

$$S = 8t$$

$$\therefore \frac{S}{8} = \frac{8t}{8}$$

$$\therefore \frac{S}{8} = t$$

$$\therefore t = \frac{S}{8}$$

D   Make **t** the subject of these equations.

1	$4t = u$	2	$8t = y$	3	$12t = r$	4	$5t = q$
5	$s = 9t$	6	$y = 10t$	7	$w = 8t$	8	$q = 18t$

Eg 4

$$x = 4w + 6$$

$$\therefore x - 6 = 4w + 6 - 6$$

$$\therefore x - 6 = 4w$$

$$\therefore \frac{x-6}{4} = \frac{4w}{4} \qquad \therefore \frac{x-6}{4} = w$$

$$\therefore w = \frac{x-6}{4}$$

E   Make **w** the subject of these equations.

1	$3w + 7 = g$	2	$7w - 5 = y$	3	$6w + 11 = u$	4	$3w - 18 = e$
5	$r = 7w - 12$	6	$v = 5w + 23$	7	$q = 9w - 14$	8	$s = 9w + w + 7$
9	$3w + s = 18$	10	$5w + t = 23$	11	$35 = 8w + 2t$	12	$w + 9 = 8 - w$

Eg 5

$$x = \frac{7k}{2}$$

$$\therefore 2x = \frac{7k}{2} \times 2$$

$$\therefore 2x = 7k \qquad \therefore \frac{2x}{7} = \frac{7k}{7}$$

$$\therefore \frac{2x}{7} = k$$

$$\therefore k = \frac{2x}{7}$$

F   Make k the subject of these equations.

1	$w = \frac{k}{3}$	2	$p = \frac{k}{5}$	3	$t = \frac{k}{6}$	4	$e = \frac{k}{9}$
5	$q = \frac{k}{11}$	6	$j = \frac{k}{23}$	7	$n = \frac{k}{616}$	8	$m = \frac{k}{48}$

9    $q = \frac{3k}{11}$ 10 $j = \frac{7k}{23}$ 11 $n = \frac{9k}{616}$ 12 $m = \frac{16k}{48}$

Eg 6

$$7t = \sqrt{h}$$
$$\therefore (7t)^2 = h$$
$$\therefore 49t^2 = h$$
$$\therefore h = 49t^2$$

G   Make h the subject of these equations

1    $y = \sqrt{h}$ 2 $w = \sqrt{h}$ 3 $4t = \sqrt{h}$ 4 $3y = \sqrt{h}$

Eg 7

$$5x = \sqrt{ah}$$
$$\therefore (5x)^2 = ah$$
$$\therefore 25x^2 = ah$$
$$\therefore \frac{25x^2}{a} = \frac{ah}{a}$$

$$\therefore \frac{25x^2}{a} = h$$
$$\therefore h = \frac{25x^2}{a}$$

5    $y = \sqrt{ht}$ 6 $w = \sqrt{hk}$ 7 $4t = \sqrt{hw}$ 8 $y = \sqrt{dh}$

Eg 8

$$5y = \sqrt{h+9}$$
$$\therefore (5y)^2 = h+9$$
$$\therefore 25y^2 = h+9$$
$$\therefore 25y^2 - 9 = h+9-9$$

$$\therefore 25y^2 - 9 = h$$
$$\therefore h = 25y^2 - 9$$

9    $y = \sqrt{h+5}$ 10 $w = \sqrt{h+7}$ 11 $4t = \sqrt{h+9}$ 12 $y = \sqrt{h-6}$

Eg 9 $p^2 = 6u + 9t$

$$\therefore p = \sqrt{6u + 9t}$$

Make **p** the subject of these equations.

1   $p^2 = 6 + 3t$ 2 $p^2 = u + 8y$ 3 $p^2 = 6q + 3t$ 4 $p^2 = 5u + 3t$

Eg 10 $p^2 = \dfrac{7+t}{x}$

$$\therefore p = \sqrt{\dfrac{7+t}{x}}$$

5   $p^2 = \dfrac{6+3t}{t}$ 6 $p^2 = \dfrac{u+8y}{k}$ 7 $p^2 = \dfrac{6q+3t}{3}$ 8 $p^2 = \dfrac{5u+3t}{y}$

Eg 11 $t = 5 + 3yp^2$

$\therefore t - 5 = 5 + 3yp^2 - 5$

$\therefore t - 5 = 3yp^2$

$\therefore \dfrac{t-5}{3y} = \dfrac{3yp^2}{3y}$

$\therefore \dfrac{t-5}{3y} = p^2$

$\therefore \sqrt{\dfrac{t-5}{3y}} = p$

$\therefore p = \sqrt{\dfrac{t-5}{3y}}$

9   $t = 6 + 3p^2$ 10 $x = u + 8yp^2$ 11 $3t = 6q + p^2$ 12 $w = \dfrac{5u+3t}{p^2}$