Fully-worked Solutions

Summative Assessment (*Ujian Akhir Sesi Akademik*)

Section A

1 $P = 3 + \dfrac{4}{6}$

$= 3 + \dfrac{2}{3}$

$= \dfrac{9+2}{3}$

$= \dfrac{11}{3}$

Answer: **C**

2 A The prime factors of 21 are 3 and 7.

$3 + 7 = 10$

B The prime factors of 28 are 2 and 7.

$2 + 7 = 9$

C The prime factors of 35 are 5 and 7.

$5 + 7 = 12$

D The prime factors of 40 are 2 and 5.

$2 + 5 = 7$

Answer: **C**

3 The smallest multiple of 7 that is greater than 100 is 105.

$\therefore p = 105$

The largest multiple of 13 that is less than 150 is 143.

$\therefore q = 143$

$q - p = 143 - 105$

$= 38$

Answer: **A**

4 $\sqrt{49} = 2.21$

$\sqrt{490} = \sqrt{4.9 \times 100}$

$= \sqrt{4.9} \times \sqrt{100}$

$= 2.21 \times 10$

$= 22.1$

$\sqrt{49} + \sqrt{490}$

$= 7 + 22.1$

$= 29.1$

Answer: **A**

5 $\left(1\dfrac{1}{4}\right)^3 - \left(\dfrac{3}{8}\right)^2 = \left(\dfrac{5}{4}\right)^3 - \left(\dfrac{3}{8}\right)^2$

$= \dfrac{125}{64} - \dfrac{9}{64}$

$= \dfrac{116}{64}$

$= \dfrac{29}{16}$

$= 1\dfrac{13}{16}$

Answer: **B**

6 $p : q = 8 : 13$

$p : p + q = 8 : 8 + 13$

$p : 147 = 8 : 21$

$\dfrac{p}{147} = \dfrac{8}{21}$

$p = \dfrac{8}{21} \times 147$

$= 56$

Answer: **D**

7 A Like terms

B Unlike terms

C Unlike terms

D Unlike terms

Answer: **A**
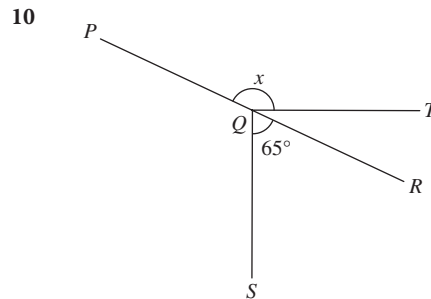
8 $7m - 15 = 3(m + 7)$

$7m - 15 = 3m + 21$

$4m = 36$

$m = 9$

Answer: **C**

9 $7x < 28$

$x < 4$

$17 > 13 - 2x$

$2x > -4$

$x > -2$

$-2 < x < 4$

The integer values of x are $\{-1, 0, 1, 2, 3\}$.

Answer: **C**

10

$\angle RQT + 65° = 90°$

$\angle RQT = 25°$

$x + 25° = 180°$

$x = 155°$

Answer: **D**

11 $41° + \angle MNP = 68°$

$\angle MNP = 27°$

$(x + 102°) + 27° = 180°$

$x + 129° = 180°$

$x = 51°$

Answer: **D**

12 $\angle LGJ = 36°$

$(25° + x) + 36° + 36° = 180°$

$\qquad\qquad x + 97° = 180°$

$\qquad\qquad\qquad x = 83°$

Answer: **C**

13
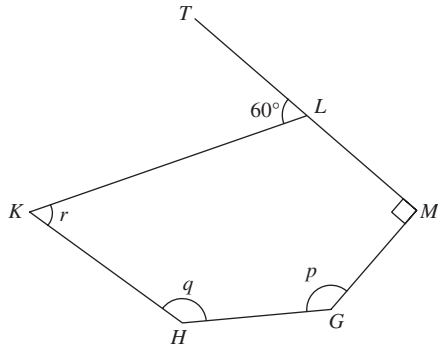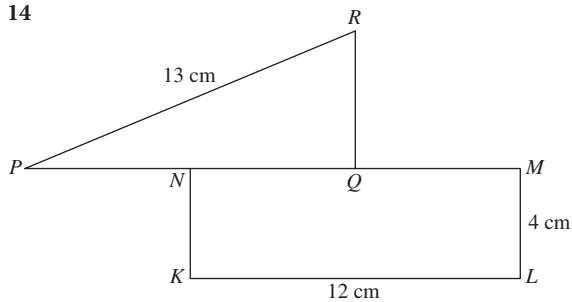

$\angle KLM + 60° = 180°$

$\qquad \angle KLM = 120°$

Sum of interior angles of polygon

$= (5 - 2) \times 180°$

$= 540°$

$p + q + r + 120° + 90° = 540°$

$\qquad p + q + r + 210° = 540°$

$\qquad\qquad p + q + r = 330°$

Answer: **B**

14

$PN = NQ = QM = 6$ cm

$PQ = 12$ cm

$QR^2 = 13^2 - 12^2$

$\qquad = 169 - 144$

$\qquad = 25$

$QR = 5$ cm

Perimeter

$= 6 + 4 + 12 + 4 + 6 + 5 + 13$

$= 50$ cm

Answer: **B**

15 Area of $MQRS = \dfrac{1}{2} \times (9 + 3) \times 6$

$\qquad\qquad\qquad = 36 \text{ cm}^2$

$\qquad\qquad x^2 = 36$

$\qquad\qquad\; x = 6$

Length of sides of square

$= 6$ cm

Answer: **A**

16 A $\quad G = \{1, 2, 5, 10, 25, 50\}$

$\qquad G = H$

$\quad$ B $\quad N = \{I, C, O, N\}$

$\qquad N = M$

$\quad$ C $\quad \sqrt{10}$ is not a rational number.

$\qquad P \neq Q$

$\quad$ D $\quad T = \{5, 7, 11, 13, 17\}$

$\qquad T = W$

Answer: **C**

17 $\xi = \{11, 12, 13, \ldots, 29\}$

$P = \{11, 13, 15, 17, 19, 20, 22, 24, 26, 28\}$

$n(\xi) = 19$
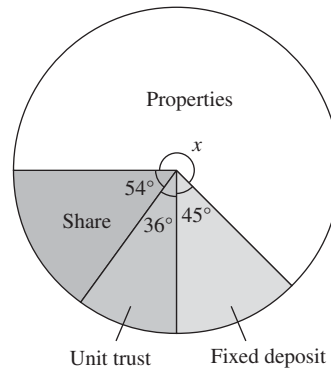
$n(P) = 10$

$n(P') = 19 - 10$

$\qquad\; = 9$

Answer: **B**

18 A $\quad$ False

$\quad$ B $\quad$ True

$\quad$ C $\quad$ False

$\quad$ D $\quad$ False

Answer: **B**

19

$x + 54° + 36° + 45° = 360°$

$\qquad\quad x + 135° = 360°$

$\qquad\qquad\qquad x = 225°$

$\dfrac{H}{80\,000} = \dfrac{225°}{36°}$

$\qquad H = \dfrac{225°}{36°} \times 80\,000$

$\qquad\quad = 500\,000$

Answer: **C**

20
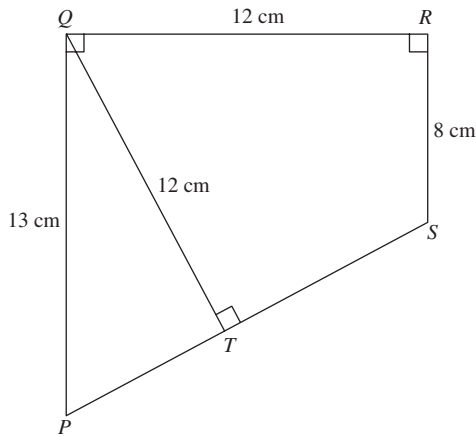
$$PT^2 = 13^2 - 12^2$$
$$= 169 - 144$$
$$= 25$$
$$PT = 5 \text{ cm}$$
$$PS^2 = 12^2 + 5^2$$
$$= 144 + 25$$
$$= 169$$
$$PS = 13 \text{ cm}$$
$$TS = PS - PT$$
$$= 13 - 5$$
$$= 8 \text{ cm}$$
Answer: **C**

Section B

1 (a) $\dfrac{11}{23}$ ✓ 1.63 ✓

   $\sqrt{2}$ ☐ 45 ✓

   (b) $-10 < -5$

2 $p = 3\dfrac{1}{4}, q = 3.7, r = 4.2, s = 4\dfrac{4}{5}$

3 (a) $42 \div 21 = 2$
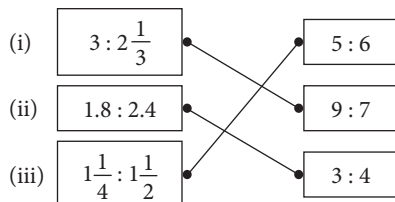
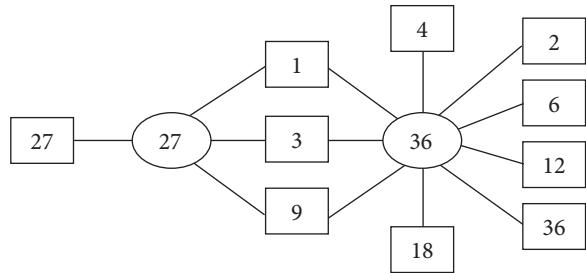| 13	8	㉑	5
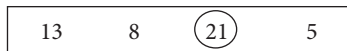
   (b) $3 : 2\dfrac{1}{3} = 3 : \dfrac{7}{3}$

   $\qquad = 3 \times 3 : \dfrac{7}{3} \times 3$

   $\qquad = 9 : 7$

   $1.8 : 2.4 = 1.8 \div 0.6 : 2.4 \div 0.6$

   $\qquad\quad = 3 : 4$

   $1\dfrac{1}{4} : 1\dfrac{1}{2} = \dfrac{5}{4} \times 4 : \dfrac{3}{2} \times 4$

   $\qquad\qquad = 5 : 6$

   (i) $\boxed{3 : 2\dfrac{1}{3}}$ •   • $\boxed{5 : 6}$

   (ii) $\boxed{1.8 : 2.4}$ •   • $\boxed{9 : 7}$

   (iii) $\boxed{1\dfrac{1}{4} : 1\dfrac{1}{2}}$ •   • $\boxed{3 : 4}$

4

The highest common factor of 27 and 36 is 9.

5 (a) $6 = 2 \times 3$

   $\qquad 9 = 3 \times 3$

   $\qquad 15 = 3 \times 5$

   (b) $2 \times 3 \times 3 \times 5 = 90$

   The lowest common multiple of 6, 9 and 15 is 90.

Section C

1 (a) (i) The coefficient of p for the term $-7pq^3r^2$ is $-7q^3r^2$.

   (ii) $a = 3, b = 2, c = 1$

   $(a + b + c)^2 = (3 + 2 + 1)^2$

   $\qquad\qquad\quad = 6^2$

   $\qquad\qquad\quad = 36$

   (b) $x + 5y = -4 \ldots\ldots\ldots ①$

   $2x - y = 14 \ldots\ldots\ldots ②$

   $② \times 5, \quad 10x - 5y = 70 \ldots\ldots\ldots ③$

   $① + ③, \qquad 11x = 66$

   $\qquad\qquad\qquad x = 6$

   From $②$, $2(6) - y = 14$

   $\qquad\qquad\quad 12 - y = 14$

   $\qquad\qquad\qquad\quad y = -2$

   $\therefore x = 6, y = -2$

   (c) $x + x + 50° = 180°$

   $\qquad\quad 2x = 130°$

   $\qquad\quad\ x = 65°$

   $\angle MNR = 180° - 55°$

   $\qquad\quad = 125°$

   $y + 125° + 85° + 45° = 360°$

   $\qquad\qquad y + 225° = 360°$

   $\qquad\qquad\qquad\quad y = 105°$

2 (a) (i) $4k + 3m = 12$ [✗]

   (ii) $8p = 5 - 2p$ [✓]

   (iii) $\dfrac{1}{2}r + 11 = r$ [✓]

   (b) (i) $x = y - 17$

   (ii) $\qquad y \leqslant 20$

   $\qquad x + 17 \leqslant 20$

   $\qquad\qquad x \leqslant 3$

   The largest value of x is 3.

(c) (i)
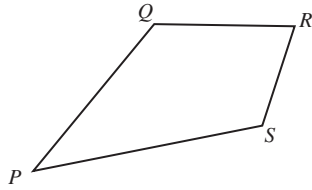
   (ii) 39°

3 (a) $\sqrt[3]{\dfrac{1}{27}} + \left(1\dfrac{1}{3}\right)^2 = \dfrac{1}{3} + \left(\dfrac{4}{3}\right)^2$

$$= \dfrac{1}{3} + \dfrac{16}{9}$$

$$= \dfrac{19}{9}$$

$$= 2\dfrac{1}{9}$$

(b) $\dfrac{4}{5} \div 1\dfrac{1}{2} - \dfrac{7}{30} \times \left(-\dfrac{9}{14}\right) = \dfrac{4}{5} \div \dfrac{3}{2} + \dfrac{7}{30} \times \dfrac{9}{14}$

$$= \dfrac{4}{5} \times \dfrac{2}{3} + \dfrac{1}{10} \times \dfrac{3}{2}$$

$$= \dfrac{8}{15} + \dfrac{3}{20}$$

$$= \dfrac{32 + 9}{60}$$

$$= \dfrac{41}{60}$$

(c) $\quad 4x \geqslant x - 12$

$\quad\quad 3x \geqslant -12$

$\quad\quad\quad x \geqslant -4$

$\quad 9 + 2x < x + 15$

$\quad 2x - x < 15 - 9$

$\quad\quad\quad x < 6$

$\quad \therefore -4 \leqslant x < 6$

4 (a)
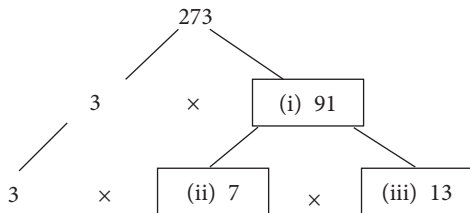
The prime factors of 273 are 3, 7 and 13.

(b) (i) 42 km   (ii) 6

(c)
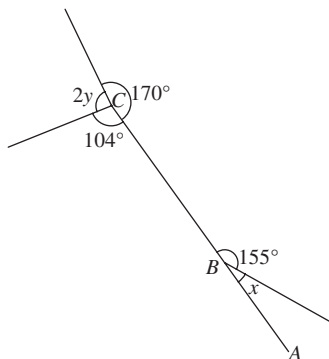
$x + 155° = 180°$

$x = 25°$

$2y + 104° + 170° = 360°$

$2y + 274° = 360°$

$2y = 86°$

$y = 43°$

5 (a) (i) $24^2 = 576$

$\quad 12^2 + 20^2 = 144 + 400$

$\quad\quad\quad\quad = 544$

$\quad 24^2 \neq 12^2 + 20^2$

$\quad \therefore$ Not a right-angled triangle

   (ii) $\quad 20^2 = 400$

$\quad 12^2 + 16^2 = 144 + 256$

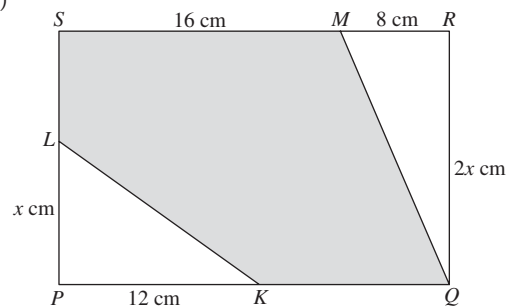$\quad\quad\quad\quad = 400$

$\quad 20^2 = 12^2 + 16^2$

$\quad \therefore$ A right-angled triangle

(b) (i)

Class	Fraction of students obtained grade A	Percentage of students obtained grade A
1A	$\dfrac{24}{30}$	80%
1B	$\dfrac{35}{40}$	87.5%
1C	$\dfrac{27}{36}$	75%

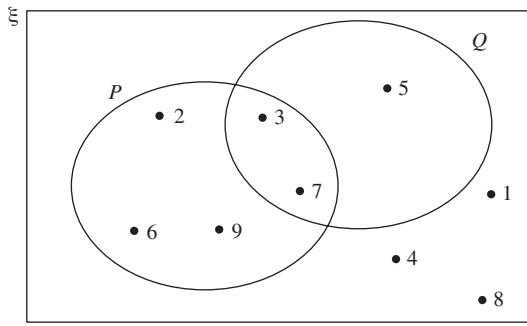   (ii) The class that achieved the highest percentage of grade *A* in Mathematics is 1B.

(c)

$24(2x) - \dfrac{1}{2}(12)(x) - \dfrac{1}{2}(2x)(8) = 238$
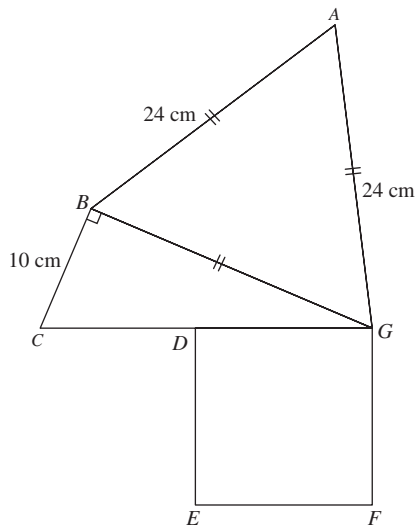
$48x - 6x - 8x = 238$

$34x = 238$

$x = 7$

6 (a) (i)

(ii) $Q' = \{1, 2, 4, 6, 8, 9\}$

(b)

(i) $CG^2 = 10^2 + 24^2$
     $= 100 + 576$
     $= 676$
   $CG = \sqrt{676}$
     $= 26$ cm

(ii) $CD = DE = EF = FG = 13$ cm
     Perimeter $= 24 + 10 + 13 + 13 + 13 + 13 + 24$
     $= 110$ cm

(c) Bookings for May
     $= 35 - 6 - 9 - 4 - 6$
     $= 10$