

# Fully-worked Solutions

## Summative Assessment (Ujian Akhir Sesi Akademik)

### Section A

$$1 \quad \frac{r^x w^{-3}}{r^9 w^y} = \frac{1}{r^5 w^4}$$

$$r^{x-9} w^{-3-y} = r^{-5} w^{-4}$$

$$x - 9 = -5$$

$$x = 4$$

$$-3 - y = -4$$

$$-y = -1$$

$$y = 1$$

$$(x + y)^2 = (4 + 1)^2$$

$$= 5^2$$

$$= 25$$

Answer: D

$$2 \quad \frac{\sqrt{m^6 \times n^{-8}}}{m \times m \times n \times n \times n} = \frac{m^3 \times n^{-4}}{m^2 \times n^3}$$

$$= m^{3-2} \times n^{-4-3}$$

$$= mn^{-7}$$

Answer: C

$$3 \quad 0.040\overline{77} = 0.0408$$

Answer: D

$$4 \quad \frac{1}{2} \times (2\,800 + 1\,600) \times y = 71.5 \times 10^6$$

$$\frac{1}{2} \times 4\,400 \times y = 71.5 \times 10^6$$

$$\frac{1}{2} \times 4.4 \times 10^3 \times y = 71.5 \times 10^6$$

$$2.2 \times 10^3 \times y = 71.5 \times 10^6$$

$$2.2y = 32.5 \times 10^3$$

$$y = 32.5 \times 10^3$$

$$= 3.25 \times 10^4$$

Answer: D

$$5 \quad MV = \text{RM}25\,000 \left(1 + \frac{0.048}{4}\right)^{4 \times 5}$$

$$= \text{RM}25\,000(1.012^{20})$$

$$= \text{RM}31\,735.86$$

Answer: B

$$6 \quad P(0.05)(8) = P\left(1 + \frac{r}{1}\right)^{1(8)} - P$$

$$0.4 = (1 + r)^8 - 1$$

$$(1 + r)^8 = 1.4$$

$$1 + r = \sqrt[8]{1.4}$$

$$1 + r = 1.043$$

$$r = 0.043$$

∴ The annual interest rate calculated in investment 2 is 4.3%.

Answer: C

$$7 \quad \frac{2\,000 \times 2.45 + 5\,000 \times 1.72 + 3\,000 \times 2.24}{2\,000 + 5\,000 + 3\,000 + 10\,000} = 1.776$$

$$\frac{20\,220 + 10\,000x}{20\,000} = 1.776$$

$$20\,220 + 10\,000x = 35\,520$$

$$10\,000x = 15\,300$$

$$x = 1.53$$

Answer: B

$$8 \quad \frac{1}{k^2} = \frac{50}{450}$$

$$\frac{1}{k^2} = \frac{1}{9}$$

$$k^2 = 9$$

$$k = 3$$

The scale factor is 1 : 3.

Answer: C

9  $x$  = length of prawn in the scale drawing

$$x : 8.45 \text{ cm} = 1 : \frac{1}{9}$$

$$\frac{x}{8.45 \text{ cm}} = \frac{1}{9}$$

$$x = 9 \times 8.45 \text{ cm}$$

$$= 76.05 \text{ cm}$$

Answer: C

$$10 \quad \cos x = \frac{3}{5}$$

$$\frac{6}{QR} = \frac{3}{5}$$

$$3QR = 30$$

$$QR = 10 \text{ cm}$$

$$QS^2 = 10^2 - 6^2$$

$$= 64$$

$$QS = 8 \text{ cm}$$

$$PQ = 2 \times 6 \text{ cm}$$

$$= 12 \text{ cm}$$

$$\tan y = \frac{8}{12}$$

$$= \frac{2}{3}$$

Answer: B

11  $\tan x = \frac{2}{5}$

$$\frac{MT}{15} = \frac{2}{5}$$

$$MT = \frac{2}{5} \times 15$$

$$= 6 \text{ cm}$$

$$LM = 2 \times 6 \text{ cm}$$

$$= 12 \text{ cm}$$

$$KL^2 = 16^2 + 12^2$$

$$= 400$$

$$KL = 20 \text{ cm}$$

Answer: **B**

12  $PR^2 = 24^2 + 10^2$   
 $= 676$

$$PR = 26 \text{ cm}$$

$$HR = 13 \text{ cm} + 26 \text{ cm}$$

$$= 39 \text{ cm}$$

$$\cos x = \frac{33}{39}$$

$$= \frac{11}{13}$$

Answer: **C**

13  $\angle RHP = \angle PRH$

$$= 50^\circ$$

$$\angle GHR = 180^\circ - 110^\circ - 50^\circ$$

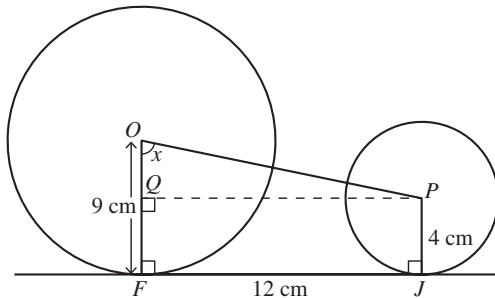
$$= 20^\circ$$

$$x + 20^\circ = 50^\circ$$

$$x = 30^\circ$$

Answer: **B**

14



$$PQ = 12 \text{ cm}$$

$$OQ = OF - FQ$$

$$= 9 \text{ cm} - 4 \text{ cm}$$

$$= 5 \text{ cm}$$

$$\tan x = \frac{12}{5}$$

$$= 2.4$$

$$x = 67^\circ 23'$$

Answer: **C**

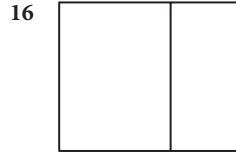
15 **A** Correct

**B** Correct

**C** Correct

**D** Wrong

Answer: **D**

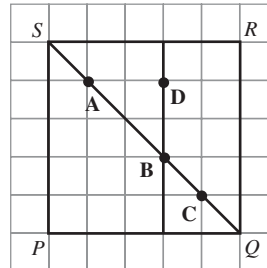


Answer: **C**

17 The most likely locus of point  $P$  is an arc of a circle.

Answer: **B**

18



$\therefore$  The point of intersection of locus  $X$  and locus  $Y$  is **B**.

Answer: **B**

19  $c = y$ -intercept of the straight line

$$\text{Gradient} = -\frac{2}{3}$$

$$-\frac{c}{-4} = -\frac{2}{3}$$

$$\frac{c}{4} = -\frac{2}{3}$$

$$c = -\frac{8}{3}$$

$\therefore$  The equation of the straight line is  $y = -\frac{2}{3}x - \frac{8}{3}$ .

Answer: **D**

20 **A**  $x - \frac{y}{4} = \frac{7}{4}$

$$y = 4x - 7$$

$$m = 4, c = -7$$

**B**  $\frac{1}{3}y = -2x + 1$

$$y = -6x + 3$$

$$m = -6, c = 3$$

**C**  $3x - y = 8$

$$y = 3x - 8$$

$$m = 3, c = -8$$

**D**  $\frac{1}{2}x + y = \frac{1}{2}$

$$y = -\frac{1}{2}x + \frac{1}{2}$$

$$m = -\frac{1}{2}, c = \frac{1}{2}$$

Answer: **A**

### Section B

1 (a)  $0.0000001648 = 1.65 \times 10^{-7}$

(b)  $8.7 \times 10^9 \times 15 \times 10^{-6}$

$$= 130.5 \times 10^3$$

$$= 1.305 \times 10^5$$

2 Perimeter of the photograph  
 $= 2(11 + 8)$   
 $= 38 \text{ cm}$

Perimeter of the actual area  
 $= 1\,140 \text{ m}$   
 $= 114\,000 \text{ cm}$

Scale for the photograph  
 $= 114\,000 \text{ cm} : 38 \text{ cm}$   
 $= 1 : \frac{1}{3\,000}$

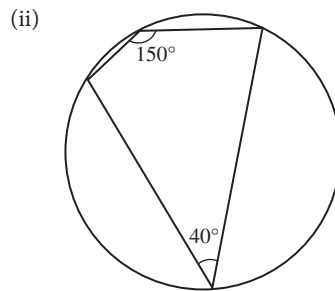
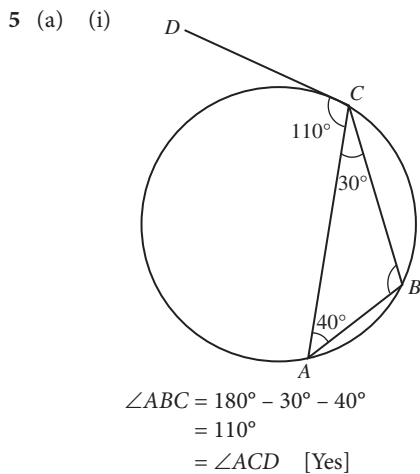
3 (a)  $2^7 \times 8^4 = 2^7 \times (2^3)^4$   
 $= 2^7 \times 2^{12}$   
 $= 2^{7+12}$   
 $= 2^{19}$

(b)  $81^3 \div \frac{1}{9} = (3^4)^3 \div 3^{-2}$   
 $= 3^{12} \div 3^{-2}$   
 $= 3^{12 - (-2)}$   
 $= 3^{12+2}$   
 $= 3^{14}$

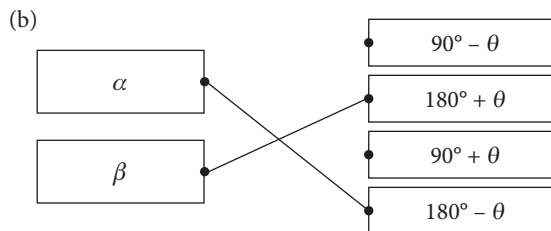
4 (a)  $\sin x = \frac{5}{13}$

(b)  $\cos y = \frac{8}{10}$   
 $= \frac{4}{5}$

(c)  $\frac{1 - \tan x}{1 + \tan x} = \frac{1 - \frac{5}{12}}{1 + \frac{5}{12}}$   
 $= \frac{7}{17}$



$40^\circ + 150^\circ \neq 180^\circ \quad [\text{No}]$



### Section C

1 (a) (i)  $27.386 \approx 27.4$  (three significant figures)

(ii)  $8 \times 10^{13} + 0.045 \times 10^{16}$   
 $= 0.8 \times 10^1 \times 10^{13} + 4.5 \times 10^{-2} \times 10^{16}$   
 $= 0.8 \times 10^{14} + 4.5 \times 10^{14}$   
 $= (0.8 + 4.5) \times 10^{14}$   
 $= 5.3 \times 10^{14}$

#### Alternative method

$$\begin{aligned} & 8 \times 10^{13} + 0.045 \times 10^{16} \\ &= 8 \times 10^{13} + 45 \times 10^{-3} \times 10^{16} \\ &= 8 \times 10^{13} + 45 \times 10^{13} \\ &= (8 + 45) \times 10^{13} \\ &= 53 \times 10^{13} \\ &= 5.3 \times 10^{14} \end{aligned}$$

(b)  $169^{-\frac{1}{2}} - 13^{-2} = (13^2)^{-\frac{1}{2}} - 13^{-2}$   
 $= 13^{-1} - 13^{-2}$   
 $= \frac{1}{13} - \frac{1}{13^2}$   
 $= \frac{13 - 1}{169}$   
 $= \frac{12}{169}$

(c)  $\frac{16^{9-4x}}{128^{3x-2}} = \frac{(2^4)^{9-4x}}{(2^7)^{3x-2}}$   
 $= \frac{2^{4(9-4x)}}{2^{7(3x-2)}}$   
 $= 2^{4(9-4x) - 7(3x-2)}$   
 $= 2^{36 - 16x - 21x + 14}$   
 $= 2^{50 - 37x}$

2 (a) (i)

$$\frac{4\,000 \times \text{RM}2.30 + 2\,000 \times \text{RM}2.80 + 5\,000 \times \text{RM}2.00 + n \times \text{RM}1.60}{4\,000 + 2\,000 + 5\,000 + n} = \text{RM}1.96$$

$$\frac{9\,200 + 5\,600 + 10\,000 + 1.6n}{11\,000 + n} = 1.96$$

$$\frac{24\,800 + 1.6n}{11\,000 + n} = 1.96$$

$$24\,800 + 1.6n = 1.96(11\,000 + n)$$

$$24\,800 + 1.6n = 21\,560 + 1.96n$$

$$0.36n = 3\,240$$

$$n = 9\,000$$

(ii) Return of investment

$$= \frac{20\,000 \times \text{RM}2.50 - 20\,000 \times \text{RM}1.96}{20\,000 \times \text{RM}1.96} \times 100\%$$

$$= \frac{\text{RM}0.54}{\text{RM}1.96} \times 100\%$$

$$= 27.6\%$$

$$(b) MV = P \left( 1 + \frac{r}{n} \right)^{nt}$$

(i) When  $t = 10$ ,

$$MV = \text{RM}1\,000 \left( 1 + \frac{0.075}{1} \right)^{1 \times 10}$$

$$= \text{RM}1\,000(1.075)^{10}$$

$$= \text{RM}2\,061$$

When  $t = 20$ ,

$$MV = \text{RM}1\,000 \left( 1 + \frac{0.075}{1} \right)^{1 \times 20}$$

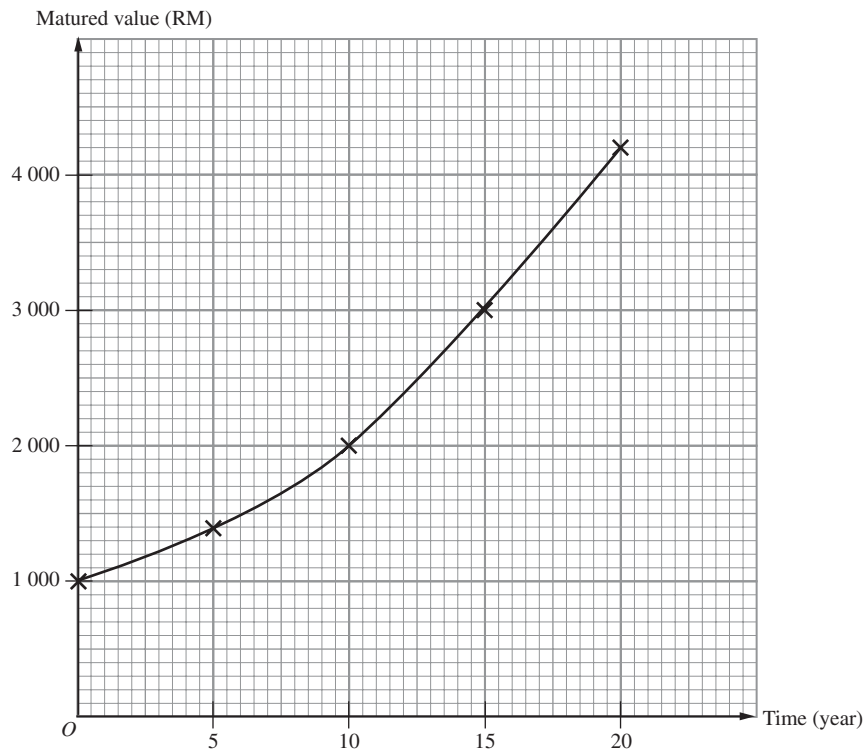
$$= \text{RM}1\,000(1.075)^{20}$$

$$= \text{RM}4\,248$$

(i)

Time, $t$ (year)	Matured value (RM)
0	1 000
5	1 436
10	2 061
15	2 959
20	4 248

(ii)



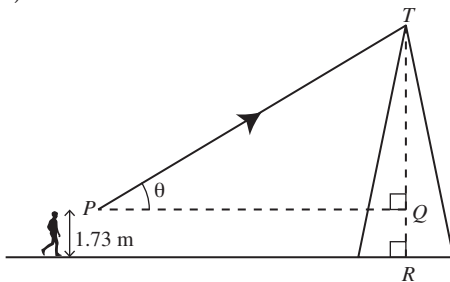
$$\begin{aligned}
 \text{(c)} \quad 217 \times 12 &= P + P \times 0.042 \times 1 \\
 2604 &= P + 0.042P \\
 2604 &= 1.042P \\
 P &= \frac{2604}{1.042} \\
 &= 2499
 \end{aligned}$$

Cash price of the washing machine  
 = RM2 499 + RM360  
 = RM2 859

3 (a) (i)  $x$  = actual height of pagoda

$$\begin{aligned}
 12.16 \text{ cm} : x &= 1 : 500 \\
 \frac{12.16 \text{ cm}}{x} &= \frac{1}{500} \\
 x &= 500 \times 12.16 \text{ cm} \\
 &= 6080 \text{ cm} \\
 &= 60.8 \text{ m}
 \end{aligned}$$

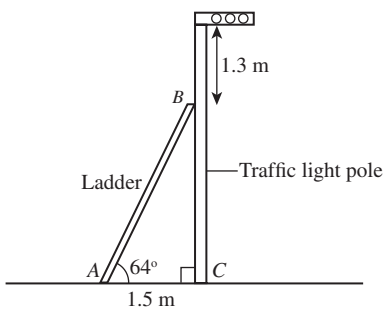
(ii)



$$\begin{aligned}
 \tan \theta &= \frac{QT}{PQ} \\
 &= \frac{60.8 - 1.73}{100} \\
 &= 0.5907 \\
 \theta &= 30^\circ 34'
 \end{aligned}$$

$\therefore$  The angle of elevation of the peak of the pagoda from the tourist's eyes is  $30^\circ 34'$ .

(b)



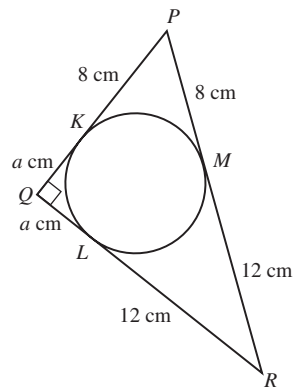
$$\text{(i)} \quad \frac{1.5}{AB} = \cos 64^\circ$$

$$\begin{aligned}
 AB &= \frac{1.5}{\cos 64^\circ} \\
 &= 3.42 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii)} \quad BC^2 &= 3.42^2 - 1.5^2 \\
 &= 11.6964 - 2.25 \\
 &= 9.4464 \\
 BC &= 3.07 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{Height of traffic light post} &= 3.07 \text{ m} + 1.3 \text{ m} \\
 &= 4.37 \text{ m}
 \end{aligned}$$

4 (a)



$$\begin{aligned}
 PQ &= (a + 8) \text{ cm} \\
 QR &= (a + 12) \text{ cm} \\
 PR &= 8 \text{ cm} + 12 \text{ cm} = 20 \text{ cm} \\
 (a + 8)^2 + (a + 12)^2 &= 20^2 \\
 a^2 + 16a + 64 + a^2 + 24a + 144 &= 400 \\
 2a^2 + 40a - 192 &= 0 \\
 a^2 + 20a - 96 &= 0 \\
 (a - 4)(a + 24) &= 0
 \end{aligned}$$

$$a = 4 \text{ or } a = -24$$

$$a > 0, \therefore a = 4$$

$\therefore$  The radius of the circle is 4 cm.

$$\text{(b)} \quad \angle EFG + \angle EHG = 180^\circ$$

$$x + 70^\circ = 180^\circ$$

$$x = 110^\circ$$

$$\angle EOG = 2 \times \angle EHG$$

$$= 2 \times 70^\circ$$

$$= 140^\circ$$

$$y = \frac{1}{2} \times (180^\circ - 140^\circ)$$

$$= 20^\circ$$

$$\angle EHG = \angle HEJ + \angle EJH$$

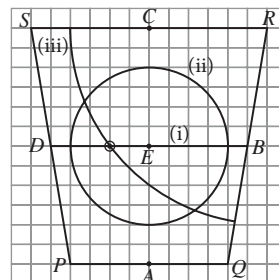
$$70^\circ = \angle HEJ + 40^\circ$$

$$\angle HEJ = 30^\circ$$

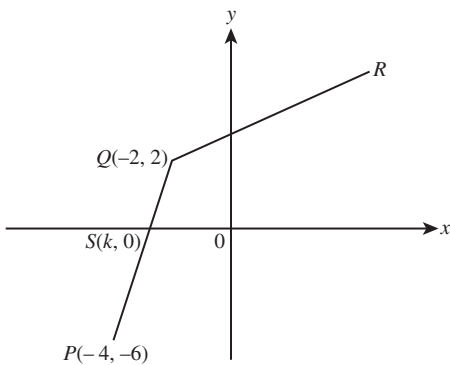
$$30^\circ + z = 90^\circ$$

$$z = 60^\circ$$

5 (a)



(b)



(i) Gradient  $PQ$

$$\begin{aligned}
 &= \frac{2 - (-6)}{-2 - (-4)} \\
 &= \frac{2 + 6}{-2 + 4} \\
 &= \frac{8}{2} \\
 &= 4
 \end{aligned}$$

Gradient  $QS =$  Gradient  $PQ$

$$\begin{aligned}
 \frac{2 - 0}{-2 - k} &= 4 \\
 2 &= -8 - 4k \\
 4k &= -10 \\
 k &= -\frac{5}{2}
 \end{aligned}$$

$\therefore$  The  $x$ -intercept of the straight line  $PQ$  is  $-\frac{5}{2}$ .

(ii) Gradient  $QR = \frac{1}{3} \times$  Gradient  $PQ$

$$\begin{aligned}
 &= \frac{1}{3} \times 4 \\
 &= \frac{4}{3}
 \end{aligned}$$

$$y = \frac{4}{3}x + c$$

Substitute  $x = -2, y = 2,$

$$2 = \frac{4}{3}(-2) + c$$

$$2 = -\frac{8}{3} + c$$

$$c = 2 + \frac{8}{3}$$

$$= \frac{14}{3}$$

$\therefore$  The equation of the straight line

$$QR \text{ is } y = \frac{4}{3}x + \frac{14}{3}.$$

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