

SULIT



LEMBAGA PEPERIKSAAN
KEMENTERIAN PENDIDIKAN MALAYSIA

SIJIL PELAJARAN MALAYSIA 2019

ADDITIONAL MATHEMATICS

3472/2

Kertas 2
Okt./Nov.

2 $\frac{1}{2}$ jam

Dua jam tiga puluh minit

JANGAN BUKA KERTAS PEPERIKSAAN INI SEHINGGA DIBERITAHU

1. *Kertas peperiksaan ini adalah dalam dwibahasa.*
2. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
3. *Calon dikehendaki membaca maklumat di halaman belakang kertas peperiksaan ini.*
4. *Calon dikehendaki ceraikan halaman 27 dan ikat sebagai muka hadapan bersama-sama dengan buku jawapan.*

Kertas peperiksaan ini mengandungi 28 halaman bercetak.

[Lihat halaman sebelah



SULIT

2

The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used.

Rumus-rumus berikut boleh membantu anda menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.

ALGEBRA

$$1 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2 \quad a^m \times a^n = a^{m+n}$$

$$3 \quad a^m \div a^n = a^{m-n}$$

$$4 \quad (a^m)^n = a^{mn}$$

$$5 \quad \log_a mn = \log_a m + \log_a n$$

$$6 \quad \log_a \frac{m}{n} = \log_a m - \log_a n$$

$$7 \quad \log_a m^n = n \log_a m$$

$$8 \quad \log_a b = \frac{\log_c b}{\log_c a}$$

$$9 \quad T_n = a + (n-1)d$$

$$10 \quad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$11 \quad T_n = ar^{n-1}$$

$$12 \quad S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, r \neq 1$$

$$13 \quad S_\infty = \frac{a}{1 - r}, |r| < 1$$

CALCULUS

KALKULUS

$$1 \quad y = uv, \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$2 \quad y = \frac{u}{v}, \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

$$3 \quad \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

4 Area under a curve
Luas di bawah lengkung

$$= \int_a^b y \, dx \text{ or (atau)}$$

$$= \int_a^b x \, dy$$

5 Volume of revolution
Isi padu kisanan

$$= \int_a^b \pi y^2 \, dx \text{ or (atau)}$$

$$= \int_a^b \pi x^2 \, dy$$



STATISTICS
STATISTIK

$$1 \quad \bar{x} = \frac{\sum x}{N}$$

$$2 \quad \bar{x} = \frac{\sum fx}{\sum f}$$

$$3 \quad \sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N}} = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$$

$$4 \quad \sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}} = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$$

$$5 \quad m = L + \left(\frac{\frac{1}{2}N - F}{f_m} \right) C$$

$$6 \quad I = \frac{Q_1}{Q_0} \times 100$$

$$7 \quad \bar{I} = \frac{\sum WiIi}{\sum Wi}$$

$$8 \quad {}^n P_r = \frac{n!}{(n-r)!}$$

$$9 \quad {}^n C_r = \frac{n!}{(n-r)! r!}$$

$$10 \quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$11 \quad P(X = r) = {}^n C_r p^r q^{n-r}, \quad p + q = 1$$

$$12 \quad \text{Mean / Min} , \mu = np$$

$$13 \quad \sigma = \sqrt{npq}$$

$$14 \quad Z = \frac{X - \mu}{\sigma}$$

GEOMETRY
GEOMETRI

$$1 \quad \text{Distance / Jarak} \\ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$2 \quad \text{Midpoint / Titik tengah} \\ (x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$3 \quad \text{A point dividing a segment of a line} \\ \text{Titik yang membahagi suatu tembereng garis} \\ (x, y) = \left(\frac{nx_1 + mx_2}{m+n}, \frac{ny_1 + my_2}{m+n} \right)$$

$$4 \quad \text{Area of triangle / Luas segi tiga} \\ = \frac{1}{2} | (x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3) |$$

$$5 \quad |\underline{r}| = \sqrt{x^2 + y^2}$$

$$6 \quad \hat{\underline{r}} = \frac{x\underline{i} + y\underline{j}}{\sqrt{x^2 + y^2}}$$

[Lihat halaman sebelah



TRIGONOMETRY
TRIGONOMETRI

- | | |
|---|---|
| <p>1 Arc length, $s = r\theta$
<i>Panjang lengkok, $s = j\theta$</i></p> <p>2 Area of sector, $A = \frac{1}{2}r^2\theta$
<i>Luas sektor, $L = \frac{1}{2}j^2\theta$</i></p> <p>3 $\sin^2 A + \cos^2 A = 1$
$\sin^2 A + \text{kos}^2 A = 1$</p> <p>4 $\sec^2 A = 1 + \tan^2 A$
$\text{sek}^2 A = 1 + \tan^2 A$</p> <p>5 $\text{cosec}^2 A = 1 + \cot^2 A$
$\text{kosek}^2 A = 1 + \text{kot}^2 A$</p> <p>6 $\sin 2A = 2 \sin A \cos A$
$\sin 2A = 2 \sin A \text{kos} A$</p> <p>7 $\cos 2A = \cos^2 A - \sin^2 A$
$= 2 \cos^2 A - 1$
$= 1 - 2 \sin^2 A$</p> <p>$\text{kos} 2A = \text{kos}^2 A - \sin^2 A$
$= 2 \text{kos}^2 A - 1$
$= 1 - 2 \sin^2 A$</p> | <p>8 $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$</p> <p>9 $\sin (A \pm B) = \sin A \cos B \pm \cos A \sin B$
$\sin (A \pm B) = \sin A \text{kos} B \pm \text{kos} A \sin B$</p> <p>10 $\cos (A \pm B) = \cos A \cos B \mp \sin A \sin B$
$\text{kos} (A \pm B) = \text{kos} A \text{kos} B \mp \sin A \sin B$</p> <p>11 $\tan (A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$</p> <p>12 $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$</p> <p>13 $a^2 = b^2 + c^2 - 2bc \cos A$
$a^2 = b^2 + c^2 - 2bc \text{kos} A$</p> <p>14 Area of triangle / <i>Luas segi tiga</i>
$= \frac{1}{2}ab \sin C$</p> |
|---|---|



Section A
Bahagian A

[40 marks]

[40 markah]

Answer **all** questions.Jawab **semua** soalan.

- 1 Solve the simultaneous equations $x + 2y = 1$ and $\frac{3}{x} - \frac{2}{y} = 5$.

Give your answers correct to three decimal places.

[5 marks]

Selesaikan persamaan serentak $x + 2y = 1$ dan $\frac{3}{x} - \frac{2}{y} = 5$.

Beri jawapan anda betul kepada tiga tempat perpuluhan.

[5 markah]

- 2 Express $2^{n+2} - 2^{n+1} + 2^{n-1}$ in the form $p(2^{n-1})$, where p is a constant.

Hence, solve the equation $8(2^{n+2} - 2^{n+1} + 2^{n-1}) = 5(2^{n^2})$.

[6 marks]

Ungkapkan $2^{n+2} - 2^{n+1} + 2^{n-1}$ dalam bentuk $p(2^{n-1})$, dengan keadaan p ialah pemalar.

Seterusnya, selesaikan persamaan $8(2^{n+2} - 2^{n+1} + 2^{n-1}) = 5(2^{n^2})$.

[6 markah]



$$\textcircled{1} \quad x + 2y = 1$$

$$x = 1 - 2y \quad \text{--- (1)}$$

$$\frac{3}{x} - \frac{2}{y} = 5$$

$$3 - \frac{2x}{y} = 5x$$

$$3y - 2x = 5xy \quad \text{--- (2)}$$

$$\textcircled{1} \rightarrow \textcircled{2}: \quad 3y - 2(1 - 2y) = 5(1 - 2y)y$$

$$3y - 2 + 4y = 5y - 10y^2$$

$$10y^2 + 2y - 2 = 0$$

$$5y^2 + y - 1 = 0$$

$$y = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1 \pm \sqrt{1 - 4(5)(-1)}}{2(5)}$$

$$= \frac{-1 \pm \sqrt{21}}{10}$$

$$= 0.3583 \text{ atau } -0.5583$$

$$x = 1 - 2y$$

$$= 1 - 2(0.3583) \text{ atau } 1 - 2(-0.5583)$$

$$= \text{---} \text{ atau } \text{---} \quad \#$$

$$\textcircled{2} \quad 2^{n+2} - 2^{n+1} + 2^{n-1} \quad P(2^{n-1})$$

$$= 2^n(2^2) - 2^n(2^1) + 2^n(2^{-1})$$

$$= 2^n \left(4 - 2 + \frac{1}{2} \right)$$

$$= 2^n \left(\frac{5}{2} \right)$$

$$= \frac{2^n}{2} \times 5$$

$$= 5(2^{n-1}) \quad \#$$

$$8(2^{n+2} - 2^{n+1} + 2^{n-1}) = 5(2^{n^2})$$

$$8(5(2^{n-1})) = 5(2^{n^2})$$

$$40(2^{n-1}) = 5(2^{n^2})$$

$$\frac{40}{5} = \frac{2^{n^2}}{2^{n-1}}$$

$$8 = 2^{n^2 - (n-1)}$$

$$2^3 = 2^{n^2 - n + 1}$$

$$3 = n^2 - n + 1$$

$$n^2 - n - 2 = 0$$

$$(n-2)(n+1) = 0$$

$$n = 2, -1 \quad \#$$

3 Diagram 1 shows a sector POA with centre O .

Rajah 1 menunjukkan sektor POA dengan pusat O .

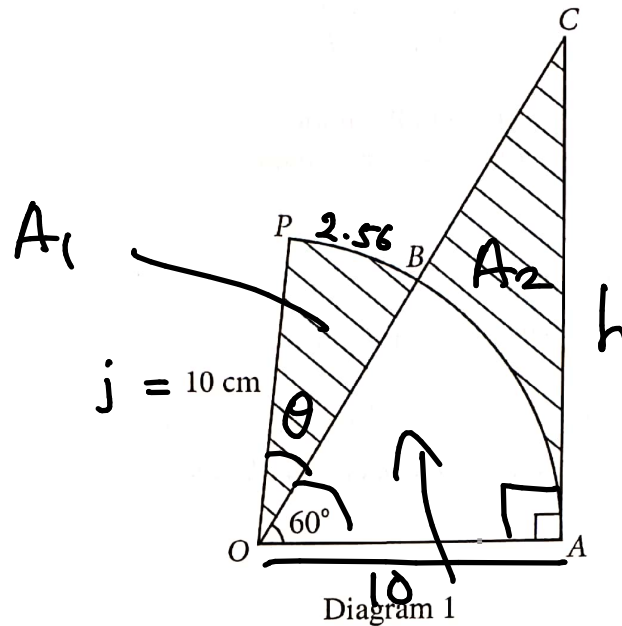


Diagram 1

Rajah 1

It is given that the length of arc PB is 2.56 cm.

Diberi bahawa panjang lengkok PB ialah 2.56 cm.

[Use / Guna $\pi = 3.142$]

Calculate

Hitung

(a) $\angle POB$ in radians,

[2 marks]

$\angle POB$ dalam radian,

[2 markah]

(b) the area, in cm^2 , of the shaded region.

[4 marks]

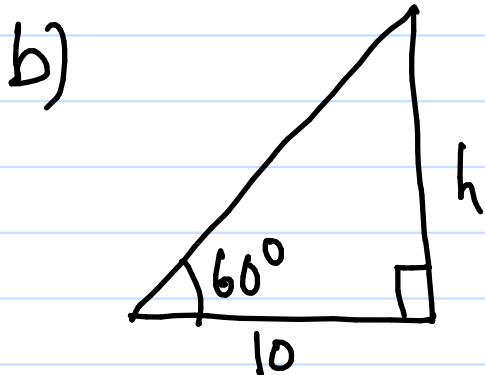
luas, dalam cm^2 , kawasan berlorek.

[4 markah]



③ a) $s = j\theta$
 $2.56 = 10\theta$

$$\theta = \frac{2.56}{10} = 0.256 \text{ rad} \neq$$



$$\tan(60^\circ) = \frac{h}{10}$$

$$h = 10 \times \tan 60^\circ = 17.32$$

$$60^\circ = \frac{60}{180} \times 3.142 = 1.047 \text{ rad.}$$

$$A_1 = \frac{1}{2} j^2 \theta = \frac{1}{2} (10)^2 (0.256) = 12.8$$

$$A_2 = \left(\text{triangle with base 10 and height 17.32} \right) - \left(\text{triangle with base 10 and angle } 60^\circ \right)$$

$$= \frac{1}{2} (10)(17.32) - \frac{1}{2} (10)^2 (1.047)$$

$$= \underline{\hspace{2cm}}$$

L. Kawason Berlorek

$$= A_1 + A_2$$

$$= \underline{\hspace{2cm}} \neq$$

- 4 Diagram 2 shows the curve $y = 4x - x^2$ and tangent to the curve at point Q passes point P .

Rajah 2 menunjukkan lengkung $y = 4x - x^2$ dan tangen kepada lengkung pada titik Q melalui titik P .

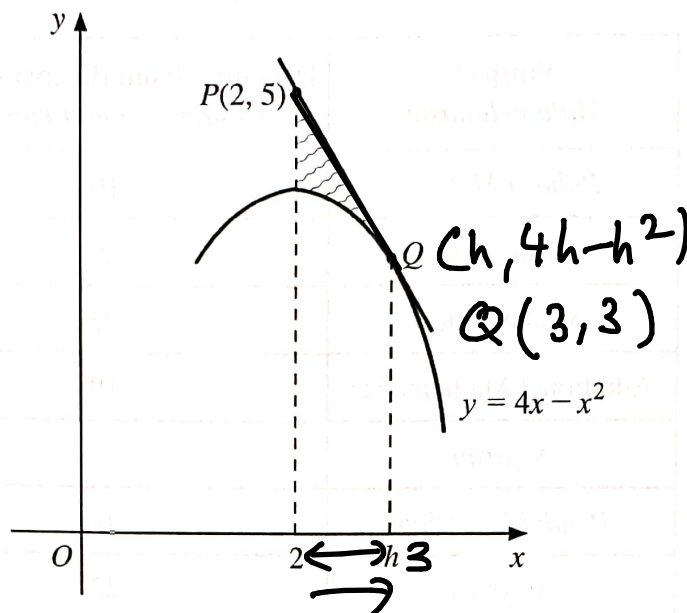


Diagram 2

Rajah 2

- (a) Show that $h = 3$. [4 marks]
 Tunjukkan bahawa $h = 3$. [4 markah]
- (b) Calculate the area of the shaded region. [4 marks]
 Hitung luas rantau berlorek. [4 markah]



$$Q: x=h, y=4(h)-h^2 \\ = 4h-h^2$$

$$Q(h, 4h-h^2)$$

Kecerunan PQ:

$$P(2,5) \\ Q(h, 4h-h^2)$$

$$M = \frac{y_2 - y_1}{x_2 - x_1} \\ = \frac{5 - (4h - h^2)}{2 - h}$$

Garis tangen:

$$y = 4x - x^2$$

$$\frac{dy}{dx} = 4 - 2x$$

$$\text{Di titik } Q: M = 4 - 2(h) \\ = 4 - 2h$$

$$\frac{5 - (4h - h^2)}{2 - h} = 4 - 2h$$

$$5 - 4h + h^2 = (4 - 2h)(2 - h) \\ = 8 - 4h - 4h + 2h^2$$

$$h^2 - 4h + 3 = 0$$

$$(h-3)(h-1) = 0$$

$$h = 1 \text{ or } 3$$

$$h > 2$$

$$\therefore h = 3 \neq$$

(b) Was Kawason Berlorck

$$= \frac{1}{2}(8)(1) - \int_2^3 y dx$$

$$= 4 - \int_2^3 4x - x^2 dx$$

$$= 4 - \left[\frac{4x^2}{2} - \frac{x^3}{3} \right]_2^3$$

$$= 4 - \left[(18 - 9) - \left(8 - \frac{8}{3} \right) \right]$$

$$= \text{---} \neq$$

- 5 Table 1 shows the deviation from the mean mark scored by Nora in a monthly test. The deviation from the mean mark for Sejarah has been left out.

Jadual 1 menunjukkan sisihan dari min markah yang diperoleh Nora dalam suatu ujian bulanan. Sisihan dari min markah bagi Sejarah telah tertinggal.

Subject Mata pelajaran	Deviation from the mean mark Sisihan dari min markah	\mathcal{K}	
Bahasa Melayu	10	70	
Bahasa Inggeris	2	62	
Mathematics	23	83	
Additional Mathematics	-19	41	③
Sejarah		90	
Pendidikan Islam	-6	54	④
Physics	-22	38	①
Chemistry	-20	40	②
Biology	2	62	⑤

Table 1

Jadual 1

It is given that her mean mark for all the 9 subjects is 60.

Diberi bahawa min markahnya bagi semua 9 mata pelajaran itu ialah 60.

Find

Cari

- (a) the median mark, [4 marks]
markah median, [4 markah]
- (b) the standard deviation. [3 marks]
sisihan piawai. [3 markah]



$$x_1 \quad x_2 \quad x_3 \quad x_4$$

$$\bar{x} = \frac{x_1 + x_2 + x_3 + x_4}{4}$$

$$x_1 - \bar{x}$$

$$x_2 - \bar{x}$$

$$\begin{aligned} \text{Sejarah} &= (9 \times 60) - 450 \\ &= 90 \end{aligned}$$

a) Median

= Markah ke-5

= 62 #

$$b) \sigma = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$$

$$\begin{aligned} \sum x^2 &= 70^2 + 62^2 + \dots + 62^2 \\ &= 35218 \end{aligned}$$

$$\sigma = \sqrt{\frac{35218}{9} - 60^2}$$

$$= 17.695 \#$$

- 6 Solution by scale drawing is **not** accepted.

Penyelesaian secara lukisan berskala tidak diterima.

Diagram 3 shows the positions of jetty O and kelong K, L, R, S and T in the sea.

Rajah 3 menunjukkan kedudukan jeti O dan kelong-kelong K, L, R, S dan T di laut.

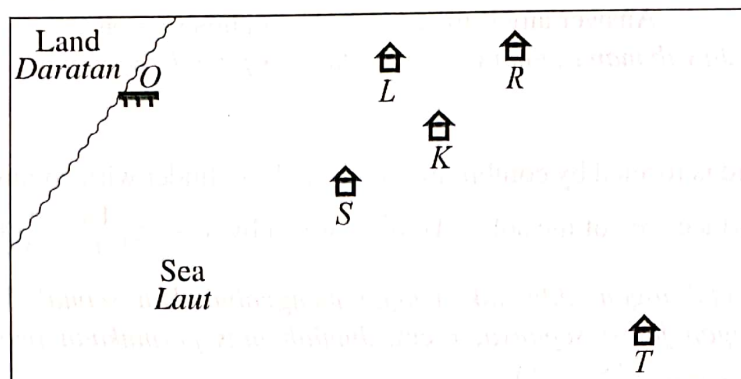


Diagram 3

Rajah 3

Kelong L is situated 400 m from jetty O and kelong R is situated 600 m from jetty O in the direction of OL . Kelong S is situated 300 m from jetty O and kelong T is situated 600 m from kelong S in the direction of OS . Kelongs L, K and T are situated on a straight line such that the distance of kelong K from kelong T is 5 times its distance from kelong L .

Kelong L terletak 400 m dari jeti O dan kelong R terletak 600 m dari jeti O pada arah OL . Kelong S terletak 300 m dari jeti O dan kelong T terletak 600 m dari kelong S pada arah OS . Kelong-kelong L, K dan T terletak pada satu garis lurus dengan keadaan jarak kelong K dari kelong T adalah 5 kali jaraknya dari kelong L .

- (a) By using \underline{p} to represent 100 m in the direction of OR and \underline{q} to represent 150 m in the direction of OT , express in terms of \underline{p} and \underline{q}

Dengan menggunakan \underline{p} untuk mewakili 100 m pada arah OR dan \underline{q} untuk mewakili 150 m pada arah OT , ungkapkan dalam sebutan \underline{p} dan \underline{q}

(i) \overrightarrow{OK} ,

(ii) \overrightarrow{RK} .

[3 marks]

[3 markah]

- (b) If Joe uses a binocular to observe kelong R from kelong S , determine whether kelong R can be seen without being blocked by kelong K or otherwise.

Prove your answer mathematically.

[5 marks]

Jika Joe menggunakan binokular untuk melihat kelong R dari kelong S , tentukan sama ada kelong R dapat dilihat tanpa dihalang oleh kelong K atau sebaliknya.

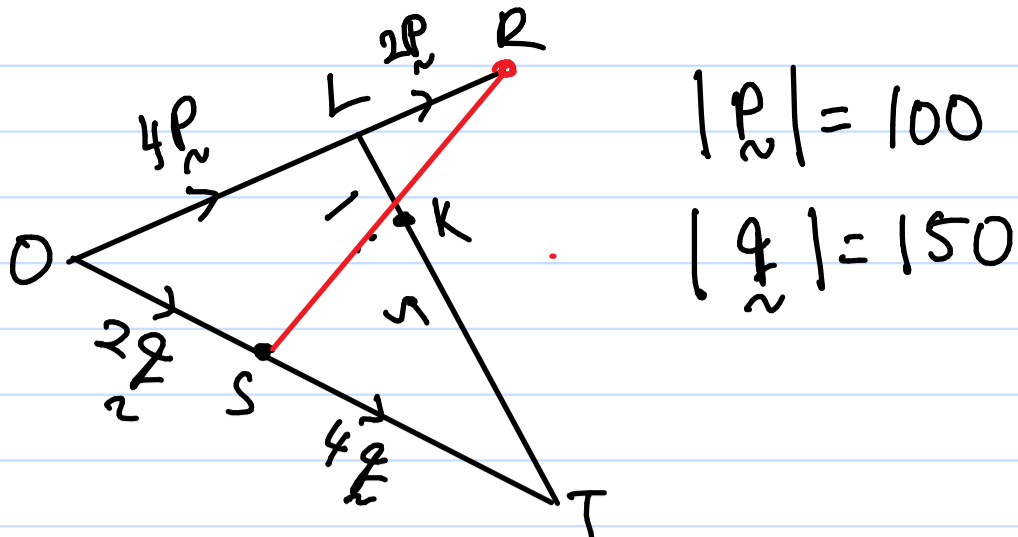
Buktikan jawapan anda secara matematik.

[5 markah]

[Lihat halaman sebelah

SULIT





$$\begin{aligned}
 \text{a) } \vec{OK} &= \vec{OL} + \vec{LK} \\
 &= 4p + \frac{1}{6} \vec{LT} \\
 &= 4p + \frac{1}{6} (\vec{LO} + \vec{OT}) \\
 &= 4p + \frac{1}{6} (-4p + 6q) \\
 &= 4p - \frac{2}{3}p + q \\
 &= \frac{10}{3}p + q \neq
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) } \vec{RK} &= \vec{RL} + \vec{LK} \\
 &= -2p + \frac{1}{6} (-4p + 6q) \\
 &= -2p - \frac{2}{3}p + q \\
 &= -\frac{8}{3}p + q
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) } \vec{SR} &= \vec{SO} + \vec{OR} \\
 &= -2q + 6p
 \end{aligned}$$

$$\begin{aligned}
 \vec{SK} &= \vec{SO} + \vec{OL} + \vec{LK} \\
 &= -2q + 4p + \frac{1}{6} (\vec{LT}) \\
 &= -2q + 4p + \frac{1}{6} (-4p + 6q) \\
 &= -q + \frac{10}{3}p
 \end{aligned}$$

$$\vec{SK} = \lambda \vec{SR}$$

$$\begin{aligned}
 -q + \frac{10}{3}p &= \lambda (-2q + 6p) \\
 &= -2\lambda q + 6\lambda p
 \end{aligned}$$

$$\begin{array}{l|l}
 -1 = -2\lambda & \frac{10}{3} = 6\lambda \\
 \frac{1}{2} = \lambda & \frac{10}{18} = \lambda \\
 & \frac{5}{9} = \lambda
 \end{array}$$

$\therefore S, K, R$ bukan segaris

\therefore Pandangan Bob tidak terhalang oleh Kelong K.

Section B
Bahagian B

[40 marks]

[40 markah]

Answer any **four** questions from this section.

Jawab mana-mana **empat** soalan daripada bahagian ini.

- 7 A metal solid is formed by combining a cone and a cylinder with common radius, r cm. The total surface area of the solid, A cm², is given by $A = 2\pi\left(\frac{18}{r} + \frac{r^2}{3}\right)$.

Sebuah pepejal logam dibentuk dengan menggabungkan sebuah kon dan sebuah silinder dengan jejari sepunya, r cm. Jumlah luas permukaan pepejal itu, A cm², diberi oleh $A = 2\pi\left(\frac{18}{r} + \frac{r^2}{3}\right)$.

- (a) (i) The solid expands when heated. It is given that the surface area of the solid changes at the rate of 1.4π cm² s⁻¹.

Find the rate of change of its radius, in cm s⁻¹, when its radius is 6 cm.

Pepejal itu mengembang apabila dipanaskan. Diberi bahawa luas permukaan pepejal itu berubah dengan kadar 1.4π cm² s⁻¹.

Cari kadar perubahan jejari, dalam cm s⁻¹, pada ketika jejarinya ialah 6 cm.

- (ii) Find the approximate change in the surface area of the solid, in terms of π , when its radius increases from 6 cm to 6.02 cm.

Cari perubahan hampir bagi luas permukaan pepejal itu, dalam sebutan π , apabila jejarinya bertambah daripada 6 cm kepada 6.02 cm.

δA

[6 marks]

[6 markah]

- (b) If a solid of a same shape is to be formed in such that the total surface area is minimum, find the minimum total surface area of the solid, in terms of π .

[4 marks]

Jika sebuah pepejal yang sama bentuk akan dibentuk dengan keadaan jumlah luas permukaan ialah minimum, cari jumlah luas permukaan minimum bagi pepejal itu, dalam sebutan π .

[4 markah]



$$a) (i) \frac{dj}{dt} = \frac{dA}{dt} \times \left(\frac{dj}{dA} \right)$$

$$\text{LHS} = \text{RHS}$$

$$\frac{dj}{dt} = 1.4\pi \times$$

$$\textcircled{A} = 2\pi \left(\frac{18}{r} + \frac{r^2}{3} \right)$$
$$= 36\pi r^{-1} + \frac{2\pi r^2}{3}$$

$$\frac{dA}{dr} = -36\pi r^{-2} + \frac{4\pi}{3} r$$
$$= -\frac{36\pi}{r^2} + \frac{4\pi}{3} r$$

$$= -\frac{36\pi}{6^2} + \frac{4\pi}{3} (6)$$

$$= -\pi + 8\pi$$

$$= 7\pi \neq$$

$$(ii) r: 6 \rightarrow 6.02$$

$$\delta r = 0.02$$

$$\delta A = ?$$

$$\frac{\delta A}{\delta r} = \frac{dA}{dr}$$

$$\delta A = \frac{dA}{dr} (\delta r)$$

$$= 7\pi (0.02)$$

$$= 0.14\pi \neq$$

$$(b) A_{\min} = ?$$

$$\frac{dA}{dr} = -\frac{36\pi}{r^2} + \frac{4\pi}{3} r$$

$$A \text{ is Min when } \frac{dA}{dr} = 0$$

$$0 = -\frac{36\pi}{r^2} + \frac{4\pi}{3} r$$

$$\frac{36\pi}{r^2} = \frac{4\pi}{3} r$$

$$\frac{36(3)}{4} = r^3$$

$$27 = r^3$$

$$r = 3$$

$$A_{\min} = 2\pi \left(\frac{18}{3} + \frac{9}{3} \right)$$

$$= 2\pi (6 + 3)$$

$$= 18\pi \neq$$

- 8 Diagram 4 shows a dart's target board at a dart game booth in a funfair.

Rajah 4 menunjukkan papan sasaran 'dart' di sebuah gerai permainan 'dart' dalam pesta ria.

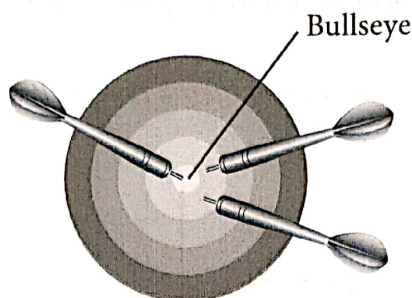


Diagram 4

Rajah 4

The booth offers 3 darts per game. The customers have to pay RM5 to play a game. A toy bear will be given to customers who are able to hit the bullseye for the three darts' throws in a game. Bob is a dart player. By average, he hits the bullseye 7 times out of 10 darts thrown.

Gerai itu menawarkan 3 'dart' bagi setiap permainan. Pelanggan perlu membayar RM5 untuk bermain satu permainan. Patung mainan beruang akan diberi kepada pelanggan yang dapat mengenai 'bullseye' bagi ketiga-tiga balingan 'dart' dalam satu permainan. Bob ialah seorang pemain 'dart'. Secara purata, balingannya kena pada 'bullseye' 7 kali daripada 10 'dart' yang dibaling.

- (a) Bob would play the game if he had at least 90% chance to win at least one toy bear by spending RM30.

By mathematical calculation, suggest to Bob whether he should play the game or otherwise. [7 marks]

Bob akan bermain permainan itu jika dia mempunyai sekurang-kurangnya 90% peluang untuk memenangi sekurang-kurangnya satu patung mainan beruang dengan membelanjakan RM30.

Dengan pengiraan matematik, cadangkan kepada Bob sama ada dia patut main permainan itu atau sebaliknya. [7 markah]

- (b) What is the minimum number of games that Bob needed so that he can get 4 toy bears? [3 marks]

Berapakah bilangan minimum permainan yang Bob perlukan supaya dia boleh mendapat 4 patung mainan beruang? [3 markah]

[Lihat halaman sebelah

SULIT



1 permainan = 3 dart
beruang.

$X = \text{bil bullseye}$

$$X \sim B(3, 0.7)$$

$$\begin{aligned} P(\text{Beraung}) &= P(X=3) \\ &= {}^3C_3 (0.7)^3 (0.3)^0 \\ &= 0.343 \end{aligned}$$

RM30 \rightarrow 6 games.

$X = \text{Bil Beraung}$

$$X \sim B(6, 0.343)$$

$$P(X \geq 1)$$

$$= 1 - P(X=0)$$

$$= 1 - {}^6C_0 (0.343)^0 (0.657)^6$$

$$= 1 - 0.0804$$

$$= 0.9196 > 0.9$$

\therefore Bob patut bermain ~~4~~

$$b) \mu = np$$

$$4 = n(0.343)$$

$$n = 11.66 \approx 12.$$

Bob mesti bermain min
12 permainan

9 Solution by scale drawing is **not** accepted.

Penyelesaian secara lukisan berskala tidak diterima.

Diagram 5 shows the path of a moving point $P(x, y)$. P always moves at a constant distance from point A .

Rajah 5 menunjukkan laluan titik bergerak $P(x, y)$. P adalah sentiasa bergerak dengan jarak tetap dari titik A .

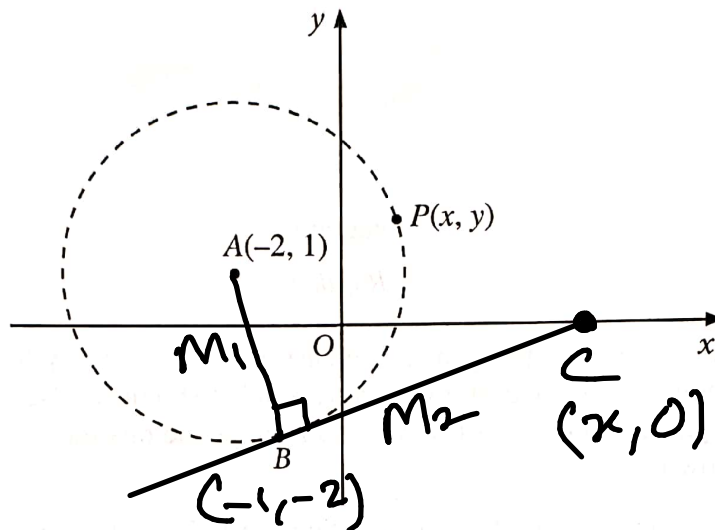


Diagram 5

Rajah 5

$B(-1, -2)$ and $R(-5, q)$ lie on path of point P . The straight line BC is a tangent to the path and intersects the x -axis at point C .

$B(-1, -2)$ dan $R(-5, q)$ berada pada laluan titik P . Garis lurus BC ialah tangen kepada laluan itu dan bersilang dengan paksi- x pada titik C .

Find

Cari

- (a) the equation of the path of point P , [3 marks]
persamaan bagi laluan titik P , [3 markah]
- (b) the possible values of q , [2 marks]
nilai-nilai yang mungkin bagi q , [2 markah]
- (c) the area of $\triangle ABC$. [5 marks]
luas $\triangle ABC$. [5 markah]



$$\begin{aligned}
 \text{Jajari} &= AB \\
 &= \sqrt{(-2+1)^2 + (1-(-2))^2} \\
 &= \sqrt{10}
 \end{aligned}$$

$$PA = \sqrt{10}$$

$$\sqrt{(x+2)^2 + (y-1)^2} = \sqrt{10}$$

$$(x+2)^2 + (y-1)^2 = 10$$

$$x^2 + 4x + 4 + y^2 - 2y + 1 - 10 = 0$$

$$x^2 + y^2 + 4x - 2y - 5 = 0$$

#

b) R(-5, 2)

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

$$2^2 - 2(2) = 0$$

$$2 = 0, 2 \text{ #}$$

$$M_{AB} M_{BC} = -1$$

$$\frac{1-(-2)}{-2+1} \times \frac{0-(-2)}{x+1} = -1$$

$$\frac{3}{-1} \times \frac{2}{x+1} = -1$$

$$\frac{2}{x+1} = \frac{1}{3}$$

$$6 = x+1$$

$$x = 5$$

$$C(5, 0)$$

Luas $\triangle ABC$

$$= \frac{1}{2} \begin{vmatrix} -2 & -1 & 5 & -2 \\ 1 & -2 & 0 & 1 \end{vmatrix}$$

$$= \frac{1}{2} |4 + 0 + 5 + 1 + 10 - 0|$$

$$= \frac{1}{2} |20|$$

$$= 10 \text{ #}$$

10 (a) (i) Prove that $\tan \frac{A}{2} = \frac{1 - \cos A}{\sin A}$.

Buktikan bahawa $\tan \frac{A}{2} = \frac{1 - \cos A}{\sin A}$.

(ii) Hence, without using a calculator, find the value of $\tan 15^\circ$.

State your answer in the form $p - \sqrt{q}$, where p and q are constants.

Seterusnya, tanpa menggunakan kalkulator, cari nilai bagi $\tan 15^\circ$.

Nyatakan jawapan anda dalam bentuk $p - \sqrt{q}$, dengan keadaan p dan q ialah pemalar.

[4 marks]

[4 markah]

(b) (i) Sketch the graph of $y = -\frac{3}{2} \sin A$ for $0 \leq A \leq 2\pi$.

Lakar graf bagi $y = -\frac{3}{2} \sin A$ untuk $0 \leq A \leq 2\pi$.

(ii) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $\left(\cot \frac{A}{2}\right)(1 - \cos A) = -\frac{A}{2\pi}$ for $0 \leq A \leq 2\pi$.

State the number of solutions.

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan

$\left(\cot \frac{A}{2}\right)(1 - \cos A) = -\frac{A}{2\pi}$ untuk $0 \leq A \leq 2\pi$.

Nyatakan bilangan penyelesaian itu.

[6 marks]

[6 markah]

[Lihat halaman sebelah

SULIT



Formula:

$$\textcircled{1} \quad \begin{aligned} \cos(2A) &= 2\cos^2 A - 1 \\ &= \underline{1 - 2\sin^2 A} \end{aligned}$$

$$\textcircled{2} \quad \sin(2A) = \underline{2\sin A \cos A}$$

a) Buktikan $\tan\left(\frac{A}{2}\right) = \frac{1 - \cos(A)}{\sin(A)}$

$$\begin{aligned} \text{RHS: } \frac{1 - \cos(A)}{\sin(A)} &= \frac{1 - [1 - 2\sin^2\left(\frac{A}{2}\right)]}{\underline{2\sin\left(\frac{A}{2}\right)\cos\left(\frac{A}{2}\right)}} \\ &= \frac{2\sin^2\left(\frac{A}{2}\right)}{\underline{2\sin\left(\frac{A}{2}\right)\cos\left(\frac{A}{2}\right)}} \\ &= \frac{\sin\left(\frac{A}{2}\right)}{\cos\left(\frac{A}{2}\right)} \end{aligned}$$

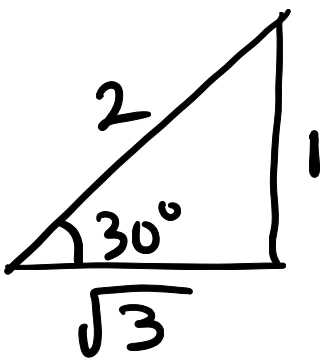
$$= \tan\left(\frac{A}{2}\right) \text{ LHS.}$$

$$\tan(15^\circ) = \frac{1 - \cos(30^\circ)}{\sin(30^\circ)}$$

$$= \frac{1 - \frac{\sqrt{3}}{2}}{\frac{1}{2}} = \left(1 - \frac{\sqrt{3}}{2}\right) \div \frac{1}{2}$$

$$= \left(1 - \frac{\sqrt{3}}{2}\right) \times 2$$

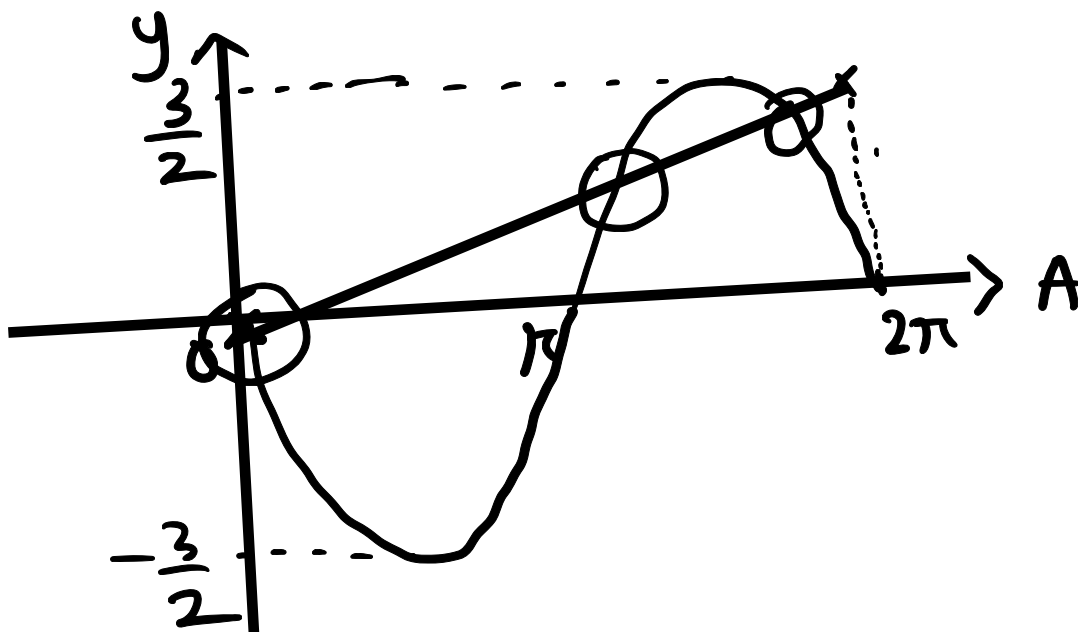
$$= 2 - \sqrt{3} \neq$$



$$\sin 30^\circ = \frac{1}{2}$$

$$\cos 30^\circ = \frac{\sqrt{3}}{2}$$

(b) Lakar $y = -\frac{3}{2} \sin A$, $0 \leq A \leq 2\pi$



$$(ii) \cot\left(\frac{A}{2}\right) (1 - \cos A) = -\frac{A}{2\pi}$$

$$\frac{1 - \cos A}{\tan\left(\frac{A}{2}\right)} = -\frac{A}{2\pi}$$

$$\frac{1 - \cos A}{\frac{1 - \cos A}{\sin A}} = -\frac{A}{2\pi}$$

$$(1 - \cos A) \div \frac{1 - \cos A}{\sin A} = -\frac{A}{2\pi}$$

$$(1 - \cos A) \times \frac{\sin A}{(1 - \cos A)} = -\frac{A}{2\pi}$$

$$\sin A = -\frac{A}{2\pi}$$

$$-\frac{3}{2} \sin A = -\frac{3}{2} \left(-\frac{A}{2\pi}\right)$$

$$= \frac{3A}{4\pi}$$

$$y = \frac{3A}{4\pi}$$

A	0	2π
y	0	$3/2$

$$y = \frac{3(0)}{4\pi} = 0, \quad y = \frac{3(2\pi)}{24\pi}$$

Bil penyelesaian = 3 \neq .

- 11 Use the graph paper provided on page 21 to answer this question. Detach the graph paper and tie it together with your answer booklet.

Gunakan kertas graf yang disediakan pada halaman 21 untuk menjawab soalan ini. Ceraikan kertas graf itu dan ikat bersama-sama buku jawapan anda.

Table 2 shows the values of two variables, x and y , obtained from an experiment. The variables x and y are related by the equation $y = \frac{a}{b\sqrt{x}}$, where a and b are constants.

Jadual 2 menunjukkan nilai-nilai bagi dua pemboleh ubah, x dan y , yang diperolehi daripada suatu eksperimen. Pemboleh ubah x dan y dihubungkan oleh persamaan

$$y = \frac{a}{b\sqrt{x}}, \text{ dengan keadaan } a \text{ dan } b \text{ ialah pemalar.}$$

x	0.34	0.43	0.55	0.85	1.08	1.42
y	47.68	25.12	12.58	4.17	2.51	1.38

Table 2

Jadual 2

- (a) Based on Table 2, construct a table for the values of $\log_{10}x$ and $\log_{10}y$. [2 marks]
Berdasarkan Jadual 2, bina satu jadual bagi nilai-nilai $\log_{10}x$ dan $\log_{10}y$.

[2 markah]

- (b) Plot $\log_{10}y$ against $\log_{10}x$, using a scale of 2 cm to 0.1 unit on the X -axis and 2 cm to 0.2 unit on the Y -axis.

Hence, draw the line of best fit.

[3 marks]

Plot $\log_{10}y$ melawan $\log_{10}x$, menggunakan skala 2 cm kepada 0.1 unit pada paksi- X dan 2 cm kepada 0.2 unit pada paksi- Y .

Seterusnya, lukis garis lurus penyuaian terbaik.

[3 markah]

- (c) Using the graph in 11(b), find the value of

Menggunakan graf di 11(b), cari nilai

(i) a ,

(ii) b .

[5 marks]

[5 markah]



a)

$\log_{10} x$	-0.47	-0.37	-0.26	-0.07	0.03	0.15
$\log_{10} y$	1.68	1.40	1.10	0.62	0.40	0.14

c) Daripada graf:

$$M = \frac{1.72 - 0}{-0.5 - 1.99} = -0.69$$

$$C = 0.48$$

Daripada persamaan:

$$y = \frac{a}{b\sqrt{x}}$$

$$\log_{10}(y) = \log_{10}\left(\frac{a}{b\sqrt{x}}\right)$$

$$= \log_{10}(a) - \log_{10} b\sqrt{x}$$

$$= \log_{10}(a) - \log_{10} x^{\frac{1}{b}}$$

$$= -\frac{1}{b} \log_{10} x + \log_{10} a$$

$$Y = mX + c$$

$$m = -\frac{1}{b} \quad , \quad c = \log_{10} a$$

$$-0.69 = -\frac{1}{b}$$

$$b = \frac{1}{0.69}$$

$$= 1.45 \#$$

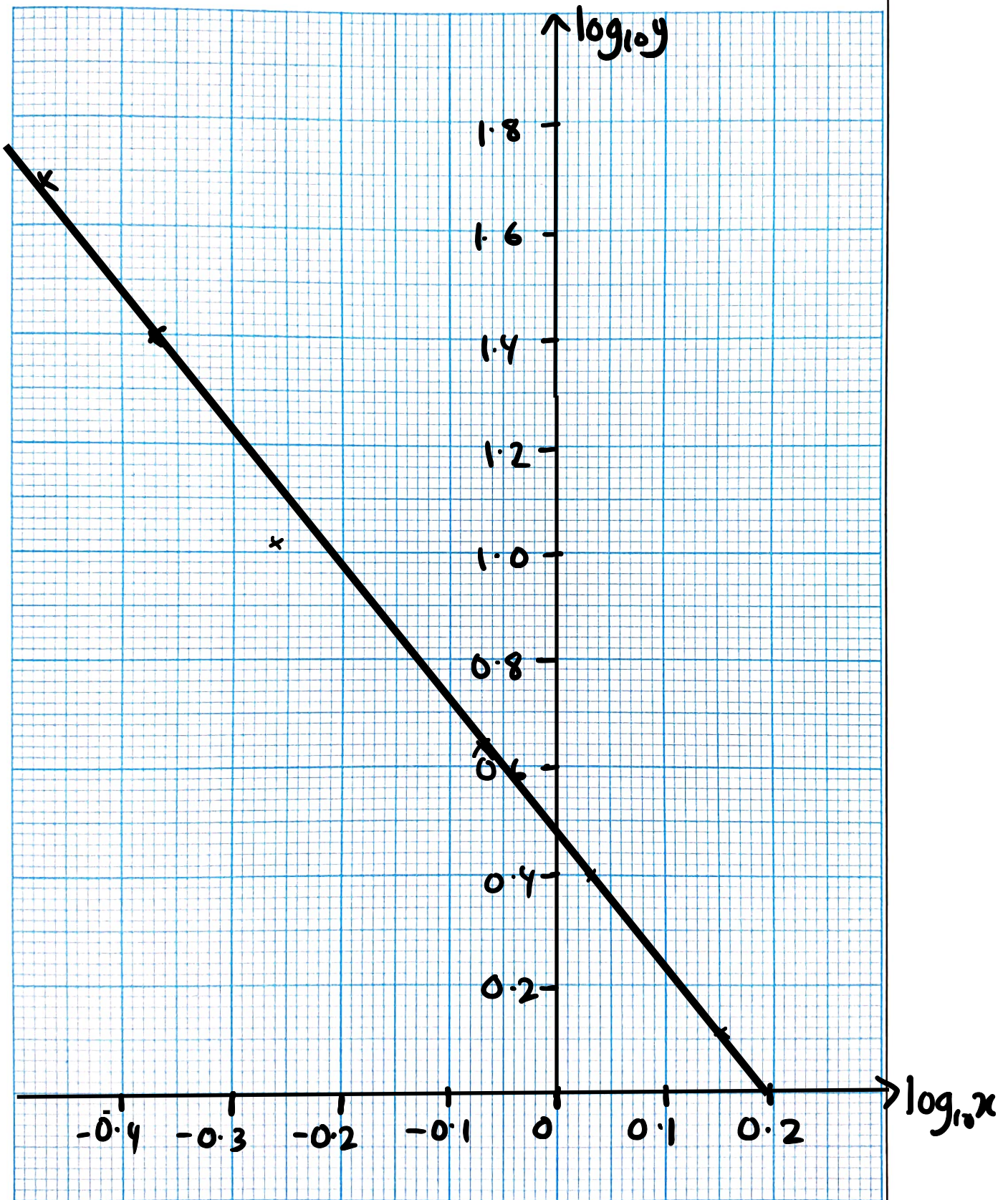
$$0.48 = \log_{10} a$$

$$a = 10^{0.48}$$

$$= 3.02 \#$$

No. Kad Pengenalan..... Angka Giliran.....

Graph paper for Question 11 (Detach and tie this page together with your answer booklet)
Kertas graf untuk Soalan 11 (Ceraikan dan ikat halaman ini bersama-sama buku jawapan anda)



[Lihat halaman sebelah



Section C
Bahagian C

[20 marks]

[20 markah]

Answer any **two** questions from this section.
Jawab mana-mana **dua** soalan daripada bahagian ini.

- 12 Solution by graph sketching is **not** accepted.

Penyelesaian secara lakaran graf **tidak** diterima.

A particle moves along a straight line such that its velocity, $v \text{ ms}^{-1}$, is given by $v = t^3 - 4t^2 + 3t$, where t is time, in seconds, after passing through a fixed point O .

Suatu zarah bergerak di sepanjang suatu garis lurus dengan keadaan halajunya, $v \text{ ms}^{-1}$, diberi oleh $v = t^3 - 4t^2 + 3t$, dengan keadaan t ialah masa, dalam saat, selepas melalui satu titik tetap O .

Find

Cari

$$t = 0, S = 0$$

- (a) the initial acceleration, in ms^{-2} , of the particle, [2 marks]
pecutan awal, dalam ms^{-2} , bagi zarah itu, [2 markah]
- (b) the time interval, in seconds, when the acceleration of the particle is less than 6 ms^{-2} , [2 marks]
julat masa, dalam saat, apabila pecutan zarah itu kurang daripada 6 ms^{-2} , [2 markah]
- (c) the time, in seconds, when the particle stop instantaneously, [2 marks]
masa, dalam saat, apabila zarah itu berhenti seketika, [2 markah]
- (d) the total distance, in m, travelled by the particle until the particle returned to the fixed point O for the second time. [4 marks]
jumlah jarak, dalam m, yang dilalui oleh zarah itu sehingga zarah itu kembali ke titik tetap O buat kali kedua. [4 markah]

[Lihat halaman sebelah
SULIT



$$V = t^3 - 4t^2 + 3t$$

$$a) a = \frac{dV}{dt} = 3t^2 - 8t + 3$$

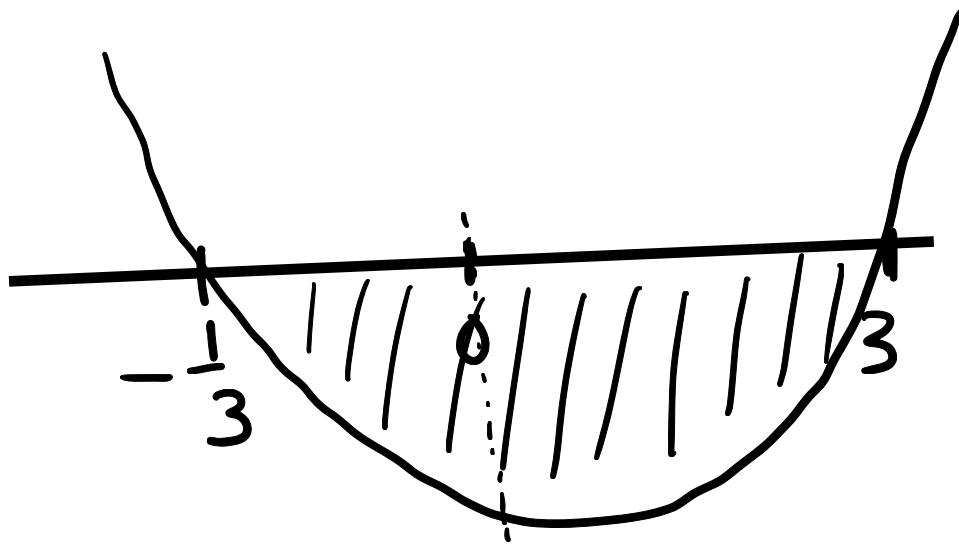
$$t=0: a=3 \quad \#$$

$$b) a < 6$$

$$3t^2 - 8t + 3 < 6$$

$$3t^2 - 8t - 3 \leq 0$$

$$t = 3, -\frac{1}{3}$$



$$0 \leq t < 3 \quad \#$$

$$c) \quad v = 0$$

$$t^3 - 4t^2 + 3t = 0$$

$$t(t^2 - 4t + 3) = 0$$

$$t(t-3)(t-1) = 0$$

$$t = 0, 1, 3 \quad \#$$

$$d) \quad s = \int v \, dt$$

$$= \int t^3 - 4t^2 + 3t \, dt$$

$$= \frac{t^4}{4} - \frac{4t^3}{3} + \frac{3t^2}{2} + C$$

$t=0, S=0$, maka $c=0$

$$\therefore S = \frac{t^4}{4} - \frac{4t^3}{3} + \frac{3t^2}{2}$$

Apabila zarah kembali ke 0:

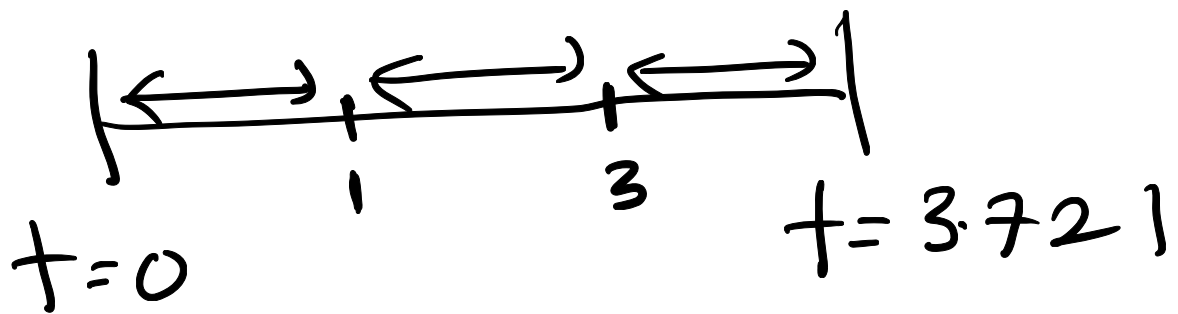
$$S = 0$$

$$\frac{t^4}{4} - \frac{4t^3}{3} + \frac{3t^2}{2} = 0$$

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

$$t = 0, 1.613, \underline{\underline{3.721}}$$

kembali ke 0
kali kedua



Zarah berhenti: 1, 3

Jarak dilalui

$$= \int_0^1 t^3 - 4t^2 + 3t \, dt \quad \leftarrow$$

$$+ \left| \int_1^3 t^3 - 4t^2 + 3t \, dt \right|$$

$$+ \int_3^{3.721} t^3 - 4t^2 + 3t \, dt$$

$$= \left[\frac{t^4}{4} - \frac{4t^3}{3} + \frac{3t^2}{2} \right]_0^1 + \left| \left[\frac{t^4}{4} - \frac{4t^3}{3} + \frac{3t^2}{2} \right]_1^3 \right|$$

$$+ \left[\frac{t^4}{4} - \frac{4t^3}{3} + \frac{3t^2}{2} \right]_3^{3.721}$$

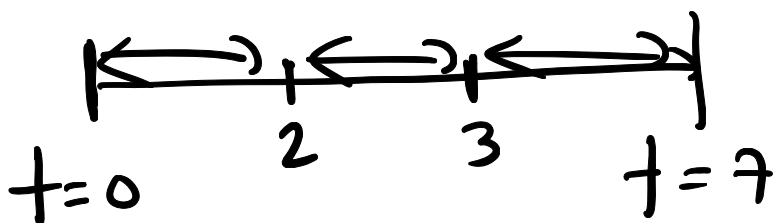
$$= \frac{5}{12} + \left| -\frac{8}{3} \right| + 2.252$$

$$= \frac{5}{12} + \frac{8}{3} + 2.252$$

$$= 5.335 \quad \#$$

$$\int (x^3 - 4x^2 + 3x, 0, 1)$$

$$V = t^2 - 5t + 6$$



$$t^2 - 5t + 6 = 0$$

$$t = 2, 3$$

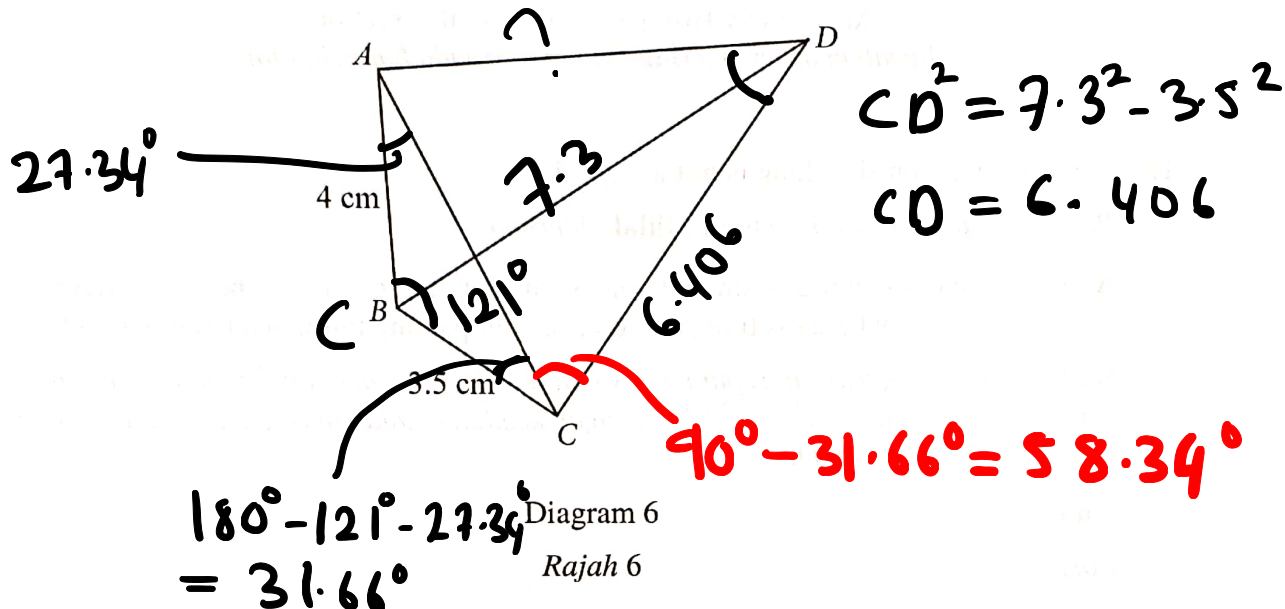
$$\text{Jarak} = \int_0^2 t^2 - 5t + 6 \, dt + \left| \int_2^3 t^2 - 5t + 6 \, dt \right| + \int_3^7 t^2 - 5t + 6 \, dt =$$

13 Solution by scale drawing is **not** accepted.

Penyelesaian secara lukisan berskala tidak diterima.

Diagram 6 shows a quadrilateral $ABCD$ such that AC and BD are straight lines.

Rajah 6 menunjukkan sisi empat $ABCD$ dengan keadaan AC dan BD adalah garis lurus.



It is given that the area of $\triangle ABC = 6 \text{ cm}^2$ and $\angle ABC$ is obtuse.

Diberi bahawa luas $\triangle ABC = 6 \text{ cm}^2$ dan $\angle ABC$ adalah cakah.

(a) Find

Cari

- (i) $\angle ABC$,
- (ii) the length, in cm, of AC ,
panjang, dalam cm, bagi AC ,
- (iii) $\angle BAC$.

[7 marks]

[7 markah]

(b) Given $BD = 7.3$ cm and $\angle BCD = 90^\circ$, calculate the area, in cm^2 , of $\triangle ACD$.

[3 marks]

Diberi $BD = 7.3$ cm dan $\angle BCD = 90^\circ$, hitung luas, dalam cm^2 , bagi $\triangle ACD$.

[3 markah]



$$a) \text{ Luas } \triangle ABC = 6$$

$$\frac{1}{2} ab \sin C = 6$$

$$\frac{1}{2} (4)(3.5) \sin C = 6$$

$$\sin C = \frac{6 \times 2}{4(3.5)}$$

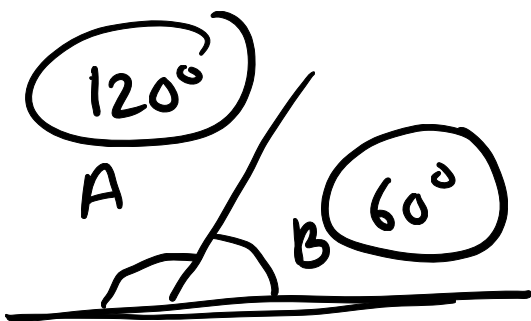
$$= 0.8571$$

$$C = \sin^{-1}(0.8571)$$

$$= 59^\circ$$

$$\angle ABC = 180^\circ - 59^\circ$$

$$= 121^\circ \# \quad \leftarrow$$



$$A + B = 180^\circ$$

$$\sin A = \sin B$$

$$\sin 60^\circ = \underline{\hspace{2cm}}$$

$$\sin 120^\circ = \underline{\hspace{2cm}} =$$

$$\sin 30^\circ = 0.5$$

$$\sin 150^\circ = 0.5$$

$$\text{ii) } AC^2 = 4^2 + 3.5^2 - 2(4)(3.5)\cos 121^\circ$$

$$= 42.671$$

$$AC = \sqrt{42.671}$$

$$= 6.532 \neq$$

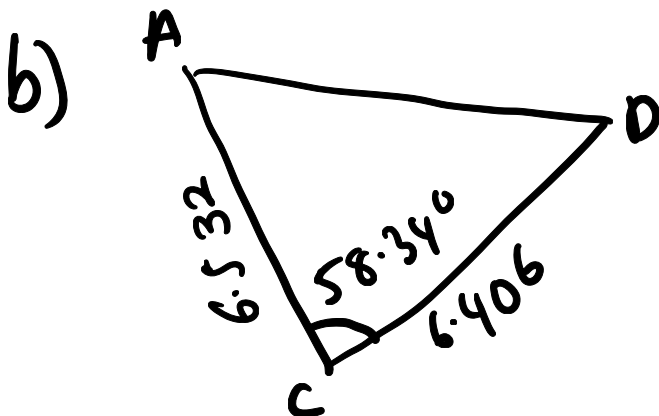
$$\text{iii) } \frac{\sin(\angle BAC)}{3.5} = \frac{\sin(121^\circ)}{6.532}$$

$$\sin(\angle BAC) = \frac{\sin(121^\circ) \times 3.5}{6.532}$$

$$= 0.4593$$

$$\angle BAC = \sin^{-1}(0.4593)$$

$$= 27.34^\circ \neq$$



$$\text{Luas } \triangle ABC$$

$$= \frac{1}{2} (6.532)(6.406) \sin 58.34^\circ$$

$$= 17.81 \neq$$

- 14 Use the graph paper provided on page 23 to answer this question. Detach the graph paper and tie it together with your answer booklet.

Gunakan kertas graf yang disediakan pada halaman 23 untuk menjawab soalan ini. Ceraikan kertas graf itu dan ikat bersama-sama buku jawapan anda.

Siti is assigned to prepare prizes in conjunction with STEM Week. She is required to purchase x set of pens and y set of notebooks. The price for a set of pens is RM3 and the price for a set of notebooks is RM4. The purchase of the prizes is based on the following constraints:

Siti ditugaskan untuk menyediakan hadiah sempena Minggu STEM. Dia dikehendaki membeli x set pen dan y set buku nota. Harga bagi satu set pen ialah RM3 dan harga bagi satu set buku nota ialah RM4. Pembelian hadiah tersebut adalah berdasarkan kekangan berikut:

- I The total number of set of pens and set of notebooks must be more than 40.
Jumlah bilangan set pen dan set buku nota mesti melebihi 40.
- II The total allocation is RM400.
Jumlah peruntukan ialah RM400.
- III The number of set of pens exceed the number of set of notebooks by at most 10.
Bilangan set pen melebihi bilangan set buku nota selebih-lebihnya 10.

- (a) Write three inequalities, other than $x \geq 0$ and $y \geq 0$ that satisfy all the above constraints. [3 marks]

Tulis tiga ketaksamaan, selain daripada $x \geq 0$ dan $y \geq 0$ yang memenuhi semua kekangan di atas. [3 markah]

- (b) Using a scale of 2 cm to 10 sets on both axes, construct and shade the region R which satisfies all the above constraints. [3 marks]

Menggunakan skala 2 cm kepada 10 set pada kedua-dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di atas. [3 markah]

- (c) Use the graph constructed in 14(b) to answer the following questions:

Gunakan graf yang dibina di 14(b) untuk menjawab soalan-soalan berikut:

- (i) Find the minimum balance of the allocation, if the number of set of pens purchased is equal to the number of set of notebooks.

Cari baki minimum peruntukan, jika bilangan set pen yang dibeli adalah sama dengan bilangan set buku nota.

- (ii) Determine the maximum number of set of pens that can be purchased if Siti spent RM50 for wrapping papers.

Tentukan bilangan maksimum set pen yang boleh dibeli jika Siti membelanjakan RM50 untuk kertas pembalut.

[4 marks]
[4 markah]

[Lihat halaman sebelah
SULIT



- 15 Table 3 shows information related to five cake ingredients *J*, *K*, *L*, *M* and *N* used by a baker in his business.

Jadual 3 menunjukkan maklumat berkaitan lima bahan kek *J*, *K*, *L*, *M* dan *N* yang digunakan oleh seorang pembuat kek dalam perniagaannya.

Ingredient Bahan	$I_{18/16}$ Price index for the year 2018 based on the year 2016 Indeks harga pada tahun 2018 berasaskan tahun 2016	$I_{20/18}$ Change in the price index from the year 2018 to the year 2020 Perubahan indeks harga dari tahun 2018 ke tahun 2020	$I_{20/16}$ Price index for the year 2020 based on the year 2016 Indeks harga pada tahun 2020 berasaskan tahun 2016	w Weightage Pemberat
	<i>J</i>	124	No change Tidak berubah	100 124
<i>K</i>	115	40% increase Menokok 40%	140 x 161	6
<i>L</i>	130	No change Tidak berubah	100 130	<i>p</i>
<i>M</i>	140	10% decrease Menyusut 10%	90 y 126	4
<i>N</i>	120	No change Tidak berubah	100 120	2

Table 3

Jadual 3

The composite index for the cost of making the cakes in the year 2020 based on the year 2016 is 136.

Indeks gabungan bagi kos membuat sebiji kek itu pada tahun 2020 berdasarkan tahun 2016 ialah 136.

(a) (i) Find the value of x and of y .

Cari nilai x dan nilai y .

(ii) Calculate the price for ingredient M in the year 2016 if the price in the year 2020 is RM6.30.

Hitung harga bagi bahan M pada tahun 2016 jika harga pada tahun 2020 ialah RM6.30.

[4 marks]

[4 markah]

(b) Calculate the value of p .

[3 marks]

Hitung nilai p .

[3 markah]

(c) The cost of baking a cake in the year 2016 is RM25.

Find the selling price of a cake made in the year 2020, if the baker intends to make a profit of 80%.

[3 marks]

Kos untuk membuat sebiji kek pada tahun 2016 ialah RM25.

Cari harga jualan sebiji kek yang dibuat pada tahun 2020, jika pembuat kek itu ingin mendapatkan keuntungan 80%.

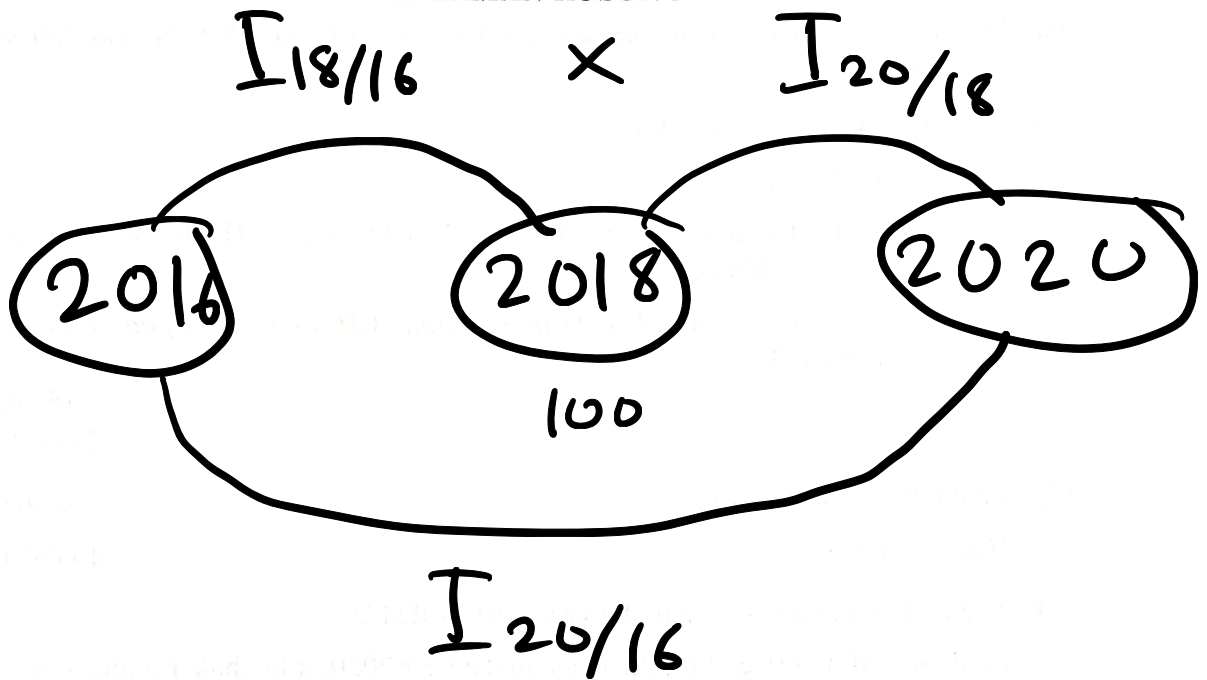
[3 markah]

END OF QUESTION PAPER
KERTAS PEPERIKSAAN TAMAT



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HALAMAN KOSONG

a)



$$\frac{I_{20/16} = I_{18/16} \times I_{20/18}}{100}$$

$$\underline{\underline{K}} \quad x = \frac{115 \times 140}{100} = 161$$

$$\underline{\underline{M}} \quad y = \frac{140 \times 90}{100} = \underline{\underline{126}}$$



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HALAMAN KOSONG

M 2020: RM6.30
2016: ?

$$\bar{I}_{20/16} = \frac{6.30}{P_{16}} \times 100$$

$$P_{16} = \frac{6.30 \times 100}{126}$$

$$= 5$$

$$= \text{RM} 5.00 \quad \#$$

$$(b) \quad \bar{I}_{20/16} = \frac{\sum IW}{\sum W}$$

$$\begin{aligned}
 136 &= (124 \times 5) + (161 \times 6) \\
 &\quad + (130p) + (126 \times 4) \\
 &\quad + (120 \times 2) \\
 \hline
 &5 + 6 + p + 4 + 2 \\
 &= \frac{2330 + 130p}{17 + p}
 \end{aligned}$$

$$2312 + 136p = 2330 + 130p$$

$$6p = 18$$

$$p = 3 \quad \cancel{4}$$

(C) Kos 2016 : RM25

kos 2020

$$\bar{I}_{20/16} = \frac{P_{20}}{P_{16}} \times 100$$

$$136 = \frac{P_{20}}{25} \times 100$$

$$P_{20} = \frac{136 \times 25}{100}$$

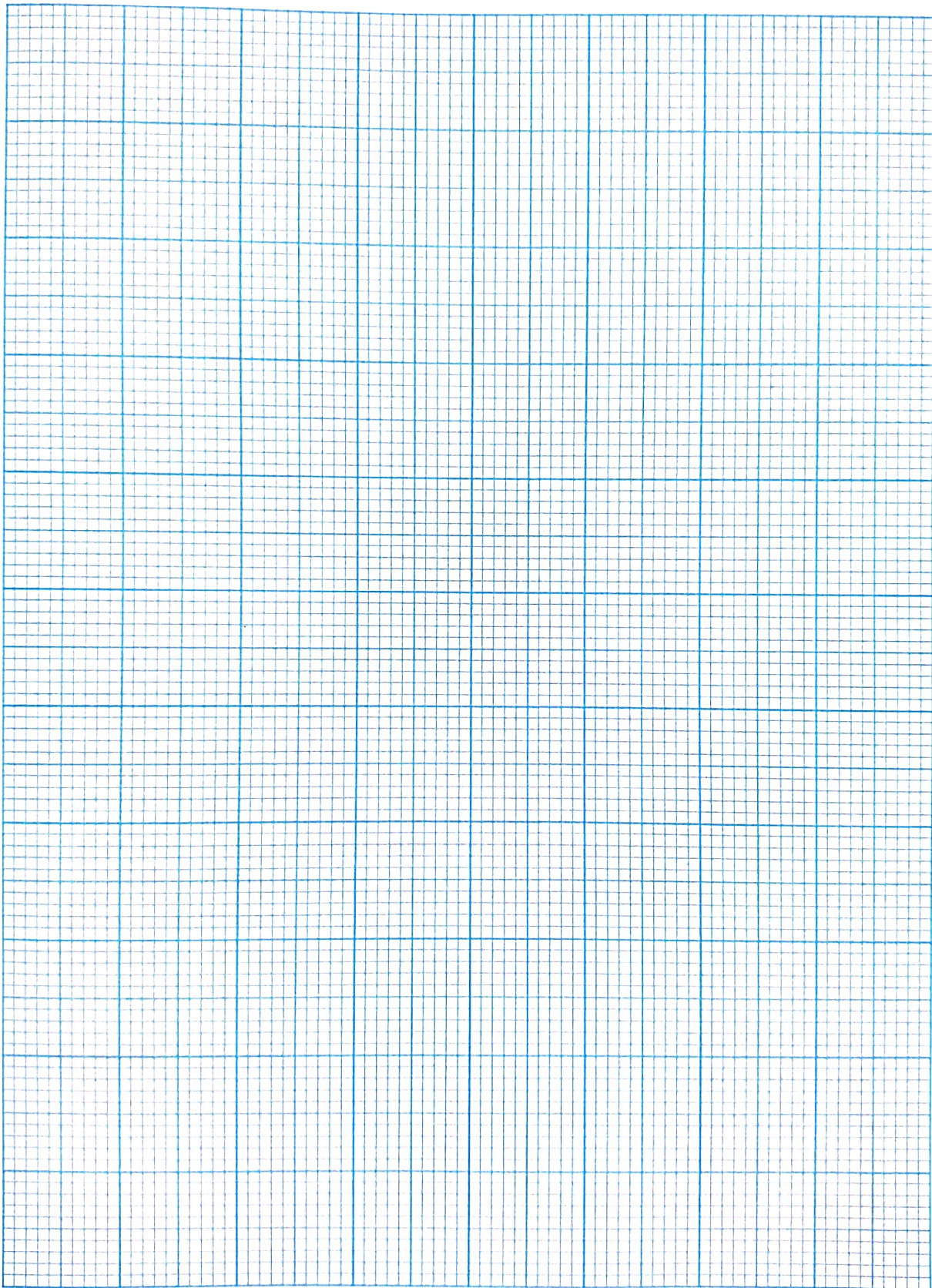
$$= \text{RM } 34.$$

$$\begin{aligned} \text{Keuntungan} &= 0.8 \times 34 \\ &= \text{RM } 27.20 \end{aligned}$$

$$\text{Harga Jual} = \text{RM } 61.20 \#$$

No. Kad Pengenalan..... Angka Giliran.....

Graph paper for Question 14 (Detach and tie this page together with your answer booklet)
Kertas graf untuk Soalan 14 (Ceraikan dan ikat halaman ini bersama-sama buku jawapan anda)



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HALAMAN KOSONG



THE UPPER TAIL PROBABILITY $Q(z)$ FOR THE NORMAL DISTRIBUTION $N(0, 1)$
 KEBARANGKALIAN Hujung Atas $Q(z)$ BAGI TABURAN NORMAL $N(0, 1)$

z											TOLAK								
	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641	4	8	12	16	20	24	28	32	36
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247	4	8	12	16	20	24	28	32	36
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859	4	8	12	15	19	23	27	31	35
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483	4	7	11	15	19	22	26	30	34
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121	4	7	11	14	18	22	25	29	32
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776	3	7	10	14	17	20	24	27	31
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451	3	7	10	13	16	19	23	26	29
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148	3	6	9	12	15	18	21	24	27
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867	3	5	8	11	14	16	19	22	25
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611	3	5	8	10	13	15	18	20	23
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379	2	5	7	9	12	14	16	19	21
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170	2	4	6	8	10	12	14	16	18
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985	2	4	6	7	9	11	13	15	17
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823	2	3	5	6	8	10	11	13	14
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681	1	3	4	6	7	8	10	11	13
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559	1	2	4	5	6	7	8	10	11
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455	1	2	3	4	5	6	7	8	9
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367	1	2	3	4	4	5	6	7	8
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294	1	1	2	3	4	4	5	6	6
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233	1	1	2	2	3	4	4	5	5
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183	0	1	1	2	2	3	3	4	4
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143	0	1	1	2	2	2	3	3	4
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110	0	1	1	1	2	2	2	3	3
2.3	.0107	.0104	.0102		.0 ² 990	.0 ² 964	.0 ² 939	.0 ² 914			0	1	1	1	1	2	2	2	2
								.0 ² 889	.0 ² 866	.0 ² 842	3	5	8	10	13	15	18	20	23
2.4	.0 ² 820	.0 ² 798	.0 ² 776	.0 ² 755	.0 ² 734						2	5	7	9	12	14	16	18	21
					.0 ² 714	.0 ² 695	.0 ² 676	.0 ² 657	.0 ² 639		2	4	6	8	11	13	15	17	19
2.5	.0 ² 621	.0 ² 604	.0 ² 587	.0 ² 570	.0 ² 554	.0 ² 539	.0 ² 523	.0 ² 508	.0 ² 494	.0 ² 480	2	3	5	6	8	9	11	12	14
2.6	.0 ² 466	.0 ² 453	.0 ² 440	.0 ² 427	.0 ² 415	.0 ² 402	.0 ² 391	.0 ² 379	.0 ² 368	.0 ² 357	1	2	3	5	6	7	8	9	10
2.7	.0 ² 347	.0 ² 336	.0 ² 326	.0 ² 317	.0 ² 307	.0 ² 298	.0 ² 289	.0 ² 280	.0 ² 272	.0 ² 264	1	2	3	4	5	6	7	8	9
2.8	.0 ² 256	.0 ² 248	.0 ² 240	.0 ² 233	.0 ² 226	.0 ² 219	.0 ² 212	.0 ² 205	.0 ² 199	.0 ² 193	1	1	2	3	4	4	5	6	6
2.9	.0 ² 187	.0 ² 181	.0 ² 175	.0 ² 169	.0 ² 164	.0 ² 159	.0 ² 154	.0 ² 149	.0 ² 144	.0 ² 139	0	1	1	2	2	3	3	4	4
3.0	.0 ² 135	.0 ² 131	.0 ² 126	.0 ² 122	.0 ² 118	.0 ² 114	.0 ² 111	.0 ² 107	.0 ² 104	.0 ² 100	0	1	1	2	2	2	3	3	4

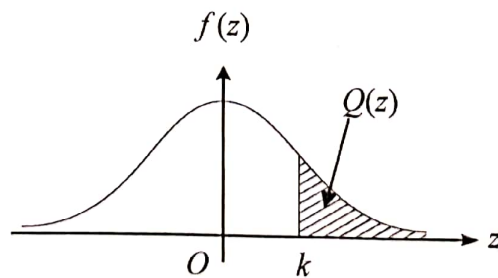
For negative z use relation:

Bagi z negatif guna hubungan:

$$Q(z) = 1 - Q(-z) = P(-z)$$

$$f(z) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}z^2\right)$$

$$Q(z) = \int_k^{\infty} f(z) dz$$



Example / Contoh:

If $X \sim N(0, 1)$, then

Jika $X \sim N(0, 1)$, maka

$$P(X > k) = Q(k)$$

$$P(X > 2.1) = Q(2.1) = 0.0179$$

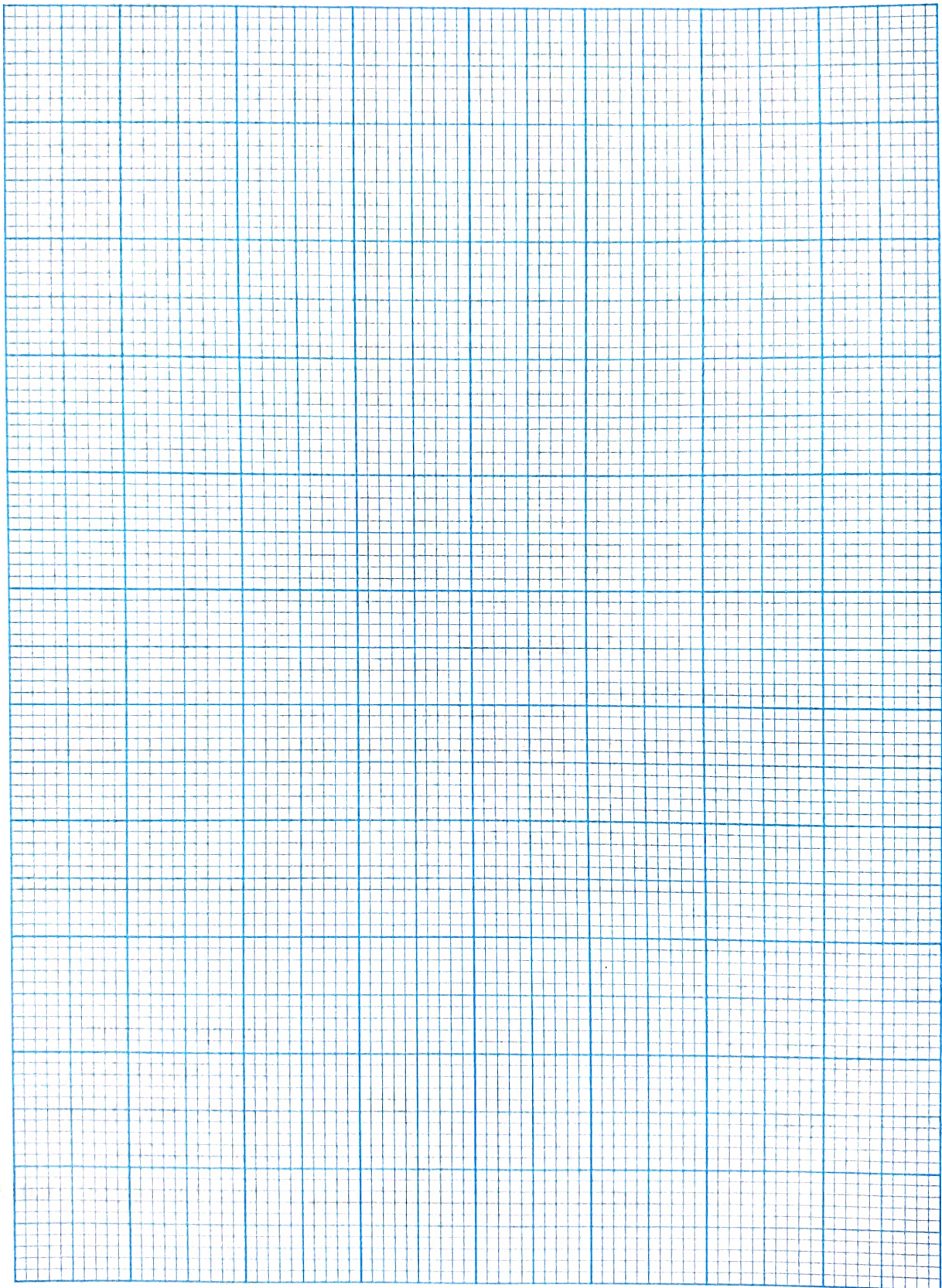
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No. Kad Pengenalan..... Angka Giliran.....

Extra graph paper (Detach and tie together with your answer booklet if you use it)

Kertas graf tambahan (Ceraikan dan ikat halaman ini bersama-sama buku jawapan anda jika anda menggunakannya)



INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of three sections: **Section A**, **Section B** and **Section C**.
Kertas peperiksaan ini mengandungi tiga bahagian: Bahagian A, Bahagian B dan Bahagian C.
2. Answer **all** questions in **Section A**, any **four** questions from **Section B** and any **two** questions from **Section C**.
Jawab semua soalan dalam Bahagian A, mana-mana empat soalan daripada Bahagian B dan mana-mana dua soalan daripada Bahagian C.
3. Write your answers in the 'buku jawapan' provided. If the 'buku jawapan' is insufficient, you may ask for 'helaian tambahan' from the invigilator.
Tulis jawapan anda dalam buku jawapan yang disediakan. Sekiranya buku jawapan tidak mencukupi, sila dapatkan helaian tambahan daripada pengawas peperiksaan.
4. Show your working.
Tunjukkan kerja mengira anda.
5. The diagrams in the questions provided are not drawn to scale unless stated.
Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.
6. The marks allocated for each question or sub-part of a question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.
7. The Upper Tail Probability $Q(z)$ For The Normal Distribution $N(0, 1)$ Table is provided on page **25**.
*Jadual Kebarangkalian Hujung Atas $Q(z)$ Bagi Taburan Normal $N(0, 1)$ disediakan di halaman **25**.*
8. A list of formulae is provided on pages **2** to **4**.
*Satu senarai rumus disediakan di halaman **2** hingga **4**.*
9. Graph papers are provided.
Kertas graf disediakan.
10. You may use a scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik.
11. Tie the 'helaian tambahan' and the graph papers together with the 'buku jawapan' and hand in to the invigilator at the end of the examination.
Ikat helaian tambahan dan kertas graf bersama-sama dengan buku jawapan dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.

