Fully-Worked Solutions

Section A

1 $x - 4 = 12$
$x = 16$
Answer: **C**

2 $3^2 \times 8^{\frac{2}{3}} \times 25^{\frac{1}{2}} = 9 \times (2^3)^{\frac{2}{3}} \times (5^2)^{\frac{1}{2}}$
$= 9 \times 4 \times 5$
$= 180$
Answer: **A**

3 $0.09048 = 0.090$ (2 s.f.)
Answer: **D**

4 $\dfrac{2\,280 \times 1\,000 \text{ m}}{60 \text{ min}} = 38 \times 1\,000$
$= 3.8 \times 10^4$
Answer: **B**

5 $t = \dfrac{I}{Pr} = \dfrac{500}{12\,500 \times 0.032} = \dfrac{5}{4}$ year
$= 15$ months
Answer: **C**

6 $MV = 60\,000\left(1 + \dfrac{0.03}{4}\right)^{(4)(5)}$
$= $ RM69 671.05
Answer: **A**

7 *Answer*: **D**

8 Perimeter on scale drawing $= (2 \times 4) + (2 \times 6) = 20$ cm
Length of fence $= 20 \times 1\,500$ cm
$= 30\,000$ cm
$= 300$ m
Answer: **B**

9 8, 15, 17 is a Pythagorean triple.
$\cos \theta = \dfrac{15}{17}$
Answer: **C**

10 $PT = 24 - 17$
$= 7$ cm
$ST = \sqrt{24^2 + 7^2}$
$= \sqrt{625}$
$= 25$ cm
$\sin \angle PTS = \dfrac{24}{25}$
Answer: **D**

11 *Answer*: **B**

12 $\angle PTS = 90°$
$\angle PTR = 90° \div 3 \times 2 = 60°$
$x = 180° - 60°$
$= 120°$ (cyclic quadrilateral)
Answer: **C**

13 $\angle KML = \dfrac{70°}{2}$
$= 35°$
$y = 20° + 35°$
$= 55°$
(cyclic quadrilateral: exterior angle = interior opposite angle)
Answer: **A**

14 *Answer*: **B**

15 *Answer*: **D**

16 *Answer*: **D**

17 *Answer*: **C**

18 $\dfrac{2x}{3} + \dfrac{y}{4} = 2$
$\dfrac{2x}{6} + \dfrac{y}{8} = \dfrac{2}{2}$
$\dfrac{x}{3} + \dfrac{y}{8} = 1$
$m = -\dfrac{b}{a}$
$= -\dfrac{8}{3}$
Answer: **B**

19 Substitute $(-4, -5)$ and $m = 3$ into $y = mx + c$.
$-5 = 3(-4) + c$
$c = -5 + 12$
$= 7$
$\therefore y = 3x + 7$
Answer: **C**
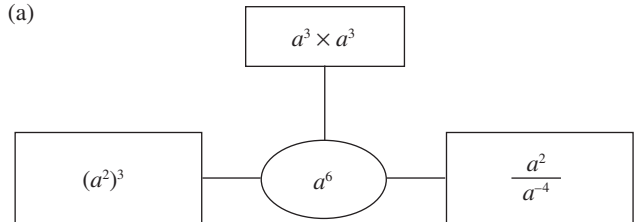
20 $-\dfrac{2}{3} = 6 - \dfrac{4}{3}k$
$-2 = 18 - 4k$
$4k = 20$
$k = 5$
Answer: **A**

Section B

1 (a)

(b) (i) True   (ii) False

2 (a) (ii), (iv)

(b) $\dfrac{12}{\text{Actual measurement}} = \dfrac{1}{6}$

Actual measurement $= 12 \times 6$
$= 72$ cm

$\dfrac{18}{1.2} = \dfrac{15}{1} = \dfrac{1}{\frac{1}{15}} \rightarrow$ Scale $= 1 : \dfrac{1}{15}$

3 (a) $2 \sin 45° + 8 \cos 60° = 2\left(\dfrac{1}{\sqrt{2}}\right) + 8\left(\dfrac{1}{2}\right)$
$= 2\left(\dfrac{1}{\sqrt{2}} + 2\right)$

$3 \tan 60° - 2 \cos 30° = 3\sqrt{3} - 2\left(\dfrac{\sqrt{3}}{2}\right)$
$= 2\sqrt{3}$

(b) $\boxed{\angle AOB = 2y}$ ✓ $\boxed{\angle OAT = 90°}$ ✓

4 (a) $PL \boxed{\ne} P'L'$ $PQ \boxed{=} P'Q'$

(b) (i) *R*   (ii) *S* and *Q*

5 (a) $y = -2x + 6$
$2x + y - 6 = 0$
(b) $x + 2y = 6$
$y = -\dfrac{1}{2}x + 3$ and is parallel to $y = -\dfrac{1}{2}x - 6$

(c) $\dfrac{x}{3} - \dfrac{y}{6} = 1$

(d) $m = 0$, The straight line is parallel to x-axis.
   $y = -6$

Section C

1 (a) $\dfrac{x^2 \times y^{-3} \times z^0}{(x^{-1})^2 \times (\sqrt{y})^4} = \dfrac{x^2 \times y^{-3} \times 1}{x^{-2} \times y^2}$

   $= x^{2+2}y^{-3-2}$
   $= x^4 y^{-5}$
   $= \dfrac{x^4}{y^5}$

(b) $p^5 = 8^{\frac{4}{3}} \div 16^{-\frac{3}{2}}$

   $= (2^3)^{\frac{4}{3}} \times (2^4)^{\frac{3}{2}}$
   $= 2^4 \times 2^6$
   $= 2^{10}$
   $= (2^2)^5$
   $\therefore p = 2^2 = 4$

(c) $3.26 \times 10^{-5} - 7.4 \times 10^{-6} = 3.26 \times 10^{-5} - 0.74 \times 10^{-5}$
   $= 2.52 \times 10^{-5}$

(d) Kinetic energy $= \dfrac{1}{2}mv^2$

   $= \dfrac{1}{2} \times (2.5 \times 10^{-12}) \times (4 \times 10^3)^2$

   $= \dfrac{1}{2} \times (2.5 \times 10^{-12}) \times (16 \times 10^6)$

   $= \dfrac{1}{2} \times 40 \times 10^{-12+6}$

   $= 20 \times 10^{-6}$

   $= 2 \times 10^{-5}$ joule

2 (a) Length of side of actual square = 18 cm;
   Length of side of drawing square = 6 cm

   Scale $= \dfrac{6}{18} = \dfrac{1}{3}$, $\therefore n = 3$

(b)

(c) Bought 20 000 units $=$ RM0.68 $\times$ 20 000
   $=$ RM13 600
   Dividend $=$ RM13 600 $\times$ 0.08
   $=$ RM1 088
   Amount sold 20 000 units $=$ RM1.33 $\times$ 20 000
   $=$ RM26 600
   Capital gain $=$ RM26 600 $-$ RM13 600
   $=$ RM13 000
   Total return $=$ RM1 088 $+$ RM13 000
   $=$ RM14 088

(b) Down payment $= \dfrac{10}{100} \times$ RM650 000

   $=$ RM65 000
   Rental $=$ RM2 300 $\times$ (12 $\times$ 4)
   $=$ RM110 400
   Capital gain $=$ RM1 200 000 $-$ RM65 000 $-$ RM150 000 $-$
   RM45 000 $-$ RM720 000
   $=$ RM220 000

   ROI $= \dfrac{\text{RM110 400} + \text{RM220 000}}{\text{RM650 000}} \times 100\%$

   $= 50.83\%$

3 (a) (i) $AC = \sqrt{10^2 + 10^2}$
   $= 14.14$ cm

(ii) $\sin \angle CVM = \dfrac{MC}{VC} = \dfrac{7.07}{16} = 0.4419$

   $\angle CVM = 26.225°$
   $\angle AVC = 52.45°$
   $= 52° 27'$

(b) (i) $DE = 12$ cm

(ii) $\tan \angle BDE = \dfrac{8}{12} = \dfrac{2}{3}$

   $\tan \angle ADC = \dfrac{2}{3} \rightarrow \dfrac{5}{CD} = \dfrac{2}{3}$

   $CD = \dfrac{5 \times 3}{2} = 7.5$ cm
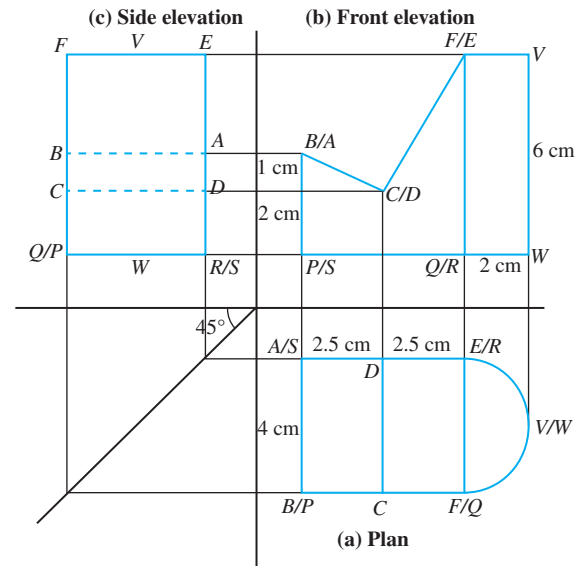
(iii) $AB = AD + DB$
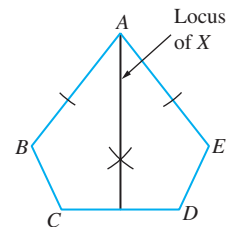 $= \sqrt{5^2 + 7.5^2} + \sqrt{8^2 + 12^2}$
   $= \sqrt{81.25} + \sqrt{208}$
   $= 23.44$ cm

4

(c) Side elevation   **(b) Front elevation**
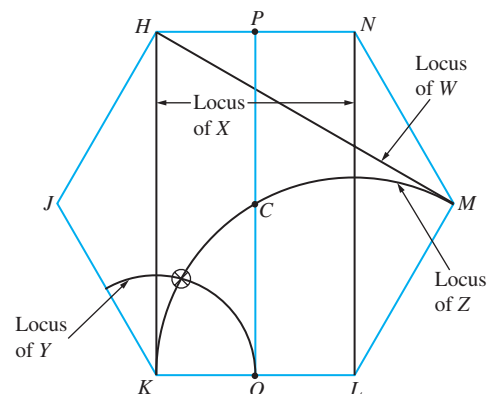
(a) Plan

5 (a)

(b) (i) EF is the locus of X such that its distance from AB is twice its distance from DC.
   (ii) BE is the locus of Y such that it is equidistant from AB and BF.
   (or BE is the locus of Y which bisects $\angle ABF$.)

(c)

6 (a) $k^2 + 6^2 = 10^2$
   $k = \sqrt{100 - 36}$
   $= 8$

(b) Gradient of $L_1 = \dfrac{8-0}{6-0} = \dfrac{4}{3}$

Equation of L_1 is $y = \dfrac{4}{3}x$

(c) Substitute $m = \dfrac{4}{3}$ and $(9, 4)$ into $y = mx + c$.

$4 = \dfrac{4}{3}(9) + c$

$c = 4 - 12$
$\quad = -8$

Equation of L_2 is $y = \dfrac{4}{3}x - 8$.

(d) $\dfrac{x}{-1} + \dfrac{y}{-1} = 1 \rightarrow x + y = -1$

(e) $y = \dfrac{4}{3}x - 8$

$\begin{array}{ll} 4x - 3y = 24 & ...(1) \\ x + y = -1 & ...(2) \end{array}$

$(2) \times 3: \quad 3x + 3y = -3 \qquad ...(3)$

$(1) + (3): \qquad 7x = 21$
$\qquad\qquad\qquad x = 3$

Substitute $x = 3$ into equation (2):

$3 + y = -1$
$\quad\; y = -4$

$\therefore$ Coordinates of $R = (3, -4)$