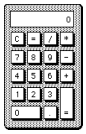
Chapter 11



Calculators should **not** be used anywhere in this Chapter unless you are otherwise instructed.

Algebra

Exercise 1

1. Simplify each of the following expressions :-

(a) $y + y + y$ (b) $3a + 4a - 5a$ (c) $3e + 3e + 3e + 3e$

(d) $4t + 7t + 5t - 11t$ (e) $9p + 12p + p - 22p$ (f) $9y + 4f + 2y + 5f$

(g) $3r + 8s + 5r - 2s$ (h) $12h + 8u - 9u - 11h$ (i) $w + 4x - 3y + x + 5y$.

2. Simplify by multiplying:-

(a) $5 \times y$ (b) $4 \times e$ (c) $h \times 7$

(d) $g \times g$ (e) $k \times k$ (f) $2a \times 3a$

(g) $5t \times t$ (h) $6k \times 6k$ (i) $2p \times 3p \times 4p$.

3. Find the value of each expression below when $a = 2$, $b = 3$ and $c = 4$:-

(a) $a + b - c$ (b) $2a + 4b - 3c$ (c) $5b - 4c + a$

(d) $a^2 + b^2 + c^2$ (e) $(c - a)^2 - 2b$ (f) $a^3 - (b - c)^3$.

4. Find the value of each expression below when $x = -1$, $y = 5$ and $z = -2$:-

(a) $x + y + z$ (b) $3x + 4y - 3z$ (c) $x^2 + (y - z)^2$.

Exercise 2

1. Multiply out the brackets :-

(a) $3(x + 2)$ (b) $4(t + 4)$ (c) $5(a - 1)$ (d) $10(w - 2)$

(e) $2(2a + 1)$ (f) $3(4e + 5)$ (g) $7(2g - 1)$ (h) $9(5k - 3)$

(i) $3(2a + b)$ (j) $5(x + 2y)$ (k) $8(2h + 4g - 1)$ (l) $15(v - 3w + y - 5)$.

2. Remove these brackets :-

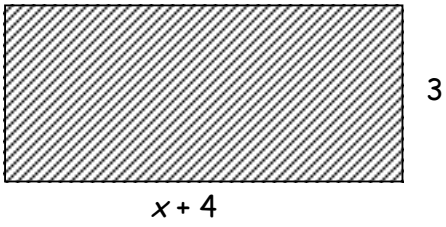
(a) $-2(a + 3)$ (b) $-5(6 + 2c)$ (c) $-3(5 - 4g)$ (d) $-(4a - 6)$

(e) $x(x + 4)$ (f) $t(2t - 5)$ (g) $-p(5p + 2)$ (h) $-k(-3 + 6k - m)$

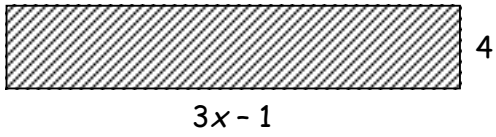
(i) $2y(3y + 1)$ (j) $4x(3x - 7)$ (k) $-2w(7 + 3w)$ (l) $-4p(6p - 2 + k)$.

3. Find the areas of each shape below :-

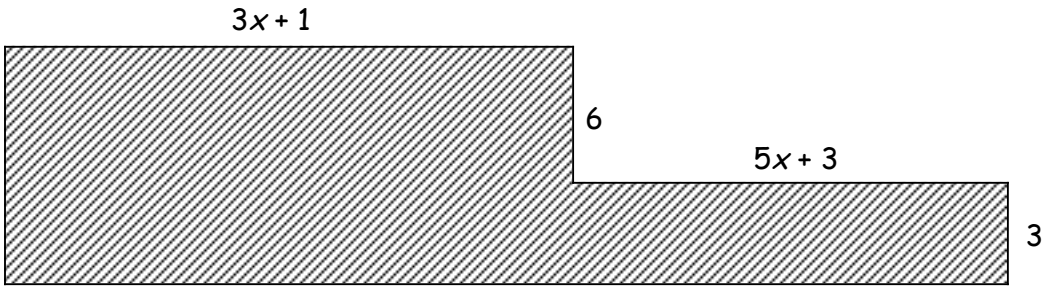
(a)



(b)



(c)



Exercise 3

Multiply out the brackets and simplify :-

1. (a) $2(x + 3) + 1$ (b) $3(y + 4) + 5$ (c) $7(k - 1) + 10$
   (d) $5(t - 2) - 5$ (e) $3(2g + 4) + 8$ (f) $6(3x + 1) - 6$
   (g) $8(3e - 2) + 5$ (h) $9(4h + 7) - 60$ (i) $4(w + 1) - 4w$.

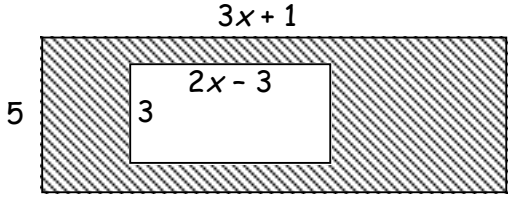
2. (a) $2(f + 3) + 3(f + 1)$ (b) $4(y + 2) + 7(y + 1)$ (c) $6(b + 3) + 2(b - 5)$
   (d) $5(2g + 2) + 4(g - 3)$ (e) $7(p + 3) - 5(p + 1)$ (f) $7(2q + 3) - 4(3q - 5)$
   (g) $5(3m - 2) + 3(2m - 6)$ (h) $4(3p - 4) - 3(4p - 5)$ (i) $5u(2u + 3) - 2u(u - 7)$.

3. (a) $5 - 4(y + 2)$ (b) $12 - 3(2b + 4)$ (c) $6 - 3(2u - 2)$
   (d) $6m - 2(4 + 3m)$ (e) $3h - 5(2h - 1) + 6h$ (f) $r - (r - 1) + (-1)$.

4. A rectangular card has length $3x + 1$ centimetres and breadth 5 centimetres.

   A smaller rectangle with sides 3 cm by $2x - 3$ cm is cut from the card.

   Find in terms of x and y the area of card left (shaded area) in its simplest form.



Exercise 4

1. Find the value of each of the following when $a = 1$, $b = 2$, $c = 3$ and $d = 4$:-

(a) $2a$ (b) $4c$ (c) $2d + 1$ (d) $a + b + c + d$

(e) $2a + 3c$ (f) $5b - 2d$ (g) $3a + 2b + c - 2d$ (h) $ab + cd$

(i) $4ab + d - 2abc$ (j) $(a + c)^2$ (k) $a^2 + b^2 + c^2$ (l) $(a + b - c)^2$

(m) $(c - d)^3$ (n) $\sqrt{(c^2 + d^2}$ (o) $2abc \div d$ (p) $a + d(bc - ab)$.

2. Find the value of each of the following when $e = -1$, $f = 3$, $g = -2$ and $h = 2$:-

(a) $5e + f$ (b) $3f + 2g - h$ (c) $3e + 2f - 3g$ (d) $ef + gh$

(e) $2fg + e^3$ (f) $(eh - gf)^2$ (g) $e^2 - h^2 - g^2 + f^2$ (h) $3(2e + f) + 2h^2$

(i) $\frac{1}{2}(h + e)^2$ (j) $2efgh$ (k) $e^2(f^2 - h^2)$ (l) $fg(3e - 5g) \div eh$.

Exercise 5

1. Copy and factorise :-

(a) $3a + 6 = 3(... + ...)$ (b) $8g - 20 = 4(... - ...)$ (c) $10y + 25x = 5(... + ...)$

(d) $ab + 4a = a(... + ...)$ (e) $2kg + 2kp = 2k(.. + ..)$ (f) $6b + 9b^2 = 3b(... + ...)$.

2. Factorise :-

(a) $2a + 4$ (b) $3x + 12$ (c) $5k - 40$ (d) $6p + 6q$

(e) $12x + 15$ (f) $16y + 24$ (g) $24k - 15$ (h) $9a + 21b$

(i) $3x + 9y + 6$ (j) $4d + 6e + 10f$ (k) $12w + 30h - 18$ (l) $15q - 45p + 75m$.

3. Factorise fully :-

(a) $3ab + 21b$ (b) $12cd + 15c$ (c) $30pqr - 24pq$

(d) $5x - 15xy + xz$ (e) $x^2 + 4x$ (f) $3y^2 + 6y$

(g) $8x^2 + 4x$ (h) $12y - y^2$ (i) $x^2 + x$

(j) $12x^2 + 4x$ (k) $x^3 + x$ (l) $y^3 + y^2 + y$.

Revision Exercise

1. Simplify :-

(a) $3x + 4x$ (b) $6x + 3x - 8x$ (c) $8 \times k$ (d) $2p \times 5$

(e) $g \times 10$ (f) $3t \times t$ (g) $4p \times 3p$ (h) $2k \times 3k \times 4k$.

2. Multiply out each bracket :-

(a) $3(x + 40)$ (b) $6(y - 3)$ (c) $9(2x + 4)$ (d) $12(3b - 5)$

(e) $a(a + 1)$ (f) $3k(2k - 4)$ (g) $-3g(4 + 2g)$ (h) $-w(4 - 3w)$.

3. Multiply out each bracket and simplify :-

(a) $3(x + 1) + 4$ (b) $4(2y + 5) - 15$ (c) $6 + 2(3e - 3)$

(d) $13 - 4(3 - 2t)$ (e) $3x(x + 1) - 3x$ (f) $12y - 3y(2y - 4) + 3y^2$

(g) $2(b + 3) + 3(2b - 1)$ (h) $5(2a + 6) - 2(4a + 15)$ (i) $5a(a + 3) - 2a(2a + 5)$.

4. Find the value of each expression when $a = -1$, $b = 2$, $c = 3$, $d = 4$ and $e = -2$:-

(a) $b + c + e$ (b) $ab + cd$ (c) $2b + 3c - 4e$ (d) $abcde \div 4$

(e) $a^2 + b^2 + c^2$ (f) $a^2 - b^2$ (g) $(ab + cd)^2 - e^2$ (h) $\sqrt{(ae)^2 - c}$.

5. Factorise fully :-

(a) $3x + 6$ (b) $4y - 10$ (c) $14p - 21$ (d) $ab + ac$

(e) $12xy + 4x$ (f) $15xyz - 3xy$ (g) $5m^2 + m$ (h) $16b^3 + 6b^2 + 28b$.