NO. KAD PENGENALAN

ANGKA GILIRAN

LEMBAGA PEPERIKSAAN
KEMENTERIAN PENDIDIKAN MALAYSIA

SIJIL PELAJARAN MALAYSIA 2019

ADDITIONAL MATHEMATICS
Kertas 1
Okt./Nov.

2 jam   **Dua jam**

JANGAN BUKA KERTAS PEPERIKSAAN INI SEHINGGA DIBERITAHU

1. *Tulis* **nombor kad pengenalan** *dan* **angka giliran** *anda pada petak yang disediakan.*

2. *Kertas peperiksaan ini adalah dalam dwibahasa.*

3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*

4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*

5. *Calon dikehendaki membaca maklumat di halaman belakang kertas peperiksaan ini.*

Untuk Kegunaan Pemeriksa		
Kod Pemeriksa:		
Soalan	Markah Penuh	Markah Diperoleh
1	2	
2	3	
3	3	
4	2	
5	2	
6	4	
7	3	
8	4	
9	3	
10	4	
11	3	
12	3	
13	3	
14	3	
15	3	
16	3	
17	4	
18	4	
19	4	
20	2	
21	3	
22	3	
23	4	
24	4	
25	4	
Jumlah	**80**	

Kertas peperiksaan ini mengandungi 32 halaman bercetak.

[Lihat halaman sebelah
SULIT

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     $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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

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

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

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

6     $\log_a \dfrac{m}{n} = \log_a m - \log_a n$

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

8     $\log_a b = \dfrac{\log_c b}{\log_c a}$

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

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

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

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

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

CALCULUS
KALKULUS

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

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

3     $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$

4   Area under a curve
      Luas di bawah lengkung

      $= \displaystyle\int_a^b y \, dx$ or *(atau)*

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

5   Volume of revolution
      Isi padu kisaran

      $= \displaystyle\int_a^b \pi y^2 \, dx$ or *(atau)*

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

STATISTICS
STATISTIK

1. $\bar{x} = \dfrac{\sum x}{N}$

2. $\bar{x} = \dfrac{\sum fx}{\sum f}$

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

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

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

6. $I = \dfrac{Q_1}{Q_0} \times 100$

7. $\bar{I} = \dfrac{\sum W_i I_i}{\sum W_i}$

8. $^nP_r = \dfrac{n!}{(n-r)!}$

9. $^nC_r = \dfrac{n!}{(n-r)!\,r!}$

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

11. $P(X = r) = {}^nC_r\, p^r q^{n-r}, \; p + q = 1$

12.   Mean / *Min* , $\mu = np$

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

14. $Z = \dfrac{X - \mu}{\sigma}$

(handwritten annotations)

$$Q_1 = L + \left(\dfrac{\frac{N}{4} - F}{f}\right) C$$

$$Q_3 = L + \left(\dfrac{3}{4}N \cdots\right)$$

GEOMETRY
GEOMETRI

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

2.   Midpoint / *Titik tengah*
$$(x, y) = \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$$

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

4.   Area of triangle / *Luas segi tiga*
$$= \dfrac{1}{2} \left| (x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3) \right|$$

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

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

TRIGONOMETRY
TRIGONOMETRI

Sukatan Membulat (handwritten)
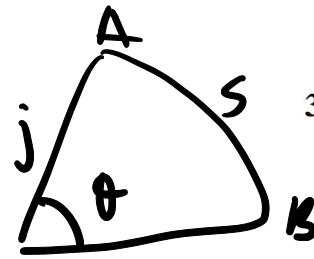
1   Arc length, $s = r\theta$
   Panjang lengkok, $s = j\theta$

2   Area of sector, $A = \frac{1}{2}r^2\theta$
   Luas sektor, $L = \frac{1}{2}j^2\theta$

3   $\sin^2 A + \cos^2 A = 1$
   $\sin^2 A + \text{kos}^2 A = 1$

4   $\sec^2 A = 1 + \tan^2 A$
   $\text{sek}^2 A = 1 + \tan^2 A$

5   $\text{cosec}^2 A = 1 + \cot^2 A$
   $\text{kosek}^2 A = 1 + \text{kot}^2 A$

6   $\sin 2A = 2 \sin A \cos A$
   $\sin 2A = 2 \sin A \text{ kos } A$

7   $\cos 2A = \cos^2 A - \sin^2 A$
      $= 2\cos^2 A - 1$
      $= 1 - 2\sin^2 A$

   $\text{kos } 2A = \text{kos}^2 A - \sin^2 A$
       $= 2\text{kos}^2 A - 1$
       $= 1 - 2\sin^2 A$

8   $\tan 2A = \dfrac{2 \tan A}{1 - \tan^2 A}$

9   $\sin (A \pm B) = \sin A \cos B \pm \cos A \sin B$
   $\sin (A \pm B) = \sin A \text{ kos } B \pm \text{kos } A \sin B$

10   $\cos (A \pm B) = \cos A \cos B \mp \sin A \sin B$
   $\text{kos } (A \pm B) = \text{kos } A \text{ kos } B \mp \sin A \sin B$

11   $\tan (A \pm B) = \dfrac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$

12   $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

13   $a^2 = b^2 + c^2 - 2bc \cos A$
   $a^2 = b^2 + c^2 - 2bc \text{ kos } A$

14   Area of triangle / *Luas segi tiga*
   $= \frac{1}{2} ab \sin C$

Answer **all** questions.

Jawab **semua** *soalan.*

1 Three dice of different colours are thrown. The numbers obtained by red, yellow and green dice are '6', '6' and '3' respectively.

Tiga biji dadu dari warna berbeza dilontarkan. Nombor yang diperoleh oleh dadu merah, kuning dan hijau masing-masing ialah '6', '6' dan '3'.

(a) Draw an arrow diagram to represent the relation 'the coloured dice thrown to the numbers obtained'.

Lukis satu gambar rajah anak panah untuk mewakilkan hubungan 'warna dadu yang dilontar kepada nombor yang diperoleh'.

(b) Hence, state the type of the relation. Is the relation a function?

Seterusnya, nyatakan jenis hubungan itu. Adakah hubungan itu satu fungsi?
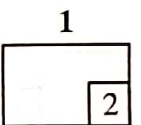
[2 marks]

[2 markah]

Answer / *Jawapan*:

(a)

a) "warna dadu yang dilontar kepada nombor diperoleh"

warna = {merah, kuning, hijau}

nombor = {1,2,3, 4,5,6}
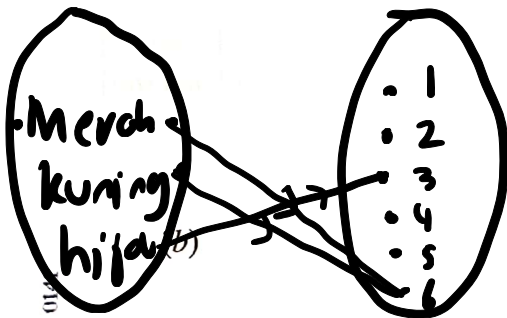
b) banyak kepada satu

Ya, satu fungsi.

1

2
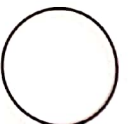
Fungsi : Setiap objek mempunyai 1 shj.

2   Diagram 1 shows the graph of a quadratic function $f(x) = \dfrac{p}{x^n} + qx + r$ such that p, q, r, n and u are constants.

Rajah 1 menunjukkan graf bagi fungsi kuadratik $f(x) = \dfrac{p}{x^n} + qx + r$ dengan keadaan p, q, r, n dan u ialah pemalar.
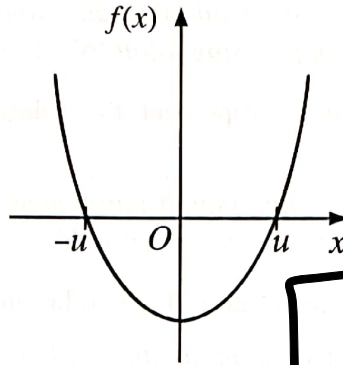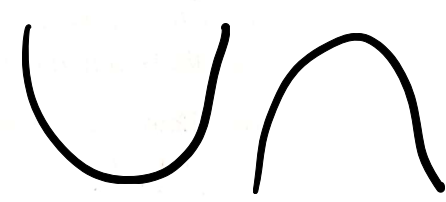

Diagram 1
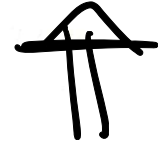
Rajah 1

[handwritten] $f(x) = ax^2 + bx + c$

(a) State the value of n.

Nyatakan nilai n.

(b) If $f(x) = 0$ and the product of roots is r, state the value of

Jika $f(x) = 0$ dan hasil darab punca ialah r, nyatakan nilai

[handwritten] $a \neq 0$

   (i) q,

   (ii) p.

[3 marks]

[3 markah]

Answer / *Jawapan*:

(a) *[handwritten]* $f(x) = \dfrac{p}{x^n} + qx + r = ax^2 + bx + c$

$= px^{-n} + qx + r$

$\therefore -n = 2$

$n = -2$ #

(b) (i)

   (ii)

[handwritten] $\dfrac{p}{x^n} = px^{-n}$
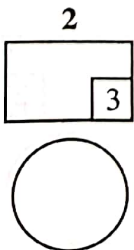
(ii) punca-punca = $\boxed{-u, u}$

$$f(x) = 0$$

$$px^2 + qx + r = 0$$

$$x^2 + \frac{q}{p}x + \boxed{\frac{r}{p}} = 0$$

$\boxed{\begin{array}{l} HOP = \frac{c}{a} \\[2mm] HIP = \frac{-b}{a} \end{array}}$

$$\left[x^2 - (HTP)x + \boxed{HOP} = 0 \right]$$

$\boxed{HOP = r}$

$$\frac{r}{p} - r$$

$$\frac{r}{r} = p$$

$$p = 1 \; \#$$

$$HTP = -\frac{b}{a}$$

$$= -\frac{q}{p}$$

$$-u+u = -\frac{q}{p}$$

$$0 = -\frac{q}{1}$$

$$q = 0 \; \#$$

3   The graph of a quadratic function $f(x) = 3[2h-(x-1)^2]$, where h is a constant, has maximum point $(1, h-10)$.

Graf bagi fungsi kuadratik $f(x) = 3[2h-(x-1)^2]$, *dengan keadaan h ialah pemalar, mempunyai titik maksimum* $(1, h-10)$.

(a) State the value of h.

   Nyatakan nilai h.

(b) State the type of roots for $f(x) = 0$. Justify your answer.

   Nyatakan jenis punca bagi $f(x) = 0$. *Justifikasikan jawapan anda.*

[3 marks]

[3 markah]

Answer / *Jawapan*:

(a)

$$f(x) = 3[2h-(x-1)^2]$$
$$= 6h - 3(x-1)^2$$

(b)

$$= -3(x-1)^2 + 6h$$
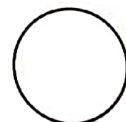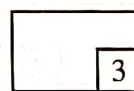
Paksi simetri   nilai max

$$nilai\ max = h-10$$
$$6h = h-10$$
$$5h = -10$$
$$h = -2 \quad ✳$$

(b) $f(x) = 0$

$$-3(x-1)^2 - 12 = 0$$
$$-3(x-1)^2 = 12$$
$$(x-1)^2 = \frac{12}{-3}$$
$$= -4$$
$$x-1 = \sqrt{-4}$$

∴ tiada punca nyata.

Kerana $\sqrt{-4}$ tiada penyelesaian nyata.

4 The following information is regarding a law of indices.

Maklumat berikut adalah berkaitan dengan satu hukum indeks.

$$(a^q)^8 = \underbrace{\sqrt{a} \times \sqrt{a} \times \sqrt{a} \times ... \times \sqrt{a}}_{p \text{ times}}, \text{ where } p \text{ and } q \text{ are constants.}$$

$$(a^q)^8 = \underbrace{\sqrt{a} \times \sqrt{a} \times \sqrt{a} \times ... \times \sqrt{a}}_{p \text{ kali}}, \text{ dengan keadaan } p \text{ dan } q \text{ ialah pemalar.}$$

State the value of p and of q. [2 marks]

Nyatakan nilai p dan nilai q. [2 markah]

Answer / Jawapan:

$$(a^q)^8 = \sqrt{a} \times \sqrt{a} \times \sqrt{a} \times .... \times \sqrt{a}$$

$$a^{8q} = (a^{\frac{1}{2}})^p$$

4

2

5 It is given that the sum of the first *m* terms of an arithmetic progression is $S_m = \frac{k+1}{2}(a+7)$, such that *k* is a constant, *a* is the first term and 7 is the last term.

Diberi bahawa hasil tambah m sebutan pertama bagi suatu janjang aritmetik ialah $S_m = \frac{k+1}{2}(a+7)$, *dengan keadaan k ialah pemalar, a ialah sebutan pertama dan 7 ialah sebutan terakhir.*

(a) Express *k* in terms of *m*.

Ungkapkan k dalam sebutan m.

(b) State the range of values of *k*.

Nyatakan julat nilai k.

[2 marks]

[2 markah]

Answer / Jawapan:

(a)

$$a)\ S_m = \frac{k+1}{2}(a+7)$$

$$S_n = \frac{n}{2}(a+l)$$

$$m = k+1$$

$$k = m-1 \quad \#$$

(b)

$$a)\ S_n \qquad n = 1, 2, 3, ...$$

$$m = 1, 2, 3, ...$$

$$k+1 = 1, 2, 3, ...$$

$$k = 0, 1, 2, ... \quad \#$$

5

2
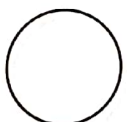
④ $a^{\textcircled{m}} = \underbrace{a \times a \times a \times a \times \cdots \times a}_{\textcircled{m} \text{ times}}$

$a^2 = a \times a$

$a^3 = a \times a \times a$

$(a^q)^8 \underset{\uparrow}{=} \underbrace{\sqrt{a} \times \sqrt{a} \times \cdots \times \sqrt{a}}_{\underline{p} \text{ times}}$

$p = 8$ # $= \underbrace{a^{\frac{1}{2}} \times a^{\frac{1}{2}} \times \cdots \times a^{\frac{1}{2}}}_{p \text{ times}}$

$q = \frac{1}{2}$

$= \left(a^{\frac{1}{2}}\right)^p$

$a^{\frac{1}{2}} = \sqrt{a}$ $\qquad a^{\frac{2}{3}} = \sqrt[3]{a^2}$

$a^{\frac{1}{3}} = \sqrt[3]{a}$

S_n = hasil tambah

$\underline{\underline{n}}$ sebutan

n = bilangan sebutan

$n = 1, 2, 3, \ldots$

$S_m \longrightarrow m = 1, 2, 3, \ldots$

$= \dfrac{k+1}{2}$

$k+1 = 1, 2, 3, \ldots$

$k = 1-1, 2-1, 3-1, \ldots$

$= 0, 1, 2, \ldots$ #

6 The third term of an arithmetic progression is 4 and the fourth term is 7.

Sebutan ketiga bagi suatu janjang aritmetik ialah 4 dan sebutan keempat ialah 7.

(a) State the common difference of the progression.

Nyatakan beza sepunya janjang itu.

(b) Find the sum of the first 25 terms of the progression.

Cari hasil tambah 25 sebutan pertama janjang itu.

[4 marks]

[4 markah]

Answer / *Jawapan*:

(a)

$$JA : T_3 = 4$$
$$T_4 = 7 \quad \} \text{ berturutan}$$

$$\frac{T_3}{T_4} = d.$$

(b)

$$T_n = a + (n-1)d$$

T_3:
$$a + (3-1)d = 4$$
$$a + 2d = 4 \quad —①$$

T_4:
$$a + (4-1)d = 7$$
$$a + 3d = 7 \quad —②$$

②-①:
$$0 + d = 3$$
$$d = 3 \; \#$$

$$a = 4 - 2(3)$$
$$= -2 \; \#$$

6

4
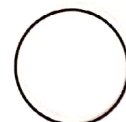
(b) $S_n = \dfrac{n}{2}\left(2a + (n-1)d\right)$

$S_{25} = \dfrac{25}{2}\left(2(-2) + 24(3)\right)$

$\qquad = 850$ #

(a) <u>Alternative</u>

$d = T_4 - T_3$

$\quad = 7 - 4$

$\quad = 3$ #

7   Three consecutive terms of a geometric progression are 32, p, q. It is given that the sum of these three terms is 26.

Find the possible values of p and of q.   [3 marks]

Tiga sebutan berturutan suatu janjang geometri ialah 32, p, q. Diberi bahawa hasil tambah ketiga-tiga sebutan itu ialah 26.

Cari nilai-nilai yang mungkin bagi p dan bagi q.   [3 markah]

Answer / *Jawapan*:

$$JG: \quad 32, p, q$$

$$\boxed{32 + p + q = 26} \quad \text{——①}$$

$$\frac{p}{32} = \frac{q}{p} \quad \text{——②}$$

$$p^2 = 32q$$

$$q = \frac{p^2}{32} \quad \text{——③}$$

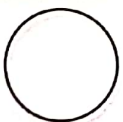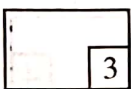③→①: $32 + p + \dfrac{p^2}{32} = 26$

$$1024 + 32p + p^2 = 832$$

$$p^2 + 32p + 192 = 0$$

$$p = -8, -24$$

$$q = 2, 18 \quad \#$$

8   Diagram 2 shows the relation of three sets.

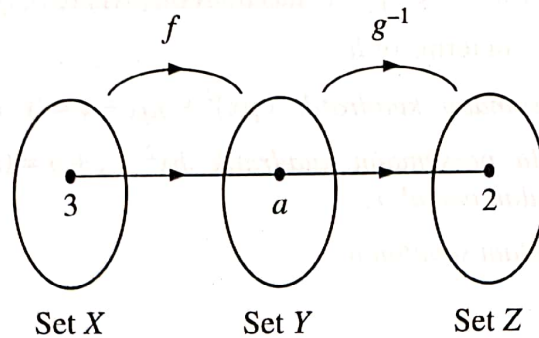*Rajah 2 menunjukkan hubungan bagi tiga set.*

Diagram 2

Rajah 2

It is given that $f : x \rightarrow 2x + 3$ and $g^{-1}f : x \rightarrow \dfrac{3}{x} + 1$, $x \neq 0$.

Diberi bahawa $f : x \rightarrow 2x + 3$ *dan* $g^{-1}f : x \rightarrow \dfrac{3}{x} + 1$, $x \neq 0$.

(a) If a student writes $a = 10$, determine whether the value is correct or wrong. Give your reason.

Jika seorang murid menulis a = 10, tentukan sama ada nilai itu betul atau salah. Beri sebab anda.

(b) Find $g^{-1}(x)$.

Cari $g^{-1}(x)$.

[4 marks]

[4 markah]

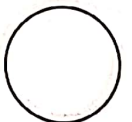Answer / *Jawapan*:

(a) $f(3) = 2(3) + 3 = 6 + 3 = 9$

(b) $a \neq 10$

$\therefore a = 10$ salah.

b) $g^{-1}f(x) = \dfrac{3}{x} + 1$ ⎫ Cari
                              ⎬
   $f(x) = 2x + 3$ ⎭ $g^{-1}(x)$.

$$\Longrightarrow \underline{\dfrac{fg\,(x)}{g\,(x)}} \left.\rule{0pt}{40pt}\right\} \text{diberi}$$

$$\Longrightarrow \text{Cari } \underline{f\,(x)}.$$

Step

① Songsang fungsi tunggal

$$g^{-1}(x) = \underline{\hspace{2cm}}.$$

② Gubah bersama fungsi

$$\underline{\text{gubahan}}.$$

$$f(x) = fg\,g^{-1}(x)$$

(b) $g^{-1} f(x) = \frac{3}{x} + 1$ ⇐

$f(x) = 2x + 3$

Cari $g^{-1}(x)$.

Jawapan.

① $f(x) = y$

$2x + 3 = y$

$2x = y - 3$

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

∴ $f^{-1}(x) = \frac{x - 3}{2}$

② $g^{-1}(x) = g^{-1} f f^{-1}(x)$

$= g^{-1} f \left(f^{-1}(x) \right)$

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

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

$$= \frac{6}{x-3} + 1$$

$$= \frac{6}{x-3} + \frac{x-3}{x-3}$$

$$= \frac{x+3}{x-3} \; \#$$

9 It is given that the quadratic equation $(px)^2 + 5qx + 4 = 0$ has two equal roots while the quadratic equation $hx^2 - x + p = 0$ has no roots, where p, q and h are constants.

Express the range of q in terms of h. [3 *marks*]

Diberi bahawa persamaan kuadratik $(px)^2 + 5qx + 4 = 0$ *mempunyai dua punca yang sama manakala persamaan kuadratik* $hx^2 - x + p = 0$ *tiada punca, dengan keadaan p, q dan h ialah pemalar.*

Ungkapkan julat q dalam sebutan h. [3 *markah*]

Answer / *Jawapan:*

$$(px)^2 + 5qx + 4 = 0$$

$$p^2x^2 + 5qx + 4 = 0$$

$$b^2 - 4ac = 0$$
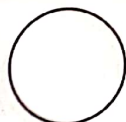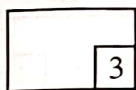
$$(5q)^2 - 4(p^2)(4) = 0$$

$$25q^2 - 16p^2 = 0$$

$$25q^2 = 16p^2$$

$$\sqrt{25q^2} = \sqrt{16p^2}$$

$$5q = 4p$$

$$p = \frac{5}{4}q \qquad —①$$

9

3

$$hx^2 - x + p = 0$$

$$b^2 - 4ac < 0$$

$$(-1)^2 - 4(h)(p) < 0$$

$$1 - 4h\left(\frac{5}{4}q\right) < 0$$

$$1 - 5hq < 0$$

$$1 < 5hq$$

$$\therefore \quad 5hq > 1$$

$$q > \frac{1}{5h} \quad \left(\begin{matrix} Jika \\ h > 0 \end{matrix}\right)$$

$$q < \frac{1}{5h} \quad \left(\begin{matrix} Jika \\ h < 0 \end{matrix}\right)$$

\#

10   Given $\log_m C = x$, express in terms of x

    Diberi $\log_m C = x$, *ungkapkan dalam sebutan x*

    (a) $\log_m\left(\dfrac{1}{C}\right)$,

    (b) $\log_{\sqrt{m}} Cm^3$.

                                     [4 *marks*]

                                     [4 *markah*]

Answer / *Jawapan*:

(a)

a) $\log_m C = x$
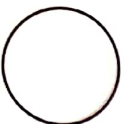
(b)

$\log_m\left(\dfrac{1}{C}\right) = \log_m 1 - \log_m C$

$= 0 - x$

$= -x$ #

atau $\log_m\left(\dfrac{1}{C}\right) = \log_m C^{-1}$

$= -\log_m C$

$= -x$ #

(b) $\log_{\sqrt{m}} Cm^3 = \dfrac{\log_m (Cm^3)}{\log_m (\sqrt{m})}$

$$= \frac{\log_m C + \log_m m^3}{\log_m m^{\frac{1}{2}}}$$

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

$$= \frac{x+3}{\frac{1}{2}} \quad = (x+3) \div \frac{1}{2}$$

$$= (x+3) \times 2$$

$$= 2(x+3) \#$$

Kaedah 2

$$\boxed{\log_a m = \log_{a^n} m^n}$$

Contoh

① $\log_2 3 = \log_4 9$

② $\log_4 5 = \log_2 5^{\frac{1}{2}} = \frac{1}{2}\log_2 5$

$$\log_{\sqrt{m}} (Cm^3)$$

$$kuasa\ 2$$
$$\sqrt{m} \longrightarrow m$$

$$= \log_m (Cm^3)^2$$

$$= 2(\log_m C + \log_m m^3)$$

$$= 2(x + 3) \quad \#$$

11 The variables x and y are related by the equation $\frac{y}{x} = px^2 - qx$ where p and q are constants. Diagram 3.1 and Diagram 3.2 show the straight line graphs obtained by plotting the relations from the equation.

Pemboleh ubah x dan y dihubungkan oleh persamaan $\frac{y}{x} = px^2 - qx$ dengan keadaan p dan q ialah pemalar. Rajah 3.1 dan Rajah 3.2 menunjukkan graf garis lurus yang diperoleh dengan memplot hubungan dari persamaan itu.
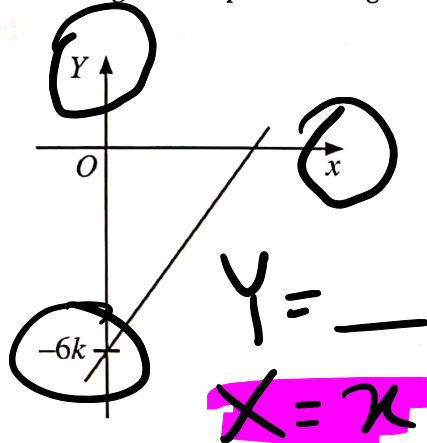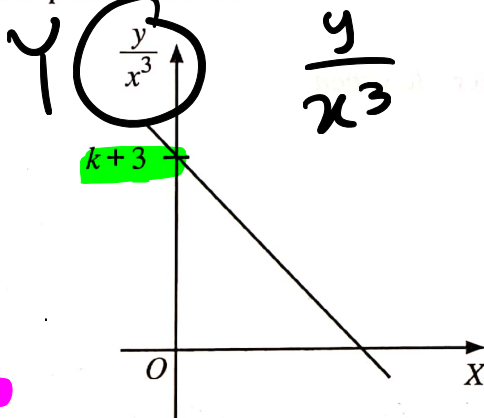

Diagram 3.1　　　　　　　　　　Diagram 3.2
Rajah 3.1　　　　　　　　　　*Rajah 3.2*

Express p in terms of q.　　　　　　　　　　　　　　　[3 *marks*]

Ungkapkan p dalam sebutan q.　　　　　　　　　　　[3 *markah*]

Answer / *Jawapan*:

$$\frac{y}{x} = px^2 - qx$$

$$\boxed{Y = mX + C}$$

① $\frac{y}{x^2} = px - q$

$$Y = mX + C$$

$$-q = -6k$$
$$q = 6k \quad —①$$

② $\frac{y}{x^3} = \frac{px^2}{x^2} - \frac{qx}{x^2}$

$$= -\frac{q}{x} + p$$

$$p = k+3$$
$$k = p - 3 \quad —②$$

$$q = 6(p-3)$$
$$= 6p - 18$$
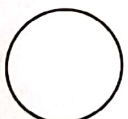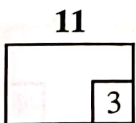
$$6p = q + 18$$
$$p = \frac{q + 18}{6} \quad \#$$

12 Diagram 4 shows a rhombus *OACB* inscribed in sector *AOB* with centre *O* and radius *r* cm.

Rajah 4 menunjukkan sebuah rombus OACB yang terterap dalam sektor AOB dengan pusat O dan jejari r cm.

$$S = \dot{j}\,\theta = r(\alpha)$$
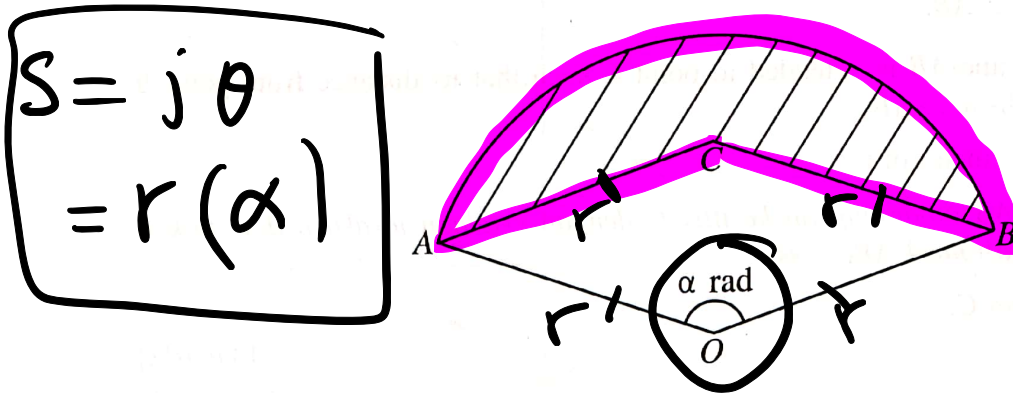
Diagram 4

Rajah 4

Given the area of sector *AOB* is 18 cm², express

Diberi luas sektor AOB ialah 18 cm², ungkapkan

$$S = \dot{j}\,\theta$$

(a) α in terms of *r*,

   α dalam sebutan r,

$$a = \frac{36}{}$$

(b) the perimeter, in cm, of the shaded region in terms of *r*.

   perimeter, dalam cm, bagi kawasan berlorek dalam sebutan r.

[3 marks]

[3 markah]

Answer / *Jawapan:*

(a)
$$L = \frac{1}{2} r^2 \theta$$
$$18 = \frac{1}{2} r^2 \alpha$$

(b)
$$r^2 = \frac{36}{\alpha}$$
$$\alpha = \frac{36}{r^2} \;/\!/$$

b) Perimeter
$$= 2r + r\alpha$$
$$= 2r + r\left(\frac{36}{r^2}\right)$$
$$= 2r + \frac{36}{r} \;/\!/$$

12

3
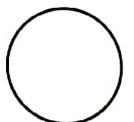
13 It is given that $A(1, 3)$ and $B(4, 7)$ lie on a Cartesian plane.

Diberi bahawa A(1, 3) dan B(4, 7) berada pada suatu satah Cartes.

(a) State the distance AB.

Nyatakan jarak AB.

(b) The straight line AB is extended to point C such that its distance from point B is twice the distance AB.

Find the coordinates of C.

Garis lurus AB dipanjangkan ke titik C dengan keadaan jaraknya dari titik B adalah dua kali jarak AB.

Cari koordinat C.

[3 marks]

[3 markah]

Answer / *Jawapan*:

(a)

$$AB = \sqrt{(4-1)^2 + (7-3)^2}$$

$$= \sqrt{3^2 + 4^2} = 5 \quad \#$$

(b)

$$1 \quad : \quad 2$$

A   B   C

$(1, 3)$ $(4, 7)$ (x, y)
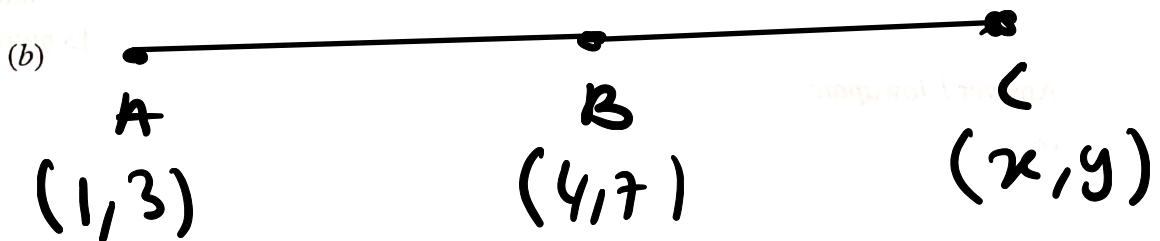
$$B(4, 7) = \left(\frac{1(2) + x}{3}, \frac{6 + y}{3} \right)$$

$$= \left(\frac{2 + x}{3}, \frac{6 + y}{3} \right)$$

13

3

$$4 = \frac{2+x}{3} \qquad 7 = \frac{6+y}{3}$$

$$12 = 2+x \qquad 21 = 6+y$$
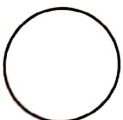
$$x = 10 \qquad y = 15$$

$$C(10, 15) \#$$

14 Diagram 5 shows three straight lines, such that k, p, q and r are constants.

Rajah 5 menunjukkan tiga garis lurus, dengan keadaan k, p, q dan r ialah pemalar.

$$\frac{x}{p} - \frac{y}{q} = 1$$

$ky = 3x + 6$

M_2

M_1

P

$$y = \frac{3x}{k} + \frac{6}{k}$$

$$= \frac{3}{k}x + \frac{6}{k}$$

$-q$
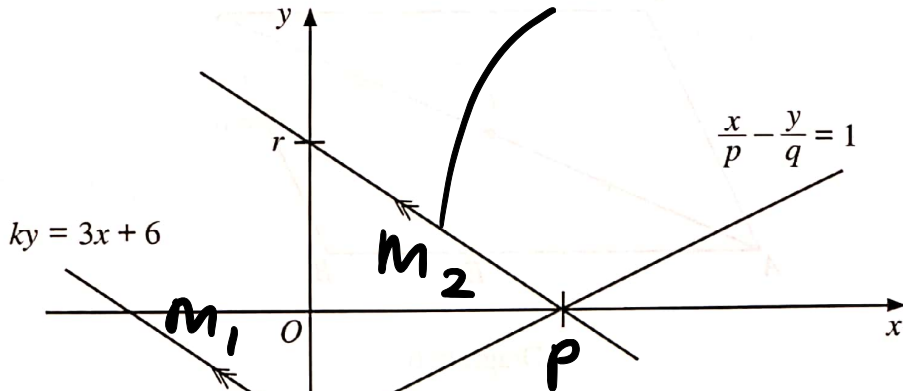
$$M_1 = M_2$$

$$\frac{3}{k} = -\frac{r}{p}$$

Express

Ungkapkan

Diagram 5

Rajah 5

(a) k in terms of q,

k dalam sebutan q,

(b) r in terms of k and p.

r dalam sebutan k dan p.

$$\frac{x}{a} + \frac{y}{b} = 1$$

[3 marks]

[3 markah]

Answer / *Jawapan*:

(a) Pint-y: $\dfrac{6}{k} = -q$

$$k = \frac{6}{-q} = -\frac{6}{q} \; /\!/$$

(b) kecerunan:

$$M_1 = M_2$$

$$\frac{3}{k} = -\frac{r}{p}$$

$$3p = -rk$$

$$r = \frac{-3p}{k} \quad \#$$

15 Diagram 6 shows a parallelogram *ABCD*.

Rajah 6 menunjukkan sebuah segi empat selari ABCD.
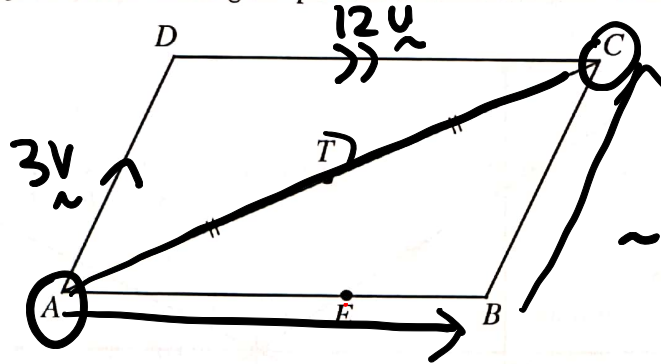
Diagram 6

Rajah 6

Point *E* lies on *AB* such that $AE : EB = 2 : 1$. It is given that $\overrightarrow{EB} = 4\underline{u}$ and $\overrightarrow{AD} = 3\underline{v}$.

Titik E berada pada AB dengan keadaan AE : EB = 2 : 1. Diberi bahawa $\overrightarrow{EB} = 4\underline{u}$ dan $\overrightarrow{AD} = 3\underline{v}$.

Express in terms of $\underline{u}$ and / or $\underline{v}$

Ungkapkan dalam sebutan $\underline{u}$ dan / atau $\underline{v}$

(a) $\overrightarrow{AE}$,

(b) $\overrightarrow{ET}$.

$$\overrightarrow{AC} = \overrightarrow{AB} + \overrightarrow{BC}$$

[3 marks]

[3 markah]

Answer / *Jawapan:*

(a) $\overrightarrow{AE} = 2\overrightarrow{EB} = 8\underline{u}$

(b) $\overrightarrow{ET} = \overrightarrow{EA} + \overrightarrow{AT}$

$$= -8\underline{u} + \frac{1}{2}\overrightarrow{AC}$$

$$= -8\underline{u} + \frac{1}{2}(12\underline{u} + 3\underline{v})$$

$$= -8\underline{u} + 6\underline{u} + \frac{3}{2}\underline{v}$$

$$= -2\underline{u} + \frac{3}{2}\underline{v} \#$$

15
3

.

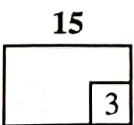**16** It is given that $P(2, m)$, $Q(h, 6)$, $v = 2i - j$, $w = 9i + 3j$ and $\overrightarrow{PQ} = 2v + kw$, where m, h and k are constants.

Express h in terms of m.   [3 marks]

Diberi bahawa $P(2, m)$, $Q(h, 6)$, $v = 2i - j$, $w = 9i + 3j$ dan $\overrightarrow{PQ} = 2v + kw$, dengan keadaan m, h dan k ialah pemalar.

Ungkapkan h dalam sebutan m.   [3 markah]

Answer / Jawapan:

$$\overrightarrow{PQ} = 2v + kw$$
$$= 2(2i - j) + k(9i + 3j)$$
$$= 4i - 2j + 9ki + 3kj$$
$$= (4 + 9k)i + (-2 + 3k)j$$

$$\overrightarrow{OP} = 2i + mj$$
$$\overrightarrow{OQ} = hi + 6j$$
$$\overrightarrow{PQ} = \overrightarrow{PO} + \overrightarrow{OQ}$$
$$= -2i - mj + hi + 6j$$
$$= (-2 + h)i + (-m + 6)j$$

$$4 + 9k = -2 + h \qquad -2 + 3k = -m + 6$$
$$9k = -6 + h \qquad\qquad 3k = 8 - m$$

$$k = \frac{-6 + h}{9} \qquad\qquad k = \frac{8 - m}{3}$$
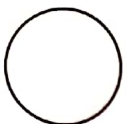
$$\frac{-6+h}{9} = \frac{8-m}{3}$$

$$-6+h = \frac{8-m}{3} \times 9$$

$$= 3(8-m)$$

$$= 24 - 3m$$

$$h = 24 - 3m + 6$$

$$= 30 - 3m \text{ \#}$$

17 The curve $y = px^4 + 2x$ has turning point at $(-1, q)$.

Find the value of p and of q. [4 marks]

Lengkung $y = px^4 + 2x$ mempunyai titik pusingan pada $(-1, q)$.

Cari nilai p dan nilai q. [4 markah]

Answer / *Jawapan*:

$$q = p(-1)^4 + 2(-1)$$

$$= p - 2 \quad —— \text{①}$$

$$y = px^4 + 2x^1$$

$$\frac{dy}{dx} = 4px^3 + 2$$

Gradient function

$$\boxed{\frac{dy}{dx} = 0}$$

Di t. pusingan $(-1, q)$:

$$4p(-1)^3 + 2 = 0$$

$$-4p + 2 = 0$$

$$-4p = -2$$

$$p = \frac{1}{2} \quad \#$$

$$q = \frac{1}{2} - 2 = \frac{-3}{2} \quad \#$$
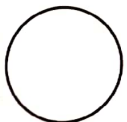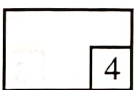
18 Given $\int_{3}^{k} f(y)\,dy = \frac{3}{2}$, find

Diberi $\int_{3}^{k} f(y)\,dy = \frac{3}{2}$, cari

(a) $\int_{k}^{3} 4f(y)\,dy$,

(b) the value of k such that $\int_{3}^{k} [2-f(y)]\,dy = 4$.

nilai k dengan keadaan $\int_{3}^{k} [2-f(y)]\,dy = 4$.

[4 marks]
[4 markah]

Answer / Jawapan:

(a)

$$\int_{k}^{3} 4f(y)\,dy = 4\int_{k}^{3} f(y)\,dy$$

$$= -4\int_{3}^{k} f(y)\,dy$$

(b)

$$= -4\left(\frac{3}{2}\right)$$

$$= -6 \#$$

b) $\int_{3}^{k} [2-f(y)]\,dy = 4$

$\int_{3}^{k} 2\,dy - \int_{3}^{k} f(y)\,dy = 4$
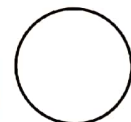
$$\left[2y\right]_3^k - \frac{3}{2} = 4 \quad \Leftarrow$$

$$2k - 6 - \frac{3}{2} = 4$$

$$2k = 10 + \frac{3}{2}$$

$$= \frac{23}{2}$$

$$k = \frac{23}{4} \quad \#$$

$$\int 2\,dx = 2x + c$$

$$\int 3\,dy = 3y + c$$

$$\int \text{④}\,dz = 4z + c$$

① $\int k\, f(x)\, dx = k \int f(x)\, dx$

Cth: $\int 3x\, dx = 3 \int x\, dx$

$$= 3 \left[\frac{x^2}{2} \right] + C$$

$$= \frac{3}{2} x^2 + C$$

② $\int_{1}^{2} f(x)\, dx = - \int_{2}^{1} f(x)\, dx$

Cth: $\int_{0}^{2} x\, dx = \left[\frac{x^2}{2} \right]_{0}^{2}$

$$= \frac{4}{2} - 0$$

$$= 2$$

$$\int_{2}^{0} x\, dx = \left[\frac{x^2}{2} \right]_{2}^{0}$$

$$= \left(0 - \frac{4}{2} \right)$$

$$= -2$$

③ $\displaystyle\int_a^b \left[f(x) \pm g(x) \right] dx$

$\displaystyle = \int_a^b f(x)\, dx \pm \int_a^b g(x)\, dx$

19 Diagram 7 shows a shaded region bounded by the graph $y = g(x)$ and x-axis from $x = a$ to $x = b$.

Rajah 7 menunjukkan kawasan berlorek yang dibatasi oleh graf $y = g(x)$ dan paksi-x dari $x = a$ ke $x = b$.

$y = g(x)$

$$A = \int_a^b g(x)\, dx$$

$$= -14$$
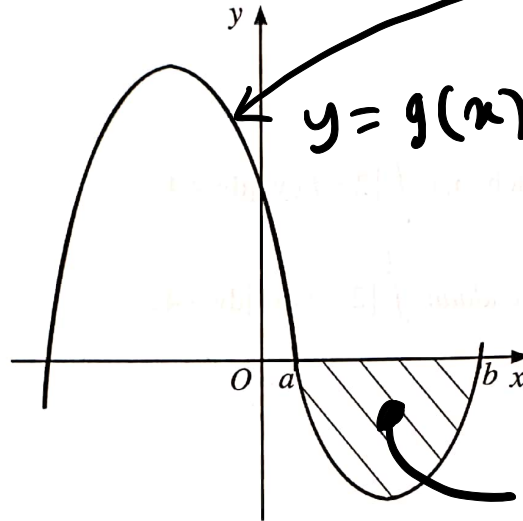
Diagram 7

Rajah 7

(a) It is given that $\frac{d}{dx}[2h(x)] = g(x)$ and $[h(x)]_a^b = -7$.

State the area of the shaded region.

Diberi bahawa $\frac{d}{dx}[2h(x)] = g(x)$ dan $[h(x)]_a^b = -7$.

Nyatakan luas kawasan berlorek.

(b) The graph $y = g(x)$ passes through point (3, 19).

Given $\frac{d}{dx}[g(x)] = 3x^2 + 2x - 6$, find $g(x)$ in terms of x.

Graf $y = g(x)$ melalui titik (3, 19).

Diberi $\frac{d}{dx}[g(x)] = 3x^2 + 2x - 6$, cari $g(x)$ dalam sebutan x.

[4 *marks*]
[4 *markah*]

$$\frac{d}{dx}[2h(x)] = g(x)$$

beza $\left(2h(x) \rightarrow g(x)\right)$

$$\text{kamir } (g(x)) = 2h(x)$$

a) $\dfrac{d}{dx}\left[2h(x)\right] = g(x)$

$$\int g(x)\,dx = 2h(x)$$

$$\int_{a}^{b} g(x)\,dx = \left[2h(x)\right]_{a}^{b}$$

$$= 2\left[h(x)\right]_{a}^{b}$$

$$= 2(-7)$$

$$= -14$$

$$\text{Luas} = 14 \ \#.$$

b) $\dfrac{d}{dx}\left[\overset{L}{g(x)}\right] = 3x^2 + 2x - 6 \quad \overset{S}{}$

$$\underline{g(x) = \int 3x^2 + 2x - 6\,dx}$$

$$= \frac{3x^3}{3} + \frac{2x^2}{2} - 6x + C$$

$$= x^3 + x^2 - 6x + C$$

$$19 = 3^3 + 3^2 - 6(3) + C$$

$$= 27 + 9 - 18 + C$$

$$= 18 + C$$

$$1 = C$$

$$g(x) = x^3 + x^2 - 6x + 1 \quad \#$$

Answer / *Jawapan*:

(a)

(b)

19

4

20 The events *A*, *B* and *C* are independent but not mutually exclusive. It is given that $P(A) = x$, $P(B) = y$ and $P(C) = z$.

Peristiwa A, B dan C adalah tak bersandar tetapi tidak saling eksklusif. Diberi bahawa $P(A) = x$, $P(B) = y$ *dan* $P(C) = z$.

Express in terms of *x* and / or *y* and / or *z*

Ungkapkan dalam sebutan x dan / atau y dan / atau z

(a) $P(A \cap B \cap C)$,

(b) $P(A \cup B)$.

[2 marks]

[2 markah]

Answer / *Jawapan*:

(a) $$P(A \cap B \cap C) = P(A) \times P(B) \times P(C)$$
$$= xyz \ \#$$

(b) $$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$
$$= x + y - xy \ \#$$

20

2

$$P(A \cap B) = P(A) \cdot P(B)$$
$$= x \cdot y$$

A , B

① A , B *independant*

$$P(A \cap B) = P(A) \times P(B)$$

② A, B *Mutually exclusive*

$$P(A \cup B) = P(A) + P(B)$$

21 Diagram 8 shows the graph of $y = |n \sin \alpha \cos \alpha|$ for $0 \le \alpha \le 2\pi$.

Rajah 8 menunjukkan graf bagi $y = |n \sin \alpha \cos \alpha|$ untuk $0 \le \alpha \le 2\pi$.

Handwritten annotations: $y = k$, $\boxed{y = k}$, $k = m$, $y = 0$, $|n \sin \alpha \cos \alpha|$, $y = \left|\dfrac{n}{2} \sin(2\alpha)\right|$
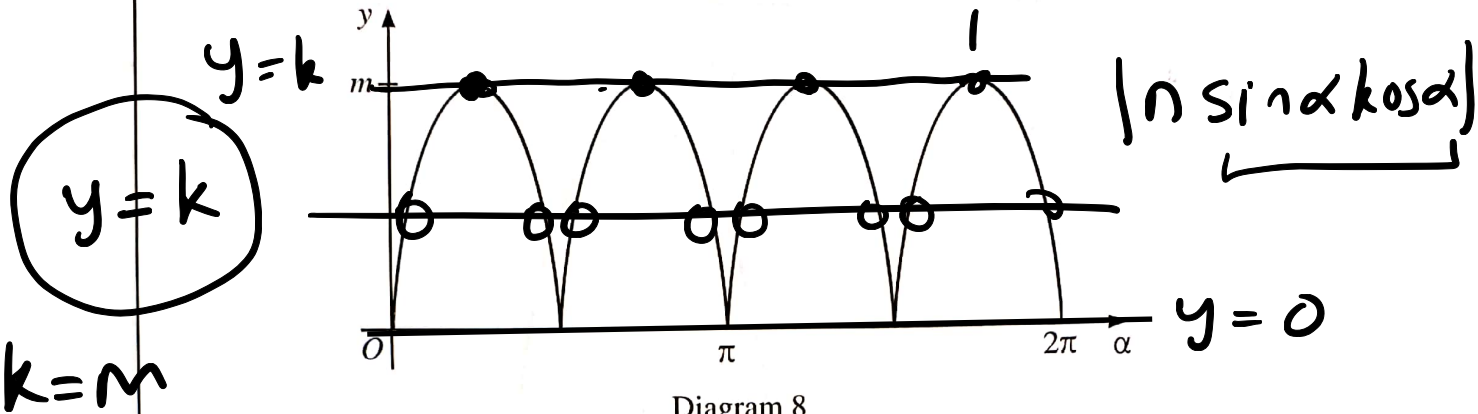
Diagram 8

Rajah 8

(a) Express *m* in terms of *n*.

Ungkapkan m dalam sebutan n.

(b) There are 8 solutions when $y = k$, where *k* is a constant.
State the range of *k* in terms of *m*.

Terdapat 8 penyelesaian apabila $y = k$, dengan keadaan k ialah pemalar.
Nyatakan julat k dalam sebutan m.

[3 marks]
[3 markah]

$\sin(2A) = 2\sin A \cos A$

Answer / *Jawapan*:

(a)

$$y = |n \sin(\alpha) \cdot \cos(\alpha)|$$
$$= \left|\frac{n}{2} \cdot 2\sin(\alpha)\cos(\alpha)\right|$$

(b)

$$= \left|\left(\frac{n}{2}\right) \sin(2\alpha)\right|$$

$$m = \frac{n}{2}$$
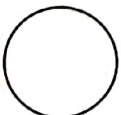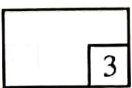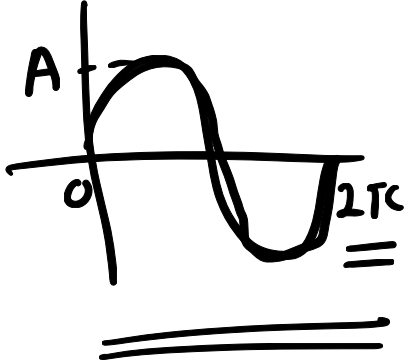
$y = A\sin x \implies y = B\sin 2x$
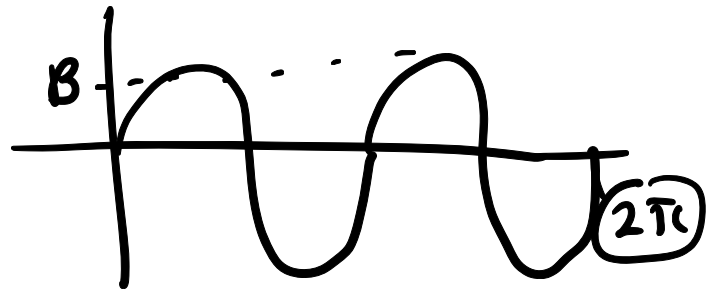
$y = n|\sin 2x|$
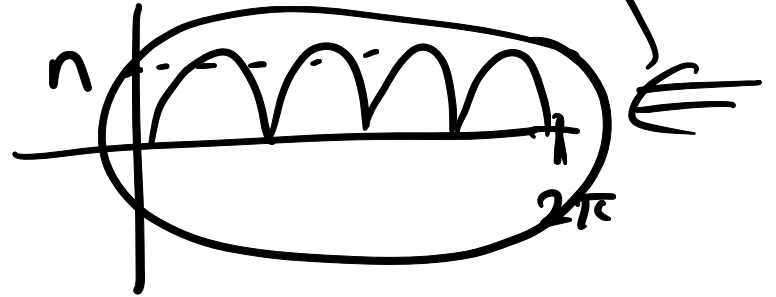
(b) $0 < k < m$ #

22 Diagram 9 shows a four-digit passcode '0131' set by San on his smartphone.

Rajah 9 menunjukkan satu kod laluan empat digit '0131' yang telah ditetapkan oleh San pada telefon pintarnya.

13 × ×   ✗

× 13 ×   ✗

× × 13   ✗

Diagram 9

Rajah 9

He wants to reset the passcode such that the new passcode cannot consists of digit 1 followed by digit 3.

How many different passcodes can be formed? [3 *marks*]

Dia hendak menetapkan semula kod laluan dengan keadaan kod laluan baharu itu tidak boleh mengandungi digit 1 diikuti oleh digit 3.

Berapakah bilangan kod laluan berbeza yang dapat dibentuk? [3 *markah*]

Answer / *Jawapan:* 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

① $\underline{10} \times \underline{10} \times \underline{10} \times \underline{10} = 10,000$ kod

② 1 3 × ×

$\underline{1} \quad \underline{3} \quad \underline{\times} \quad \underline{\times} \qquad = 10 \times 10 = 100$
1   1   10   10

③ × 1 3 ×
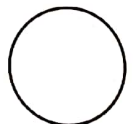
$\underline{\times} \quad \underline{1} \quad \underline{3} \quad \underline{\times} \qquad = 10 \times 10 = 100$
10   1   1   10

④ $x \times 13 = 10 \times 10 = 100$

\# kod $= 10,000 - 100 - 100$
$$- 100 + 1$$
$$= 9701 \ \#$$

$13 \times x \longrightarrow \boxed{1313}$

$x \times 13 \longrightarrow \boxed{1312}$

② $13 \times x : 1300$
$$1301$$
$$1302$$
$$\vdots$$
$$\boxed{1313}$$
$$\vdots$$
$$1399$$

tak boleh

(ditolak)

④ $x \times 13 : 0013$
$$0113$$
$$0213$$
$$\vdots$$
$$\boxed{1313}$$

For Examiner's Use

99 | 3

23 A survey was carried out on the household income distribution among a group of potential buyers by a housing developer company. Table 1 shows the findings of the survey.

Satu tinjauan telah dijalankan tentang taburan pendapatan di kalangan sekumpulan pembeli berpotensi oleh sebuah syarikat pemaju perumahan. Jadual 1 menunjukkan dapatan tinjauan itu.

2999.5 Q₁   Q₃

Household income (RM) / Pendapatan isi rumah (RM)	2 000 – 2 999	3 000 – 3 999	4 000 – 4 999	5 000 – 5 999	6 000 – 6 999	7 000 – 7 999
Number of family / Bilangan keluarga	150	208	250	160	143	49

= 960

F   2999 3000

Table 1

Jadual 1

The housing developer plans to provide a housing scheme for a medium income group. The developer identifies this group by excluding those in the top 25% and bottom 25% of the distribution. Rose qualifies for the scheme.

What is the range of Rose's income? [Round off your answer to the nearest RM]

[4 *marks*]

Pemaju perumahan itu bercadang menyediakan satu skim perumahan untuk kumpulan berpendapatan sederhana. Pemaju mengenal pasti kumpulan itu dengan mengecualikan mereka yang berada pada 25% bahagian atas dan 25% bahagian bawah taburan itu. Rose layak untuk skim tersebut.

Apakah julat pendapatan Rose? [Bundarkan jawapan anda kepada RM terhampir]

[4 *markah*]

50%

O 25%   25% 100%

q   Q₁

Q₃
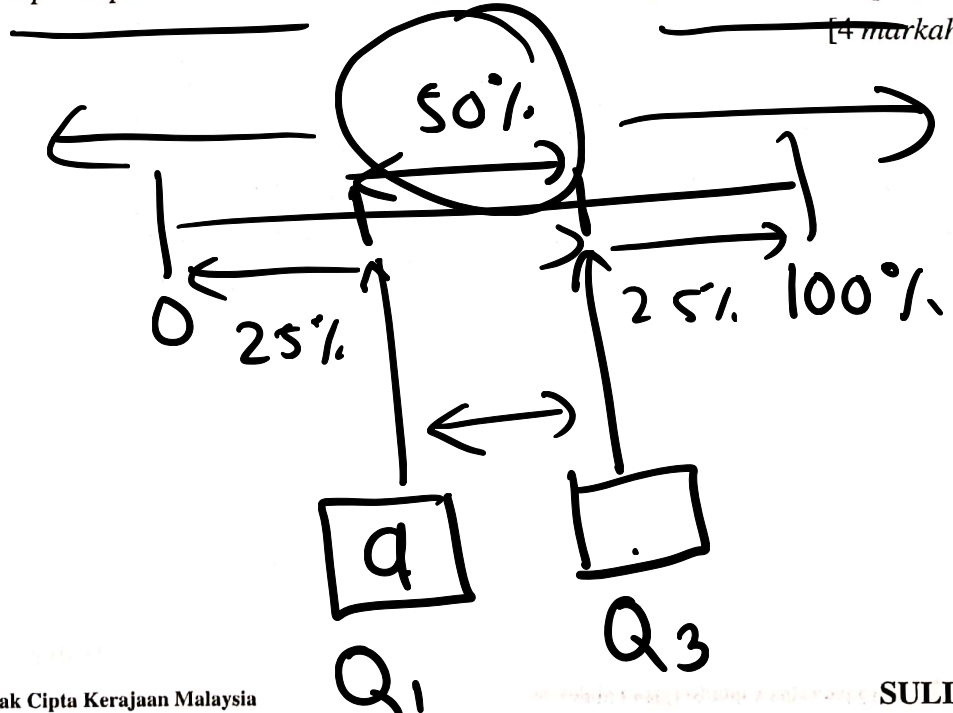
Q1   ① Kelas Q1

$$\frac{N}{4} = \frac{960}{4} = 240$$

② $Q1 = L + \left(\dfrac{\frac{N}{4} - F}{f}\right) C$

L = lower bondry of Q1 class

F = Cumulative freq before Q1 class

f = freq of Q1 class

C = Class size.

$$Q_1 = 2999.5 + \left(\frac{240 - 150}{208}\right)(1000)$$

$$= 3432.19$$

23

4
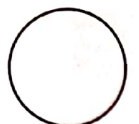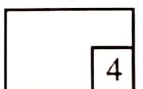
$$\underline{\underline{Q_3}}$$

① Kelas Q_3 : $\quad \frac{3}{4}N = \frac{3}{4}(960)$

$$= 720$$

$$Q_3 = L + \left(\frac{\frac{3}{4}N - F}{f}\right) c$$

$$= 4999.5 + \left(\frac{720 - 608}{160}\right)1000$$

$$= 5699.5$$

RM3432 ⩽ Pendapatan Rosa ⩽ RM6000

#

24 Diagram 10.1 shows a spinning wheel which has 4 equal parts with different points used in a lucky draw in a supermarket. After spinning the wheel twice, the customers who obtain at least nine points, are given a chance to draw a ball randomly from a box as shown in Diagram 10.2. A prize will be given if a black ball is obtained.

Rajah 10.1 menunjukkan sebuah roda putar yang mempunyai 4 bahagian yang sama besar dengan mata berbeza digunakan untuk suatu cabutan bertuah di sebuah pasar raya. Selepas membuat dua kali putaran roda, pelanggan yang mendapat sekurang-kurangnya sembilan mata, diberi peluang membuat cabutan sebiji bola secara rawak dari salah satu kotak seperti yang ditunjukkan dalam Rajah 10.2. Hadiah akan diberi jika bola hitam diperoleh.
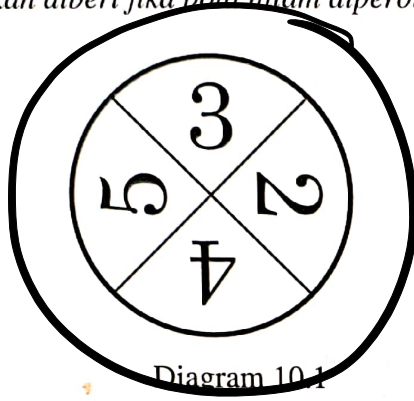
Diagram 10.1
Rajah 10.1
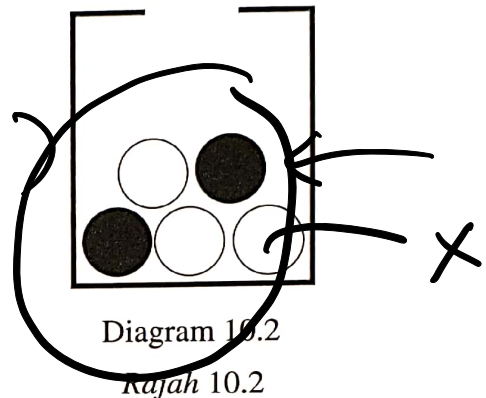
Diagram 10.2
Rajah 10.2

(a) Find the probability that a customer is qualified to draw a ball from the box.

Cari kebarangkalian bahawa seorang pelanggan layak membuat cabutan sebiji bola dari kotak itu.

(b) A customer who obtains ten points but fails to draw a black ball is given the privilege for the second draw without replacing the first ball drawn.
Find the probability that the customer will get the prize.

Seorang pelanggan yang memperoleh sepuluh mata tetapi gagal mencabut bola hitam diberi keistimewaan untuk cabutan kedua tanpa mengembalikan bola pertama yang telah dicabut.
Cari kebarangkalian bahawa pelanggan itu akan mendapat hadiah.

[4 marks]
[4 markah]

a) $S = \{22, 23, 24, 25,$
$32, 33, 34, 35,$
$42, 43, 44, 45$
$52, 53, 54, 55\}$

Answer / *Jawapan*:

(a)

$$p(\text{mata} \geqslant 9)$$

$$= \frac{3}{16} \quad \#$$

(b) $p = \frac{2}{4} = \frac{1}{2} \quad \#$

24

4

25 Diagram 11 shows the normal distribution graph of the time for a school bus to arrive at a school.

Rajah 11 menunjukkan graf taburan normal bagi masa sebuah bas sekolah untuk sampai ke sekolah.

$f(x)$

25%

50%.

2 minutes
2 minit

25%

0.25

2 minutes
2 minit

$\mu-2$ Diagram 11 $\mu+2$
         Rajah 11

μ

x

(a) Find the standard deviation.

   Cari sisihan piawai.

(b) It is given that the mean time for the bus to arrive at the school is 7.15 a.m. Students are considered late if they arrived after 7.20 a.m. Lea takes that bus to the school.

   Calculate the probability that Lea will be late. Give your answer correct to three significant figures.

   Diberi bahawa min masa untuk bas itu sampai ke sekolah ialah 7.15 pagi. Murid-murid dianggap lewat sekiranya mereka sampai selepas 7.20 pagi. Lea menaiki bas itu ke sekolah.

   Hitung kebarangkalian bahawa Lea akan sampai lewat. Beri jawapan anda betul kepada tiga angka bererti.

   [4 marks]
   [4 markah]

Answer / *Jawapan:*

(a)

b) $P\left(X > \dfrac{7.20-7.15}{2.9674}\right)$

$= P(Z > 1.685)$

(b)

$= 0.046$

25

4

a) $P(X > M+2) = 0.25$

$P\left(Z > \dfrac{(M+2)-M}{\sigma}\right) = 0.25$

$P\left(Z > \dfrac{2}{\sigma}\right) = 0.25$

0.25

$\dfrac{2}{\sigma} = 0.674$

$\sigma = \dfrac{2}{0.674} = 2.9674$ #

$\dfrac{0.2514}{13}$
$\overline{0.2501}$

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

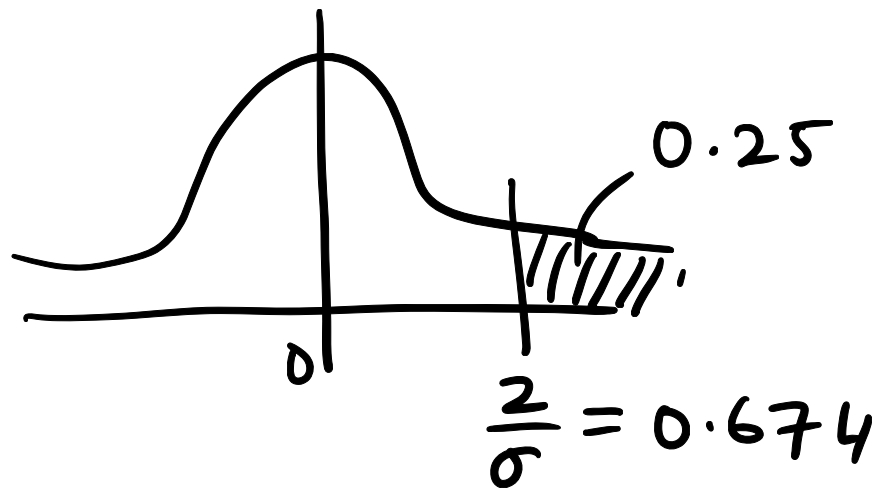| z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
															TOLAK				
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641	4	8	12	16	20	24	28	32	36
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247	4	8	12	16	20	24	28	32	36
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.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	1	1	1	1	2	2	2	2
				$.0^2990$	$.0^2964$	$.0^2939$	$.0^2914$				3	5	8	10	13	15	18	20	23
								$.0^2889$	$.0^2866$	$.0^2842$	2	5	7	9	12	14	16	18	21
2.4	$.0^2820$	$.0^2798$	$.0^2776$	$.0^2755$	$.0^2734$						2	4	6	8	11	13	15	17	19
						$.0^2714$	$.0^2695$	$.0^2676$	$.0^2657$	$.0^2639$	2	4	6	7	9	11	13	15	17
2.5	$.0^2621$	$.0^2604$	$.0^2587$	$.0^2570$	$.0^2554$	$.0^2539$	$.0^2523$	$.0^2508$	$.0^2494$	$.0^2480$	2	3	5	6	8	9	11	12	14
2.6	$.0^2466$	$.0^2453$	$.0^2440$	$.0^2427$	$.0^2415$	$.0^2402$	$.0^2391$	$.0^2379$	$.0^2368$	$.0^2357$	1	2	3	5	6	7	8	9	10
2.7	$.0^2347$	$.0^2336$	$.0^2326$	$.0^2317$	$.0^2307$	$.0^2298$	$.0^2289$	$.0^2280$	$.0^2272$	$.0^2264$	1	2	3	4	5	6	7	8	9
2.8	$.0^2256$	$.0^2248$	$.0^2240$	$.0^2233$	$.0^2226$	$.0^2219$	$.0^2212$	$.0^2205$	$.0^2199$	$.0^2193$	1	1	2	3	4	4	5	6	6
2.9	$.0^2187$	$.0^2181$	$.0^2175$	$.0^2169$	$.0^2164$	$.0^2159$	$.0^2154$	$.0^2149$	$.0^2144$	$.0^2139$	0	1	1	2	2	3	3	4	4
3.0	$.0^2135$	$.0^2131$	$.0^2126$	$.0^2122$	$.0^2118$	$.0^2114$	$.0^2111$	$.0^2107$	$.0^2104$	$.0^2100$	0	1	1	2	2	2	3	3	4

For negative z use relation:

Bagi z negatif guna hubungan:

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

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

$$Q(z) = \int_{k}^{\infty} f(z)\,dz$$
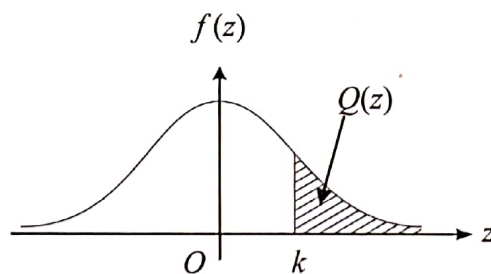
Example / *Contoh* :

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

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

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

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

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of **25** questions.

    *Kertas peperiksaan ini mengandungi **25** soalan.*

2. Answer **all** questions.

    *Jawab **semua** soalan.*

3. Write your answers in the spaces provided in the question paper.

    Tulis jawapan anda dalam ruang yang disediakan dalam kertas peperiksaan.

4. Show your working. It may help you to get marks.

    Tunjukkan langkah-langkah dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.

5. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.

    Sekiranya anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baharu.

6. The diagrams in the questions provided are not drawn to scale unless stated.

    Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

7. The marks allocated for each question are shown in brackets.

    Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan.

8. The Upper Tail Probability Q(z) For The Normal Distribution N(0, 1) Table is provided on page **31**.

    *Jadual Kebarangkalian Hujung Atas Q(z) Bagi Taburan Normal N(0, 1) disediakan di halaman **31**.*

9. A list of formulae is provided on pages **2** to **4**.

    *Satu senarai rumus disediakan pada halaman **2** hingga **4**.*

10. You may use a scientific calculator.

    Anda dibenarkan menggunakan kalkulator saintifik.

11. Hand in this question paper to the invigilator at the end of the examination.

    Serahkan kertas peperiksaan ini kepada pengawas peperiksaan di akhir peperiksaan.