

A Expressions: Simplifying, Expanding, Factorising

3 Simplify $4m + 7k - m + 3k$.

$$3m + 10k \quad [2]$$

3 Simplify.

$$3x - 2y + x + y$$

$$4x - y \quad [2]$$

1 Simplify.

$$3a + 7b - 4a + b$$

$$-a + 8b \quad [2]$$

2 Simplify.

$$4y^2 + 3y - y^2 + 2y$$

$$3y^2 + 5y \quad [2]$$

1 Simplify.

$$7c - 5d + c + 3d$$

$$8c - 2d \quad [2]$$

5 Expand.

$$3(2x - 1)$$

$$6x - 3 \quad [1]$$

3 Expand.

$$3(x-2y)$$

$$3x - 6y \quad [1]$$

6 Expand.

$$3x(2x^4-5)$$

$$6x^5 - 15x \quad [2]$$

9 Expand $3p^2(4-3p)$.

$$12p^2 - 9p^3 \quad [2]$$

4 Expand.

$$x(3+x^2)$$

$$3x + x^3 \quad [2]$$

4 Simplify fully.

(a) $3a - 6b - 2a + b$

$$a - 5b \quad [2]$$

(b) $7(x-3) - 2(2x-1)$

$$7x - 21 - 4x + 2$$

$$3x - 19 \quad [2]$$

10 Expand and simplify. $2(t+w) + 3(w-t)$

$$2t + 2w + 3w - 3t$$

$$-t + 5w \dots [2]$$

13 Expand and simplify. $6(t-q) - 2(t-3q)$

$$6t - 6q - 2t + 6q$$

$$4t \dots [2]$$

10 Expand and simplify.

(a) $2x - x(5 - x^2)$

$$2x - 5x + x^3$$

$$-3x + x^3 \dots [2]$$

8 Expand and simplify.

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

$$8a + 20b - 18b + 9a$$

$$17a + 2b \dots [2]$$

- 9 Expand the brackets and simplify.

$$5x(2-3x) - 3x(3x-2)$$

$$10x - 15x^2 - 9x^2 + 6x$$

$$16x - 24x^2 \quad [2]$$

- 4 Factorise $x^3 - 2x$.

$$x(x^2 - 2) \quad [1]$$

- 6 Factorise completely.

$$4 - 8x$$

$$4(1 - 2x) \quad [1]$$

- 9 Factorise completely.

$$12a^3 - 21a$$

$$3a(4a^2 - 7) \quad [2]$$

- 9 Factorise completely.

(a) $21a^2 + 28ab$

$$7a(3a + 4b) \quad [2]$$

12 Factorise completely.

$$x^3y^2 - xy^2$$

$$xy(x^2y - 1) \quad [2]$$

9 Factorise completely.

$$14xy - 7y^2$$

$$7y(2x - y) \quad [2]$$

5 Factorise completely.

$$8g - 2g^2$$

$$2g(4 - g) \quad [2]$$

13 Factorise completely.

(a) $18px - 27p$

$$9p(2x - 3) \quad [2]$$

12 Factorise completely.

(a) $4x^2y - 6xy^2$

$$2xy(2x - 3y) \quad [2]$$

5 Factorise completely.

(a) $42mk - 35m$

$$\underline{7m(6k - 5)} \quad [2]$$

10 Factorise.

(a) $8x + 14$

$$\underline{2(4x + 7)} \quad [1]$$

(b) $8ax^2 - 6bx^3$

$$\underline{2x^2(4a - 3bx)} \quad [2]$$

2 Simplify.

$$y \times 27 - y \times 77$$

factorise:

$$y(27 - 77)$$

$$y(-50)$$

$$= -50y$$

$$\underline{-50y} \quad [1]$$

- 9 (a) Factorise completely.

$$3x^2 - 12xy$$

$$\underline{3x(x - 4y)} \quad [2]$$

- (b) Expand and simplify.

$$(m-3)(m+2)$$

$$\begin{aligned} m^2 + 2m - 3m - 6 \\ = m^2 - m - 6 \end{aligned}$$

$$\underline{m^2 - m - 6} \quad [2]$$

- 4 (a) Factorise.

$$2p^2 - pq$$

$$\underline{p(2p - q)} \quad [1]$$

- (b) Expand the brackets and simplify.

$$(p-7)(p+3)$$

$$\begin{aligned} p^2 + 3p - 7p - 21 \\ = p^2 - 4p - 21 \end{aligned}$$

$$\underline{p^2 - 4p - 21} \quad [2]$$

- 12 Expand the brackets and simplify.

$$(4x-3y)(4x+3y)$$

$$\begin{aligned} 16x^2 + 12xy - 12xy - 9y^2 \\ = 16x^2 - 9y^2 \end{aligned}$$

$$\underline{16x^2 - 9y^2} \quad [2]$$

- 3 Find the value of $x^2 - x$ when $x = -3$.

$$\begin{aligned} & (-3)^2 - -3 \\ & = 9 + 3 \end{aligned}$$

$$= 12 \quad [1]$$

- 5 $y = mx + c$

Find the value of y when $m = -3$, $x = -2$ and $c = -8$.

$$\begin{aligned} y &= (-3)(-2) + -8 \\ &= 6 - 8 \\ &= -2 \end{aligned}$$

$$y = -2 \quad [2]$$

- 4 $v = u - 9.8t$

Find the value of v when $u = 4$ and $t = -7$.

$$\begin{aligned} v &= 4 - 9.8 \times -7 \\ &= 4 - -68.6 \\ &= 72.6 \end{aligned}$$

$$v = 72.6 \quad [2]$$

- 3 $v = u + at$

Find the value of v when $u = 30$, $a = -2$ and $t = 7$.

$$\begin{aligned} v &= 30 + (-2)(7) \\ &= 30 + -14 \\ &= 16 \end{aligned}$$

$$v = 16 \quad [2]$$

3 $P = 2a + b^2 - 3c$

Find P when $a = 5$, $b = -4$ and $c = -3$.

$$\begin{aligned} P &= 2(5) + (-4)^2 - 3(-3) \\ &= 10 + 16 + 9 \\ &= 35 \end{aligned}$$

$P = \dots\dots\dots 35 \dots\dots\dots [2]$

4 $V = 4mp^2$

(a) Find V when $m = 10$ and $p = -3$.

$$\begin{aligned} V &= 4(10)(-3)^2 \\ &= 40 \times 9 \\ &= 360 \end{aligned}$$

$V = \dots\dots\dots 360 \dots\dots\dots [2]$

(b) Find the positive value of p when $V = 3200$ and $m = 2$.

$$\begin{aligned} 3200 &= 4 \times 2 \times p^2 \\ 3200 &= 8p^2 \\ \div 8 &\quad \div 8 \\ 400 &= p^2 \\ p &= \pm 20 \end{aligned}$$

$p = \dots\dots\dots 20 \dots\dots\dots [2]$

9 $P = \frac{2wy^2}{3}$

Find the positive value of y when $P = 108$ and $w = 8$.

$$108 = \frac{2 \times 8 \times y^2}{3}$$

$$108 = \frac{16y^2}{3}$$

$\times 3 \quad \times 3$

$$324 = 16y^2$$

$\div 16 \quad \div 16$

$$\begin{aligned} 20.25 &= y^2 \\ y &= \pm 4.5 \end{aligned}$$

$y = \dots\dots\dots 4.5 \dots\dots\dots [3]$

- 6 Maria buys n pencils that cost p cents each.
She pays with a $\$y$ note.

Find, in terms of n , p and y , the amount of change Maria receives.
Give your answer in cents.

$$\underline{y \text{ dollars} = 100y \text{ cents}}$$

cost of pencils: np

change: $100y - np$

$$\underline{100y - np} \dots \text{cents} [2]$$

- 5 A taxi fare, $\$F$, consists of a fixed charge of $\$x$ plus $\$0.65$ per kilometre travelled.

Find a formula for F for a journey of y kilometres.

$$F = x + 0.65y$$

$$\underline{F = x + 0.65y} [2]$$

- 12 One solution of the equation $ax^2 + b = 181$ is $x = 8$.
 a and b are both positive integers greater than 1.

(a) Find the value of b .

$$x=8: a \times 64 + b = 181$$

$$64a + b = 181$$

a is greater than 1, e.g. $a = 2, 3, 4, \dots$

$$\underline{a=2}: 64 \times 2 + b = 181$$

$$128 + b = 181$$

$$b = 53$$

NB:

a cannot be 3 or more because:

$$\underline{a=3}: 64 \times 3 + b = 181$$

$$192 + b = 181$$

$$b = -11$$

but b is positive

$$b = \underline{53} [2]$$

(b) Write down the other solution of the equation $ax^2 + b = 181$.

$$2x^2 + 53 = 181$$

$$2x^2 = 128$$

$$x^2 = 64$$

$$x = \pm 8$$

$$x = \underline{-8} [1]$$

- 5 Petra repairs cars.
The cost of a repair is a fixed charge of \$C plus a charge of \$h per hour.

Find an expression, in terms of C, h and n, for the total cost, \$T, of a repair that takes Petra n hours.

$$T = C + hn$$

$$T = \underline{C + hn} \quad [2]$$

- 3 Complete these statements.

(a) When $x = \underline{5}$, $x + 3 = 8$.

[1]

(b) When $7y = 63$, $10y = \underline{90}$
 $\div 7 \quad \div 7$
 $y = 9$

[1]

- (c) Show that $(2n-5)^2 - 13$ is a multiple of 4 for all integer values of n.

$$\begin{aligned} & (2n-5)(2n-5) - 13 \\ & 4n^2 - 10n - 10n + 25 - 13 \\ & 4n^2 - 20n + 12 \\ & 4(n^2 - 5n + 3) \end{aligned}$$

[3]

Being able to take a

4 outside the whole

thing means the

expression is divisible by 4, therefore is a multiple of 4.