

**PROGRAM GEMPUR KECEMERLANGAN  
SIJIL PELAJARAN MALAYSIA 2025  
NEGERI PERLIS**

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**PERATURAN PEMARKAHAN  
MATEMATIK TAMBAHAN  
TINGKATAN 5  
KERTAS 2**

- 1 (a)  $\log_2(2x+1) - \log_4 x^{10} + \log_2 x^4$  P1
- $\log_2(2x+1) - \frac{\log_2 x^{10}}{\log_2 4} + \log_2 x^4$  K1
- $\log_2(2x+1) - \frac{10\log_2 x}{2} + \log_2 x^4$
- $\log_2(2x+1) - 5\log_2 x + \log_2 x^4$
- $\log_2(2x+1) - \log_2 x^5 + \log_2 x^4$
- $\log_2 \frac{(2x+1)x^4}{x^5}$  K1
- $\log_2 \frac{2x+1}{x}$  N1
- (b)  $\log_2 \frac{2x+1}{x} = 3$  K1
- $\frac{2x+1}{x} = 2^3$  K1
- $2x+1 = 8x$
- $8x - 2x = 1$
- $6x = 1$
- $x = \frac{1}{6}$  N1

[7 markah / marks]

2 (a)

$$\frac{y}{1701} = \frac{15309}{y}$$

K1

$$y^2 = 26,040,609$$

$$y = 5103$$

$$1701, 5103, 15309$$

$$r = \frac{5103}{1701}$$

$$r = 3$$

N1

(b)

$$S_5 = \frac{a(3^5 - 1)}{3 - 1} = 847$$

K1

$$\frac{a(242)}{2} = 847$$

$$a = \frac{847}{121}$$

$$a = 7$$

N1

(c)

$$T_n > 75000$$

$$ar^{n-1} > 75000$$

$$7(3)^{n-1} > 75000$$

K1

$$(3)^{n-1} > \frac{75000}{7}$$

$$\log_{10}(3)^{n-1} > \log_{10} \frac{75000}{7}$$

K1

$$(n-1)\log_{10} 3 > \log_{10} \frac{75000}{7}$$

$$n-1 > \frac{\log_{10} \frac{75000}{7}}{\log_{10} 3}$$

$$n-1 > 8.446$$

$$n > 9.446$$

$$n = 10$$

N1

[7 markah / marks]

3 (a) .

$$\text{Luas sigi tiga AOB} = \frac{1}{2} \begin{vmatrix} -3 & 0 & 6 & -3 \\ 4 & 0 & -2 & 4 \end{vmatrix}$$

$$\frac{1}{2} |[-3(0) + 0(-2) + 6(4)] - [4(0) + 0(6) + (-2)(-3)]|$$

K1

$$\frac{1}{2} |[0 + 0 + 24] - [0 + 0 + 6]|$$

$$\frac{1}{2} |24 - 6|$$

$$\frac{1}{2} |18|$$

$$9$$

N1

(b)

$$\frac{2(-3) + 3(6)}{3 + 2} @ \frac{2(4) + 3(-2)}{3 + 2}$$

K1

$$(2.4, 0.4)$$

N1

(c)

$$2PB = AP$$

$$\sqrt{(x - 6)^2 + [y - (-2)]^2} \text{ atau } \sqrt{[x - (-3)]^2 + (y - 4)^2}$$

K1

$$2\sqrt{(x - 6)^2 + (y + 2)^2} = \sqrt{(x + 3)^2 + (y - 4)^2}$$

K1

$$4[(x - 6)^2 + (y + 2)^2] = (x + 3)^2 + (y - 4)^2$$

$$4[x^2 - 12x + 36 + y^2 + 4y + 4] = x^2 + 6x + 9 + y^2 - 8y + 16$$

$$4[x^2 + y^2 - 12x + 4y + 40] = x^2 + y^2 + 6x - 8y + 25$$

$$4x^2 + 4y^2 - 48x + 16y + 160 - x^2 - y^2 - 6x + 8y - 25 = 0$$

$$3x^2 + 3y^2 - 54x + 24y + 135 = 0$$

N1

[7 markah/7 marks]

4 (a)

$$\tan \theta = \frac{4}{2}$$

K1

$$\theta = 63.43 \times \frac{\pi}{180}$$

K1

$$\theta = 1.107$$

N1

(b)

$$A_1 = \frac{1}{2} \times 6^2 \times 1.107$$

$$= 19.926$$

atau

K1

$$A_2 = \frac{1}{2} \times 4^2 \times 1.571$$

$$= 12.568$$

$$A_3 = \frac{1}{2} \times 2 \times 4$$

$$= 4$$

K1

$$A = 19.926 - 12.568 - 4$$

K1

$$= 3.358$$

N1

[7 markah / marks ]

5 (a)

$$\frac{2}{\cos 2x + 1}$$

$$\frac{2}{2\cos^2 x - 1 + 1}$$

K1

$$\frac{2}{2\cos^2 x}$$

$$\frac{1}{\cos^2 x}$$

$$\sec^2 x$$

N1

(b)

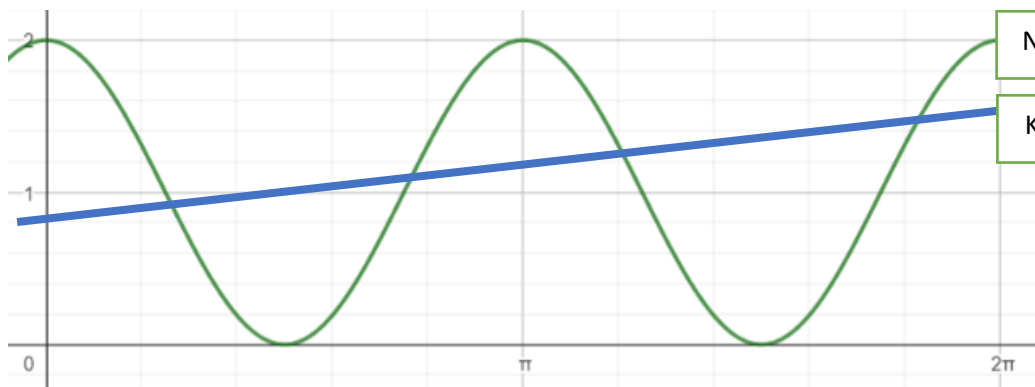
$$y = \cos 2x + 1$$

N1

N1

N1

K1



$$y = \frac{x}{4\pi} + 1$$

K1

Bilangan penyelesaian = 4

N1

[8 markah/marks]

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[Lihat halaman sebelah  
**SULIT**

6 (a)

$$\frac{dy}{dx} = -6x^2 + 12x$$

N2

(b)

$$\frac{dy}{dx} = -6x^2 + 12x = 0$$

$$-6x(x - 2) = 0$$

K1

$$x = 0, \quad x = 2$$

$$y = 1, \quad y = 9$$

Koordinat titik pusingan = (0, 1) &amp; (2, 9)

N1

(c)

$$\frac{d^2y}{dx^2} = -12x + 12$$

(0, 1),

$$\frac{d^2y}{dx^2} = -12(0) + 12 = 12 > 0,$$

 $\therefore$  (0,1) titik minimum

N1

(2, 9)

$$\frac{d^2y}{dx^2} = -12(2) + 12 = -12 < 0,$$

 $\therefore$  (2,9) titik maksimum

N1

[6 markah/marks]

7

$$2M = N = R$$

$$2(2x - y) = 3x + 1 = xy - 8$$

$$4x - 2y = 3x + 1 = xy - 8$$

$$4x - 2y = 3x + 1 \text{ ----- } \textcircled{1}$$

P1

$$3x + 1 = xy - 8 \text{ ----- } \textcircled{2}$$

Dari 1:  $4x - 3x = 2y + 1$

$$x = 2y + 1 \text{ ----- } \textcircled{3}$$

P1

Dari 2:  $3x - xy + 9 = 0 \text{ ----- } \textcircled{4}$

$$3(2y + 1) - y(2y + 1) + 9 = 0$$

K1

$$6y + 3 - 2y^2 - y + 9 = 0$$

$$-2y^2 + 5y + 12 = 0$$

$$2y^2 - 5y - 12 = 0$$

$$(2y + 3)(y - 4) = 0$$

K1

$$y = -\frac{3}{2}, y = 4$$

N1

$$x = 2\left(-\frac{3}{2}\right) + 1 = -2, \quad x = 2(4) + 1 = 9$$

N1

[6 markah / marks]

8

(a)

|               |      |      |      |      |      |       |    |
|---------------|------|------|------|------|------|-------|----|
| $x$           | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 10.60 | N1 |
| $\frac{1}{y}$ | 3.30 | 2.75 | 2.15 | 1.70 | 1.10 | 0.55  |    |

(b)

Plot  $\frac{1}{y}$  melawan  $x$ ,

- skala seragam

- 1 titik diplot betul

6 titik diplot betul

Garis lurus penyesuaian terbaik seimbang dan seragam.

(c)

$$\frac{1}{y} = \frac{p}{n}x + \frac{1}{n}$$

$$\frac{1}{n} = 0.85$$

$$n = 1.176$$

$$\frac{p}{n} = \frac{0.55 - 3.33}{0.60 - 0.10}$$

$$\frac{p}{n} = -5.56$$

$$p = -5.56n$$

$$p = -5.56(1.176)$$

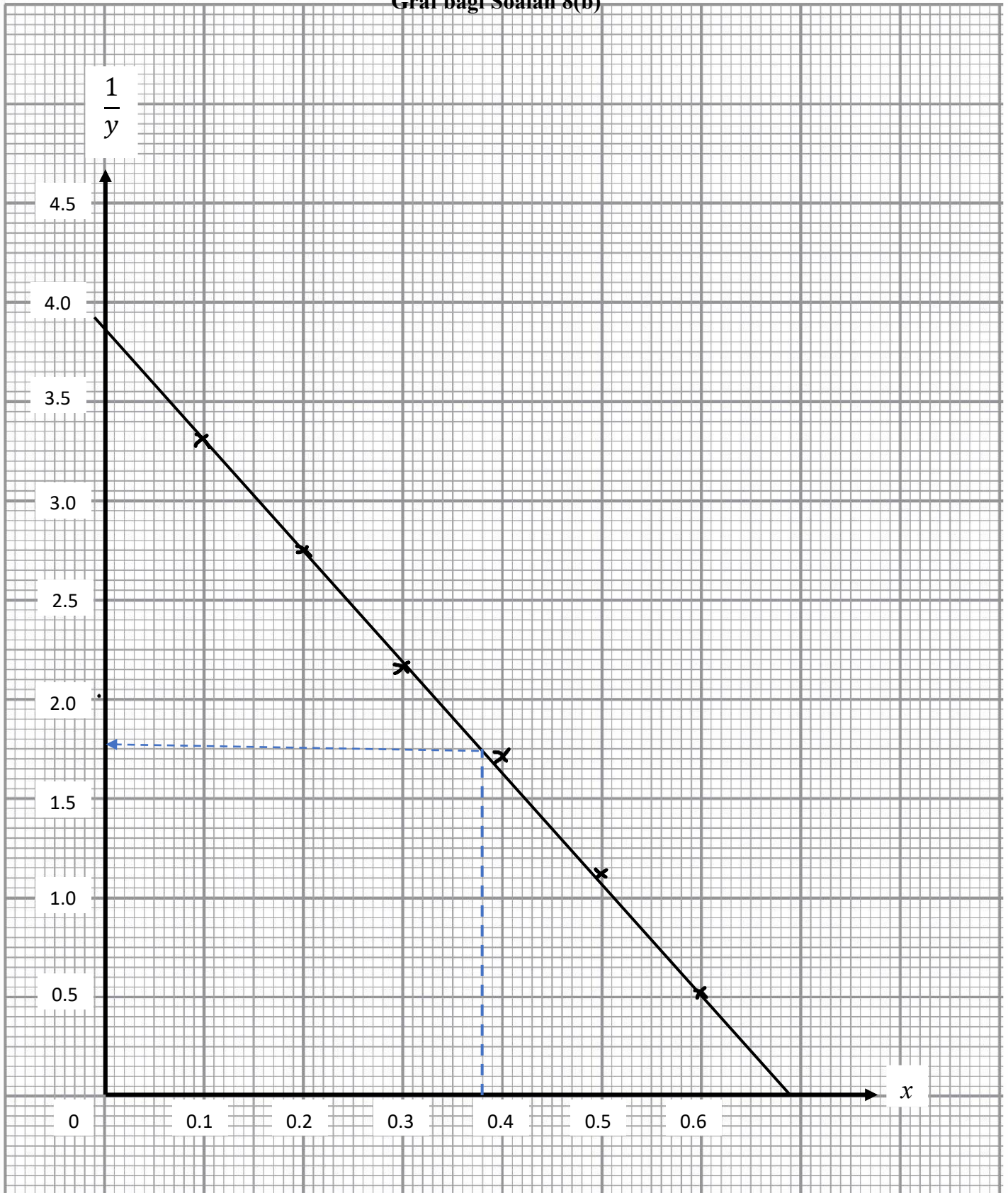
$$= -6.539$$

$$\frac{1}{y} = 0.75$$

$$y = 1.333$$

[10 markah / marks]

Graf bagi Soalan 8(b)



9

(a)

$$y = \frac{2x^2}{2} + c$$

$$y = x^2 + c$$

K1

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

K1

$$c = 2$$

$$y = x^2 + 2$$

N1

(b)

$$A_1 = (3)(1) = 3$$

$$A_2 = \left[ \frac{x^3}{3} + 2x \right]_0^1$$

K1

$$\left( \frac{(1)^3}{3} + 2(1) \right) - 0$$

K1

$$\frac{7}{3}$$

$$A = 3 - \frac{7}{3}$$

K1

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

N1

(c)

$$\text{Isipadu} = \pi \int_2^3 x^2 dy$$

$$\pi \int_2^3 (y - 2) dx$$

$$\pi \left[ \frac{y^2}{2} - 2y \right]_2^3$$

K1

$$\pi \left[ \left( \frac{(3)^2}{2} - 2(3) \right) - \left( \frac{(2)^2}{2} - 2(2) \right) \right]$$

K1

$$\frac{1}{2}\pi$$

N1

[10 markah / marks]

10 (a)

$$(i) \quad \overrightarrow{CQ} = \overrightarrow{CD} + \overrightarrow{DQ}$$

$$= \underline{v} + 6\underline{u}$$

K1

$$= 6\underline{u} + \underline{v}$$

N1

$$(ii) \quad \overrightarrow{PA} = \overrightarrow{PB} + \overrightarrow{BA}$$

$$= 2\underline{u} + \underline{v}$$

N1

$$\overrightarrow{PA} = \lambda \overrightarrow{PR}$$

$$\overrightarrow{PA} = \lambda (\overrightarrow{PC} + \overrightarrow{CR})$$

$$\overrightarrow{PA} = \lambda (-6\underline{u} + 9\underline{u} + \frac{3}{2}\underline{v})$$

$$\overrightarrow{PA} = \lambda (3\underline{u} + \frac{3}{2}\underline{v})$$

$$\overrightarrow{PA} = 3\lambda\underline{u} + \frac{3}{2}\lambda\underline{v}$$

N1

$$2\underline{u} = 3\lambda\underline{u}$$

K1

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

$$\overrightarrow{PA} = \frac{2}{3} \overrightarrow{PR}$$

N1

(b) (i)

$$\overrightarrow{PA} = 2\underline{u} + \underline{v}$$

$$\overrightarrow{PA} = 2(-3\underline{i}) + (-2)\underline{i} + 5\underline{j}$$

K1

$$\overrightarrow{PA} = -6\underline{i} - 2\underline{i} + 5\underline{j}$$

$$\overrightarrow{PA} = -8\underline{i} + 5\underline{j}$$

N1

$$\overrightarrow{PA} = -8\underline{i} + 5\underline{j}$$

$$|\overrightarrow{PA}| = \sqrt{(-8)^2 + 5^2}$$

$$= \sqrt{89}$$

K1

$$\text{Vektor unit } \overrightarrow{PA} = \frac{-8\underline{i} + 5\underline{j}}{\sqrt{89}}$$

N1

[10 markah / marks]

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11 | <p>(a)</p> <p>(i) <math>p = 0.8, q = 0.2, n = 10</math></p> $P(X = 9) = {}^{10}C_9 \times 0.8^9 \times 0.2^1$ <div style="text-align: right; border: 1px solid black; padding: 2px;">K1</div> $= 0.2684$ <div style="text-align: right; border: 1px solid black; padding: 2px;">N1</div> <p>(ii) <math>p = 0.2, q = 0.8, n = 10</math></p> $P(X \leq 2) = P(X = 0) + P(X = 1) + P(X = 2)$ $= {}^{10}C_0 \times 0.2^0 \times 0.8^{10} + {}^{10}C_1 \times 0.2^1 \times 0.8^9 + {}^{10}C_2 \times 0.2^2 \times 0.8^8$ <div style="text-align: right; border: 1px solid black; padding: 2px;">K1</div> $= 0.6778$ <div style="text-align: right; border: 1px solid black; padding: 2px;">N1</div> <p>(b)</p> <p>(i) <math>\mu = 20 \quad \sigma = 10</math></p> $P\left(Z > \frac{32 - 20}{10}\right)$ <div style="text-align: right; border: 1px solid black; padding: 2px;">K1</div> $P(Z > 1.2)$ $0.1151$ <div style="text-align: right; border: 1px solid black; padding: 2px;">N1</div> <p>(ii) <math>P(X &lt; t) = 0.1600</math></p> <div style="text-align: right; border: 1px solid black; padding: 2px;">K1</div> $z = -0.994$ <div style="text-align: right; border: 1px solid black; padding: 2px;">N1</div> $\frac{t - 20}{10} = -0.994$ <div style="text-align: right; border: 1px solid black; padding: 2px;">K1</div> $t = 10.06$ <div style="text-align: right; border: 1px solid black; padding: 2px;">N1</div> |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

12 (a)

$$w = 100 - 12 - 48 - 25 = 15$$

N1

$$x = \frac{5}{4} \times 100$$

$$x = 125$$

N1

$$\frac{y}{3} \times 100 = 150$$

$$y = 150$$

N1

$$\frac{3}{z} \times 100 = 120$$

$$z = 2.50$$

N1

(b)

$$\frac{125(15) + 150(12) + 125(48) + 120(25)}{15 + 12 + 48 + 25}$$

K1

$$126.75$$

N1

(c)

$$\frac{50}{P_{2021}} \times 100 = 126.75$$

K1

$$P_{2021} = 39.45$$

N1

(c)

$$\frac{115}{100} \times \frac{100}{126.75} \times 100$$

K1

$$90.73$$

N1

[ 10 markah / marks ]

13 (a)

$$10^2 = 12^2 + 7^2 - 2(12)(7)\cos \theta \quad \boxed{\text{K1}}$$

$$2(12)(7)\cos \theta = 12^2 + 7^2 - 10^2$$

$$\cos \theta = \frac{12^2 + 7^2 - 10^2}{2(12)(7)}$$

$$\cos \theta = 0.5535$$

$$\theta = 56.39 \quad \boxed{\text{N1}}$$

(b)

$$\frac{\sin \theta}{7} = \frac{\sin 56.39}{10} \quad \boxed{\text{K1}}$$

$$\sin \theta = \frac{7 \sin 56.39}{10}$$

$$\sin \theta = 0.5830$$

$$\angle \text{BAC} = 35.66 \quad \boxed{\text{N1}}$$

(c)

$$\frac{DC}{\sin 83.24} = \frac{7}{\sin 40.37} \quad \boxed{\text{K1}}$$

$$DC = \frac{7 \sin 83.24}{\sin 40.37} \quad \boxed{\text{K1}}$$

$$DC = 10.73 \quad \boxed{\text{N1}}$$

(d)

$$AD = 12 - 10.73 = 1.27 \quad \boxed{\text{K1}}$$

$$\frac{1}{2} \times 10 \times 1.27 \times \sin 35.66 \quad \boxed{\text{K1}}$$

$$3.702 \quad \boxed{\text{N1}}$$

[10 markah / marks ]

14 (a)

$$a = 19 - 8t = 0$$

$$19 = 8t$$

$$t = \frac{19}{8}$$

N1

(b)

$$v = \int (19 - 8t) dt$$

$$v = 19t - 4t^2 + c$$

$$5 = 19(0) - 4(0)^2 + c$$

$$5 = c$$

$$v = 19t - 4t^2 + 5$$

K1

$$v = 19\left(\frac{19}{8}\right) - 4\left(\frac{19}{8}\right)^2 + 5$$

K1

$$\frac{441}{16}$$

N1

(c)

$$v = 19t - 4t^2 + 5 = 0$$

$$4t^2 - 19t - 5 = 0$$

$$(4t + 1)(t - 5) = 0$$

$$\therefore t = 5$$

K1

K1

N1

(d)

$$\text{Jarak} = \int_0^4 (19t - 4t^2 + 5) dt$$

$$\left[ \frac{19t^2}{2} - \frac{4t^3}{3} + 5t \right]_0^4$$

K1

$$\left( \frac{19(4)^2}{2} - \frac{4(4)^3}{3} + 5(4) \right) - 0$$

K1

$$\frac{260}{3}$$

N1

[10 markah / marks]

15.

