

Fully-worked Solutions

Practice 2

Formative Practice

1 $(w - 3)(3w + 2) = 3w^2 + 2w - 9w - 6$
 $= 3w^2 - 7w - 6$

Answer: A

2 (a) $2(3x + 4) = 2 \times 3x + 2 \times 4$
 $= 6x + 8$

(b) $4(2x - 5) = 4 \times 2x - 4 \times 5$
 $= 8x - 20$

3 (a) (i) x^2 (ii) x
 (iii) $2x$ (iv) 2

(b) $(x + 2)(x + 1) = x^2 + x + 2x + 2$
 $= x^2 + 3x + 2$

4 (a) ✗ (b) ✓
 (c) ✗ (d) ✓

5 (a)	$(2x + 7)(2x + 3)$	$6x^2 - 29x + 9$
(b)	$(4x + 1)(x - 8)$	$6x^2 + 7x - 10$
(c)	$(3x - 1)(2x - 9)$	$4x^2 + 20x + 21$
(d)	$(6x - 5)(x + 2)$	$4x^2 - 31x - 8$

6 $(8p)^2 - (3r)^2 - 9r \times p + 9r^2$
 $= 64p^2 - 9r^2 - 9pr + 9r^2$
 $= 64p^2 - 9pr$

7 $(2f + 3h)^2 - 2(3f - 2h)^2$
 $= 4f^2 + 12fh + 9h^2 - 2(9f^2 - 12fh + 4h^2)$
 $= 4f^2 + 12fh + 9h^2 - 18f^2 + 24fh - 8h^2$
 $= -14f^2 + 36fh + h^2$

Answer: A

8 Area of the shaded region
 $= (4x + 5)(3x + 8) - 2(x + 3)$
 $= 12x^2 + 32x + 15x + 40 - 2x - 6$
 $= (12x^2 + 45x + 34) \text{ cm}^2$

9 5, x, y, z, ... is a sequence of Fibonacci numbers.

(a) $y = 5 + x$

(b) $z = x + y$
 $= x + (5 + x)$
 $= 5 + 2x$

(c) $z^2 - y = (5 + 2x)^2 - (5 + x)$
 $= 25 + 20x + 4x^2 - 5 - x$
 $= 4x^2 + 19x + 20$

10 $4 - m^2 = (2 - m)(2 + m)$

Answer: B

Algebraic expression	Factorisation
(a) $6k + 3$	$3(2k + 1)$
(b) $y^2 - 9$	$(y + 3)(y - 3)$
(c) $a^2 - 4ac + 4c^2$	$(a - 2c)^2$
(d) $3x^2 - 14x + 8$	$(3x - 2)(x - 4)$

12 $5pr^2 - 20qr^3 = 5(pr^2 - 4qr^3)$
 $= 5r^2(p - 4qr)$

13 (a) $64p^2 + 16 = 16(4p^2 + 1)$

(b) $64p^2 - 16 = 16(4p^2 - 1)$
 $= 16(2p + 1)(2p - 1)$

14 (a)

x	\nearrow	$+$	$\boxed{6}$	$ $	$+$	$\boxed{6}$	x
x	\searrow	$+$	$\boxed{1}$	$ $	$+$	$\boxed{1}$	x
<hr/>							
x^2	$+$	$\boxed{6}$	$ $	$+$	$\boxed{7}$	x	

$x^2 + 7x + 6 = (x + \boxed{6})(x + \boxed{1})$

(b)

$3x$	\nearrow	$-$	$\boxed{2}$	$ $	$-$	$\boxed{2}$	x
x	\searrow	$+$	$\boxed{4}$	$ $	$+$	$\boxed{12}$	x
<hr/>							
$3x^2$	$-$	$\boxed{8}$	$ $	$+$	$\boxed{10}$	x	

$3x^2 + 10x - 8 = (3x - \boxed{2})(x + \boxed{4})$

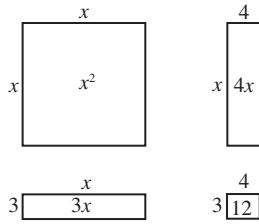
15 (a) Total price for a pen, a bag and a shirt
 $= (4x - 3) + (3x + 2)^2 + 2(4x - 3)$
 $= 4x - 3 + 9x^2 + 12x + 4 + 8x - 6$
 $= \text{RM}(9x^2 + 24x - 5)$

(b) $5(4x - 3) = 270$
 $20x - 15 = 270$
 $20x = 285$
 $x = 14.25$

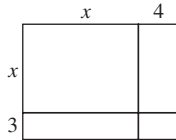
When $x = 14.25$,

Total price for the three items
 $= \text{RM}[9(14.25)^2 + 24(14.25) - 5]$
 $= \text{RM}(1\ 827.56 + 342 - 5)$
 $= \text{RM}2\ 164.56$

16 (a)

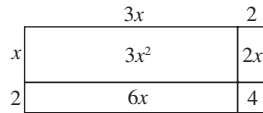


(b)



$$x^2 + 7x + 12 = (x + 4)(x + 3)$$

17 (a)



(b) $3x^2 + 8x + 4 = (3x + 2)(x + 2)$

$$\begin{aligned} 18 \quad \frac{4hk}{3k+3} \times \frac{k+1}{4hk+8h} &= \frac{4hk}{3(k+1)} \times \frac{k+1}{4h(k+2)} \\ &= \frac{k}{3} \times \frac{1}{k+2} \\ &= \frac{k}{3(k+2)} \end{aligned}$$

Answer: C

19 (a) $\frac{2y}{9} + \frac{4y}{9} = \frac{6y}{9}$
 $= \frac{2y}{3}$

True

(b) $\frac{7u}{12v} + \frac{u}{4v} = \frac{7u + 3u}{12v}$
 $= \frac{10u}{12v}$
 $= \frac{5u}{6v}$

False

(c) $\frac{r}{5p} - \frac{5-14r}{5p} = \frac{r - (5-14r)}{5p}$
 $= \frac{r - 5 + 14r}{5p}$
 $= \frac{15r - 5}{5p}$
 $= \frac{5(3r-1)}{5p}$
 $= \frac{3r-1}{p}$

False

(d) $\frac{m+3}{2n} - \frac{m-1}{6n} = \frac{3(m+3) - (m-1)}{6n}$
 $= \frac{3m+9-m+1}{6n}$
 $= \frac{2m+10}{6n}$
 $= \frac{2(m+5)}{6n}$
 $= \frac{m+5}{3n}$

True

20 $\frac{1}{p+3} - \frac{3p-8}{p^2+2p-3} = \frac{1}{p+3} - \frac{3p-8}{(p+3)(p-1)}$
 $= \frac{(p-1) - (3p-8)}{(p+3)(p-1)}$
 $= \frac{p-1-3p+8}{(p+3)(p-1)}$
 $= \frac{7-2p}{(p+3)(p-1)}$

21 (a) $\frac{a}{6c} \times \frac{9c}{ab} = \frac{1}{2} \times \frac{3}{b}$
 $= \frac{3}{2b}$ [✓]

(b) $\frac{3}{2hk} \times \frac{h^2m}{k} = \frac{3}{2k} \times \frac{hm}{k}$
 $= \frac{3hm}{2k^2}$ [✓]

(c) $\frac{p}{8} \div \frac{4}{p} = \frac{p}{8} \times \frac{p}{4}$
 $= \frac{p^2}{32}$ [✗]

(d) $\frac{10v}{u^2} \div \frac{15v^2}{u} = \frac{10v}{u^2} \times \frac{u}{15v^2}$
 $= \frac{2}{u} \times \frac{1}{3v}$
 $= \frac{2}{3uv}$ [✓]

22 $\frac{12a^2b^3}{7c^3} \div \frac{2ab^2}{21c^2} = \frac{12a^2b^3}{7c^3} \times \frac{21c^2}{2ab^2}$
 $= \frac{6ab}{c} \times \frac{3}{1}$
 $= \frac{18ab}{c}$

(a) ✓

(b) ✗

23 $\frac{18-50t^2}{3pt+6p} \div \frac{24+40t}{p^2t+2p^2} = \frac{18-50t^2}{3pt+6p} \times \frac{p^2t+2p^2}{24+40t}$
 $= \frac{2(9-25t^2)}{3p(t+2)} \times \frac{p^2(t+2)}{8(3+5t)}$
 $= \frac{(3+5t)(3-5t)}{3} \times \frac{p}{4(3+5t)}$
 $= \frac{3-5t}{3} \times \frac{p}{4}$
 $= \frac{p(3-5t)}{12}$

Answer: A

$$\begin{aligned}
 24 \text{ (a)} \quad \frac{6}{rs} + \frac{4r}{3} \times \frac{s}{2r^2} &= \frac{6}{rs} + \frac{2}{3} \times \frac{s}{r} \\
 &= \frac{6}{rs} + \frac{2s}{3r} \\
 &= \frac{18}{3rs} + \frac{2s^2}{3rs} \\
 &= \frac{18 + 2s^2}{3rs} \\
 &= \frac{2(9 + s^2)}{3rs}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad \frac{1}{6} - \frac{x}{4x-4} \div \frac{3x+1}{6x-6} &= \frac{1}{6} - \frac{x}{4x-4} \times \frac{6x-6}{3x+1} \\
 &= \frac{1}{6} - \frac{x}{4(x-1)} \times \frac{6(x-1)}{3x+1} \\
 &= \frac{1}{6} - \frac{x}{2} \times \frac{3}{3x+1} \\
 &= \frac{1}{6} - \frac{3x}{2(3x+1)} \\
 &= \frac{(3x+1) - 9x}{6(3x+1)} \\
 &= \frac{1-6x}{6(3x+1)}
 \end{aligned}$$

Summative Practice

$$1 \quad 3(7mn + 3k) + 2(5k - 2mn) = 21mn + 9k + 10k - 4mn = 17mn + 19k$$

Answer: B

$$2 \quad (2x-1)^2 - 4(x+8) = 4x^2 - 4x + 1 - 4x - 32 = 4x^2 - 8x - 31$$

Answer: D

$$\begin{aligned}
 3 \quad \frac{3y}{w} - \frac{y-2}{8w} &= \frac{24y - (y-2)}{8w} \\
 &= \frac{24y - y + 2}{8w} \\
 &= \frac{23y + 2}{8w}
 \end{aligned}$$

Answer: B

$$\begin{aligned}
 4 \quad \frac{7y}{16x^2-1} \times \frac{16xy+4y}{35x} &= \frac{7y}{(4x+1)(4x-1)} \times \frac{4y(4x+1)}{35x} \\
 &= \frac{y}{4x-1} \times \frac{4y}{5x} \\
 &= \frac{4y^2}{5x(4x-1)}
 \end{aligned}$$

Answer: D

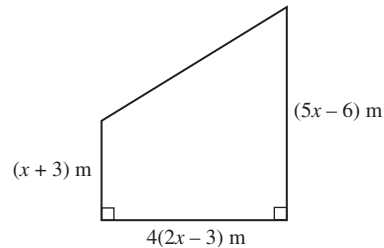
$$\begin{array}{cccc}
 9 & \begin{array}{c} \text{(i)} \\ 5(k-2) \\ \boxed{5k-10} \end{array} & \begin{array}{c} \text{(iii)} \\ (x+3)(x-3) \\ \boxed{x^2-9} \end{array} & \begin{array}{c} \text{(v)} \\ (m+4)^2 \\ \boxed{m^2+8m+16} \end{array} & \begin{array}{c} \text{(vii)} \\ (a-2b)(3c+d) \\ \boxed{3ac+ad-6bc-2bd} \end{array} \\
 & \triangle \text{ as } & \triangle \text{ as } & \triangle \text{ as } & \\
 & \begin{array}{c} \text{(ii)} \\ 5k-10 \\ \boxed{5(k-2)} \end{array} & \begin{array}{c} \text{(iv)} \\ x^2-9 \\ \boxed{(x+3)(x-3)} \end{array} & \begin{array}{c} \text{(vi)} \\ m^2+8m+16 \\ \boxed{(m+4)^2} \end{array} & \begin{array}{c} \text{(viii)} \\ 3ac+ad-6bc-2bd \\ \boxed{(a-2b)(3c+d)} \end{array}
 \end{array}$$

$$\begin{aligned}
 5 \quad \frac{6-k}{k^2} \div \frac{3+k}{k^3} &= \frac{6-k}{k^2} \times \frac{k^3}{3+k} \\
 &= \frac{6-k}{1} \times \frac{k}{3+k} \\
 &= \frac{k(6-k)}{3+k}
 \end{aligned}$$

Answer: B

$$\begin{aligned}
 6 \quad (6k+1)(3k-4) - 4(3-k)^2 &= 18k^2 - 24k + 3k - 4 - 4(9 - 6k + k^2) \\
 &= 18k^2 - 21k - 4 - 36 + 24k - 4k^2 \\
 &= 14k^2 + 3k - 40
 \end{aligned}$$

7



Area of the land

$$= \frac{1}{2}[(x+3) + (5x-6)] \times 4(2x-3)$$

$$\begin{aligned}
 &= 2(6x-3)(2x-3) \\
 &= 2(12x^2 - 18x - 6x + 9) \\
 &= 2(12x^2 - 24x + 9) \\
 &= (24x^2 - 48x + 18) \text{ m}^2
 \end{aligned}$$

$$8 \text{ (a)} \quad 10r^2 + 15r = 5r(2r + 3)$$

$$\begin{array}{r|l}
 \begin{array}{c} 2n \\ n \end{array} & \begin{array}{c} +1 \\ -7 \end{array} \\
 \hline
 2n^2 & -7 \\
 \hline
 2n^2 - 13n - 7 & = (2n+1)(n-7)
 \end{array}$$

$$\begin{aligned}
 10 \quad (a) \quad & 3r(2p-5) - p(2p-5) = (2p-5)(3r-p) \\
 (b) \quad & 4xz + 8wx - 3yz - 6wy = (4xz + 8wx) - (3yz + 6wy) \\
 & = 4x(z+2w) - 3y(z+2w) \\
 & = (z+2w)(4x-3y)
 \end{aligned}$$

$$\begin{aligned}
 11 \quad & \frac{1+4p}{3(1+3p)} + \frac{1-3p}{6(1-4p)} \\
 & = \frac{2(1+4p)(1-4p) + (1-3p)(1+3p)}{6(1+3p)(1-4p)} \\
 & = \frac{2(1-16p^2) + 1-9p^2}{6(1+3p)(1-4p)} \\
 & = \frac{2-32p^2+1-9p^2}{6(1+3p)(1-4p)} \\
 & = \frac{3-41p^2}{6(1+3p)(1-4p)}
 \end{aligned}$$

$$\begin{aligned}
 12 \quad & \frac{m+1}{2} \div (m^2 - m - 2) + \frac{2}{m} \\
 & = \frac{m+1}{2} \times \frac{1}{m^2 - m - 2} + \frac{2}{m} \\
 & = \frac{m+1}{2} \times \frac{1}{(m-2)(m+1)} + \frac{2}{m} \\
 & = \frac{1}{2(m-2)} + \frac{2}{m} \\
 & = \frac{m+4(m-2)}{2m(m-2)} \\
 & = \frac{m+4m-8}{2m(m-2)} \\
 & = \frac{5m-8}{2m(m-2)}
 \end{aligned}$$

$$\begin{aligned}
 13 \quad & \frac{3}{4} - \frac{3y^2 - y - 2}{6y + 4} \times \frac{5y}{(y-1)^2} \\
 & = \frac{3}{4} - \frac{(3y+2)(y-1)}{2(3y+2)} \times \frac{5y}{(y-1)^2} \\
 & = \frac{3}{4} - \frac{1}{2} \times \frac{5y}{y-1} \\
 & = \frac{3}{4} - \frac{5y}{2(y-1)} \\
 & = \frac{3(y-1) - 10y}{4(y-1)} \\
 & = \frac{3y-3-10y}{4(y-1)} \\
 & = \frac{-7y-3}{4(y-1)} \\
 & = \frac{7y+3}{4(1-y)}
 \end{aligned}$$