MODUL
PERKEMBANGAN PEMBELAJARAN
SPM 2019

MPP 3

MATEMATIK TAMBAHAN
KERTAS 1

NAMA : .....

KELAS : .....

DIBIAYAI OLEH KERAJAAN NEGERI TERENGGANU

HALAMAN KOSONG

MODUL PERKEMBANGAN PEMBELAJARAN MPP3 (PERCUBAAN SPM) 2019

TINGKATAN 5

NAMA : .....

TINGKATAN : .....

ADDITIONAL MATHEMATICS

Kertas 1

Dua jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis nombor nama penuh dan tingkatan anda pada petak yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
4. *Pelajar dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

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

Kertas soalan ini mengandungi 28 halaman bercetak.

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. $S_n = \dfrac{a(r^n - 1)}{r-1} = \dfrac{a(1-r^n)}{1-r}, \quad r \neq 1$
13. $S_\infty = \dfrac{a}{1-r}, \quad |r| < 1$

CALCULUS / KALKULUS

1. $y = uv$

   $\dfrac{dy}{dx} = u\dfrac{dv}{dx} + v\dfrac{du}{dx}$

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

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

4. Area under a curve
   Luas di bawah lengkung

   $= \int_a^b y \, dx$ or / *atau*

   $= \int_a^b x \, dy$

5. Volume generated
   Isipadu janaan

   $= \int_a^b \pi y^2 \, dx$ or / *atau*

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

STATISTICS / STATISTIK

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

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

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

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

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

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

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

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

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

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* $= np$

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

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

GEOMETRI (GEOMETRY)

1. Distance / *Jarak*

   $= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

2. Midpoint / *Titik tengah*

   $(x, y) = \left(\frac{x_1 + x_2}{2} , \frac{y_1 + y_2}{2}\right)$

3. A point dividing a segment of a line
   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. Area of triangle / *Luas segi tiga*

   $\frac{1}{2}\left|(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3)\right|$

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

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

TRIGONOMETRY / TRIGONOMETRI

1. Arc length, $s = r\theta$

   Panjang lengkok, $s = j\theta$

2. Area of sector $= \frac{1}{2} r^2\theta$

   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. $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$

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

9. $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$

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

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

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

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*

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

For examiner's use only

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

1 Diagram 1 show an isosceles hexagon rotation disc.
Rajah 1 *menunjukkan sebuah cakera putar berbentuk heksagon sekata.*

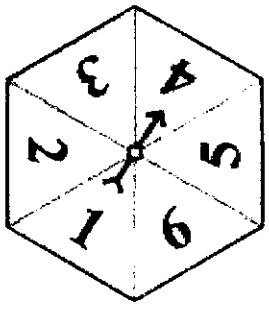


Diagram 1/ *Rajah* 1

Ikram spinned the disc for the first round. S is the set of all possible outcomes and A is the set of outcome of numbers less than 5.
Ikram memutar cakera itu sekali sahaja. S *adalah set semua kesudahan yang mungkin dan* A *adalah set kesudahan mendapat nombor kurang daripada* 5.

(*a*) State the sample space, S.
Nyatakan ruang sampel, S.

(*b*) Determine $n(A)$.
Tentukan $n(A)$.

[2 *marks*]
[2 *markah*]

Answer / *Jawapan* :

(*a*)

(*b*)

1
2

[*Lihat halaman sebelah*

2 Diagram 2 shows the probability of discrete random variable, X.
Rajah 2 menunjukkan kebarangkalian suatu pembolehubah rawak diskrit, X.

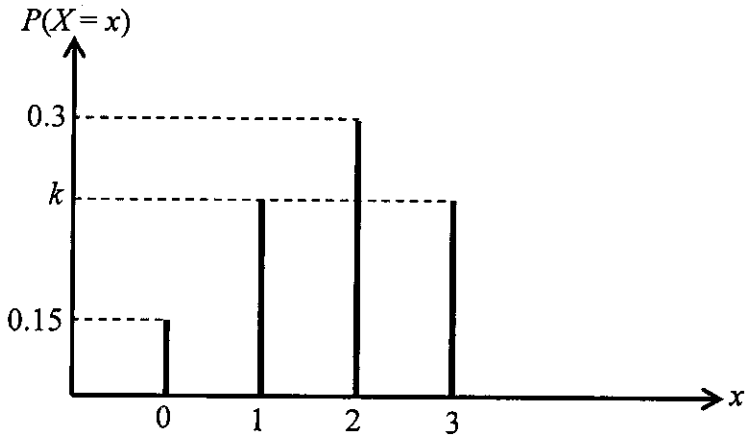


Diagram 2 / *Rajah* 2

Find
Cari
(*a*) $P(X \geq 1)$,
(*b*) the value of k.
nilai k.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

(*a*)

(*b*)

2
3

For examiner's use only

3 Given $(-2,5)$ is the maximum point of the graph of a quadratic functions $f(x)=3m-(2n+x)^2$, where m and n are constants. Determine the values of m and n.

Diberi $(-2,5)$ *ialah titk maksimum bagi graf fungsi kuadratik* $f(x)=3m-(2n+x)^2$, *dengan keadaan* m *dan* n *adalah pemalar. Cari nilai* m *dan nilai* n.

[2 *marks*]
[2 *markah*]

Answer / *Jawapan* :

3

2

---

4 Given the quadratic equation $x^2+2a(x-a)=5a-2$.

Diberi persamaan kuadratik $x^2+2a(x-a)=5a-2$

(*a*) Express x in terms of a.
Ungkapkan x *dalam sebutan* a.

(*b*) Find the range of values of a when x is real roots.
Cari julat nilai a *apabila* x *adalah punca nyata.*

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

Answer / *Jawapan* :

(*a*)

(*b*)

4

4

5 Given the functions $f : x \to \frac{2x-3}{4}$ and $g : x \to 2x+7$, find

Diberi fungsi $f : x \to \frac{2x-3}{4}$ *dan* $g : x \to 2x+7$, *cari*

(a) f^{-1}

(b) $f^{-1}g$

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

(*a*)

(*b*)

5

3

For examiner's use only

6 The rental fee of badminton court is RM8 for the first hour. Payment for the next hour is RM5. P is the amount of payment of badminton court, in RM and the hours used is h.

Kadar sewa bagi sebuah gelanggang badminton bagi satu jam pertama ialah RM8. *Bayaran bagi jam seterusnya ialah* RM5. *P ialah jumlah bayaran sewa gelanggang, dalam* RM *dan bilangan jam yang digunakan ialah h.*

(*a*) Write amount of payment P, in function notation.
Tuliskan jumlah bayaran P, dalam tatatanda fungsi.

(*b*) Chong Wei and friends wish to rent the court for 3 hours. They have collected RM20. Is the money enough for them to do rent the court?
Give your reason.

Chong Wei dan rakan-rakannya berhasrat untuk menyewa gelanggang badminton bagi tempoh 3 jam. Mereka telah mengutip wang sebanyak RM20. *Adakah wang itu mencukupi untuk menyewa gelanggang tersebut?*
Berikan alasan anda.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

(*a*)

(*b*)

6

3

7 Given the sum of roots and the product of roots of the quadratic equation $5x^2 - qx + p = 0$ are $\frac{6}{5}$ and $\frac{1}{5}$ respectively. Find the values of p and of q.

Diberi hasil tambah punca dan hasil darab punca bagi persamaan kuadratik $5x^2 - qx + p = 0$ *masing-masing ialah* $\frac{6}{5}$ *dan* $\frac{1}{5}$. *Cari nilai* p *and nilai* q.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

7

3

For examiner's use only

8 Solve the equation
Selesaikan persamaan

$$\frac{2^x}{16^{x-1}} = \frac{1}{4^x}$$

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

8

3

9 Given that $\log_a 2 = p$ and $\log_a 7 = q$, express $\log_{\sqrt{a}}\left(\frac{343a}{16}\right)$ in terms of p and q.

Diberi $\log_a 2 = p$ dan $\log_a 7 = q$, ungkapkan $\log_{\sqrt{a}}\left(\frac{343a}{16}\right)$ dalam sebutan p dan q.

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

Answer / *Jawapan* :

9

4

10 The variables x and y are related by the equation $y^2 = mx^n$. Diagram 3 shows the straight line obtained by plotting $\log_{10} y$ against $\log_{10} x$.

Pemboleh ubah x dan y dihubungkan oleh persamaan $y^2 = mx^n$. *Rajah* 3 *menunjukkan garis lurus yang diperoleh dengan memplot* $\log_{10} y$ *melawan* $\log_{10} x$.

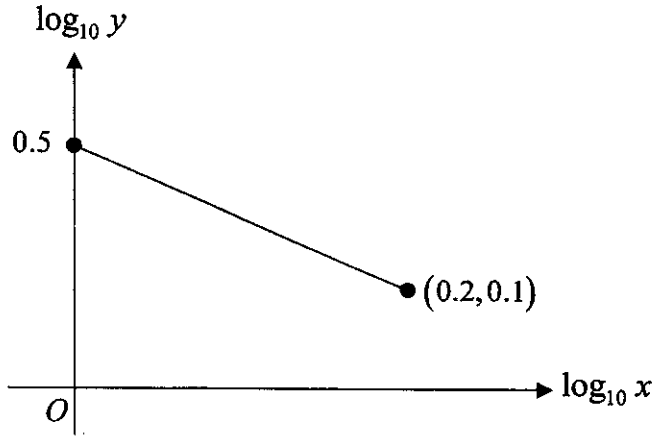


Diagram 3 / *Rajah* 3

(*a*) Find the values of m and of n,
Cari nilai m dan n,

(*b*) Express $\log_{10} y$ in terms of $\log_{10} x$.
Ungkapkan $\log_{10} y$ *dalam sebutan* $\log_{10} x$.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

(*a*)

(*b*)

10

3

For examiner's use only

11 Diagram 4 shows the straight line ST with equation $\frac{x}{6}+\frac{y}{7}=1$ intersects the straight line MN at S.

Rajah 4 menunjukkan garis lurus ST dengan persamaan $\frac{x}{6}+\frac{y}{7}=1$ *bersilang dengan garis lurus MN pada titik S.*

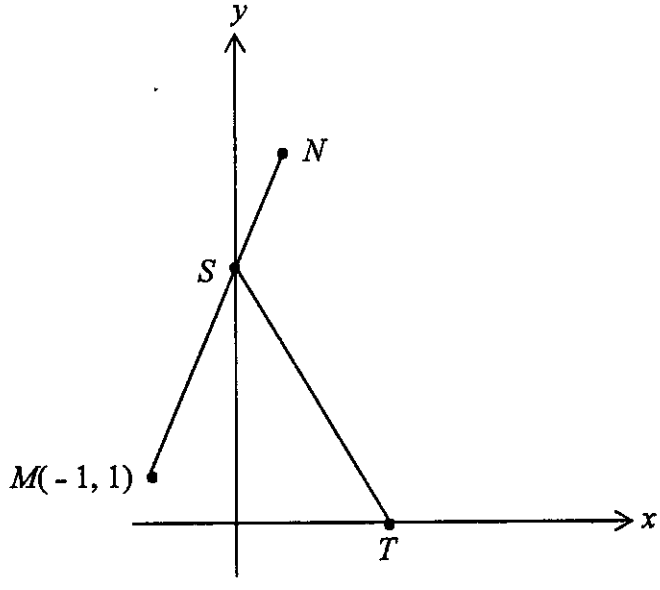


Diagram 4/ *Rajah* 4

(*a*) State the coordinates of S,
Nyatakan koordinat S,

(*b*) Find the coordinates of N, given that $MS = 2SN$.
Cari koordinat N, diberi MS = 2SN.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

(*a*)

(*b*)

11

3

12 Given $A(7, -1)$, $B(3, 5)$, $C(h, -2)$ and $D(6, k)$ are the four vertices of a parallelogram, $ABCD$.
Diberi $A(7, -1)$, $B(3, 5)$, $C(h, -2)$ *dan* $D(6, k)$ *adalah empat bucu bagi sebuah segi empat selari* $ABCD$.

Find,
Cari,

(*a*) the value of h and of k,
cari nilai h *dan nilai* k,

(*b*) the area of parallelogram $ABCD$.
cari luas segi empat selari $ABCD$ *itu.*

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

Answer / *Jawapan* :

(*a*)

(*b*)

12

4

For examiner's use only

13 Measures of central tendency is a statistical measurement which is commonly used in daily life. State the measures of central tendency suitable for the following situations:

Sukatan kecenderungan memusat ialah sukatan statistik yang biasa digunakan dalam kehidupan seharian. Nyatakan sukatan kecenderungan memusat yang sesuai sifatnya untuk situasi berikut:

(*a*) The heights of the students in 5 Biruni.
Ketinggian pelajar kelas 5 Biruni.

(*b*) The income of the parents who have a huge gap in a school in urban areas.
Pendapatan ibubapa yang mempunyai jurang yang besar di sebuah sekolah di kawasan bandar.

(c) Mirza wants to sell favoured food for her school's Young Entrepreneurship Project.
Mirza ingin menjual makanan kegemaran untuk Projek Usahawan Muda sekolahnya.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

(*a*)

(*b*)

(*c*)

13

3

14 Diagram 5 shows two sectors *OPQ* and *ORS* of circles with centre *O*.
Rajah 5 menunjukkan dua sektor bulatan OPQ dan ORS berpusat O.

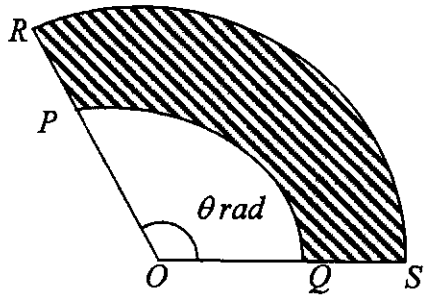


Diagram 5 / *Rajah 5*

Given $OS = 8$ cm and the arc length of PQ is twice the length of radius OQ.
Diberi $OS = 8$ cm dan *panjang lengkok PQ adalah dua kali panjang jejari OQ.*

Find,
Cari,

(*a*) the value of θ, in radians,
nilai θ, *dalam radian,*

(*b*) perimeter of the shaded region.
perimeter rantau berlorek.

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

Answer / *Jawapan* :

(*a*)

(*b*)

14

4

For examiner's use only

15 The curve $y = x^3 + x^2 - 5x + 10$ passes through the point $A(2, h)$. Find the equation of the normal to the curve at point A.

Lengkung $y = x^3 + x^2 - 5x + 10$ *melalui titik* $A(2, h)$. *Cari persamaan normal kepada lengkung itu pada titik* A.

[3 *marks*]
[3 *markah*

Answer / *Jawapan* :

15

3

16 Izuddin has a rectangular piece of zinc with a perimeter of 32 cm. He wants to use that piece of zinc to build an open cylinder at both ends.
Find the length and the width, in cm, of the piece of zinc that makes the volume of the cylinder is maximum.

Izzuddin mempunyai sekeping zink berbentuk segi empat tepat dengan perimeter 32 cm. *Dia ingin menggunakan kepingan zink itu untuk membina sebuah silinder yang terbuka pada kedua-dua hujung.*
Cari panjang dan lebar, dalam cm, *kepingan zink itu supaya isi padu silinder yang dibentuk ialah maksimum.*

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

Answer / *Jawapan* :

16

4

For examiner's use only

17 Determine whether the sequence of $\log_2 x, \log_2 x^3, \log_2 x^5, \ldots$ is an arithmetic progression or a geometric progression. Give your reason.

Tentukan sama ada jujukan $\log_2 x, \log_2 x^3, \log_2 x^5, \ldots$ *adalah janjang aritmetik atau janjang geometri. Beri alasan anda.*

[2 *marks*]
[2 *markah*]

Answer / *Jawapan* :

17

2

18 Julia and Norma walk in opposite direction at a T-junction. Julia walks a distance of 1.5 m during the 1st seconds, 1.47 m during the 2nd seconds, 1.44 m during the 3rd seconds and so on.
Norma walks in a distance of P m during the first seconds and the distance covered is always 2 cm shorter than the distance covered in the previous seconds. Both of them stop at the n^{th} seconds.

Julia dan Norma berjalan dalam arah yang bertentangan dari suatu simpang T. Julia berjalan dengan jarak 1.5 m *pada saat pertama,* 1.47 m *pada saat ke-2 dan* 1.44 m *pada saat ke-3 dan seterusnya.*
Norma berjalan dengan jarak P m *pada saat pertama dan jarak yang diambilnya sentiasa berkurang* 2 cm *daripada jarak saat sebelumnya. Kedua-duanya berhenti pada masa n saat.*

Find
Cari

(a) the value of n and of P,
nilai n dan nilai P,

(b) the difference in the total distance covered by Julia and Norma before they stop.
beza jumlah perjalanan Julia dan Norma sebelum mereka berhenti.

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

Answer / *Jawapan* :

(a)

(b)

18

4

For examiner's use only

19 Given $4m, \frac{9}{m}, 3k$ are three consecutive terms of a geometric progression.

Express k in terms of m.

Diberi $4m, \frac{9}{m}, 3k$ *adalah tiga sebutan berturutan suatu janjang geometri.*

Ungkapkan k *dalam sebutan* m.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

18

3

20 Diagram 7 shows two containers on a table beside a wall. Both containers touched each other at point $\left(\frac{3}{2}, \frac{15}{4}\right)$. Given that the gradient function of container A is $4-2x$ and the gradient function of container B is $hx-8$, such that h is a constant.

Rajah 7 menunjukkan dua buah bekas di atas meja di tepi dinding. Kedua-dua bekas tersebut menyentuh pada titik $\left(\frac{3}{2}, \frac{15}{4}\right)$. *Diberi fungsi kecerunan bagi bekas A ialah* $4-2x$ *dan kecerunan bekas B ialah* $hx-8$, *dengan keadaan h adalah pemalar.*

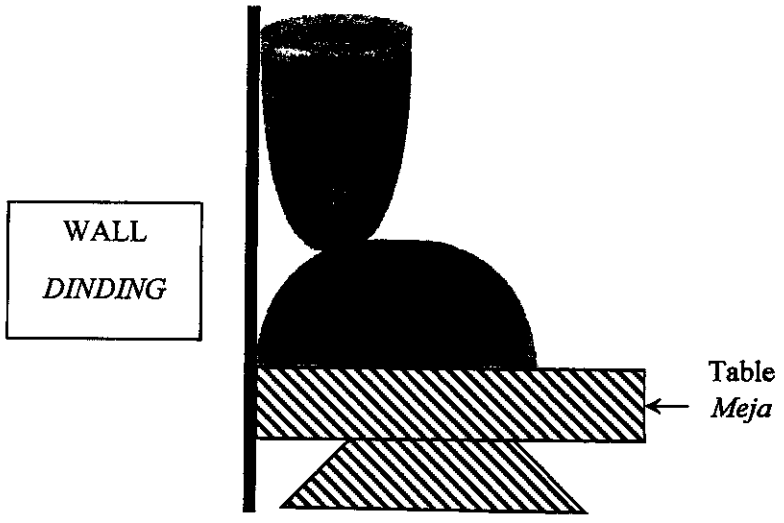


Diagram 7 / *Rajah 7*

Find
Cari

(*a*) the value of h,
nilai bagi h,

(*b*) the equation of the curve of the container B.
persamaan lengkung bekas B.

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

Answer / *Jawapan* :

(*a*)

(*b*)

20

4

For examiner's use only

21 (*a*) Diagram 8 shows vectors $\overrightarrow{PQ}$ and $\overrightarrow{AB}$. Given that $(2n-1)\overrightarrow{PQ} = (m+n-2)\overrightarrow{AB}$, where m and n are constant.

Rajah 8 menunjukkan vektor $\overrightarrow{PQ}$ *dan* $\overrightarrow{AB}$. *Diberi* $(2n-1)\overrightarrow{PQ} = (m+n-2)\overrightarrow{AB}$, *dengan m dan n adalah pemalar.*

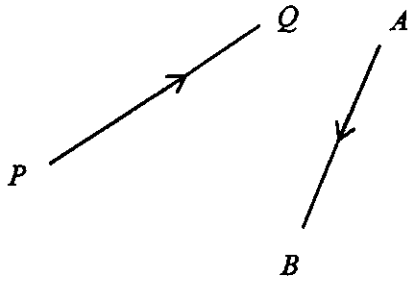


Diagram 8 / *Rajah* 8

Find the value of m and of n. [2 *marks*]
Carikan nilai m dan nilai n. [2 *markah*]

(*b*) Given $\overrightarrow{UV} = \begin{pmatrix} m-4 \\ -5 \end{pmatrix}$ is parallel to the y-axis. Find the value of m. [2 *marks*]

Diberi $\overrightarrow{UV} = \begin{pmatrix} m-4 \\ -5 \end{pmatrix}$ *selari dengan paksi-y. Cari nilai m.* [2 *markah*]

Answer / *Jawapan* :

(*a*)

(*b*)

21

4

22 It is given that $\text{cosec}\, y = \sqrt{k^2+1}$, where k is a constant and $\frac{\pi}{2} \le y \le \frac{3\pi}{2}$.

Diberi bahawa kosek $y = \sqrt{k^2+1}$ *dengan keadaan k ialah pemalar dan* $\frac{\pi}{2} \le y \le \frac{3\pi}{2}$.

Express in terms of k
Ungkapkan dalam sebutan k

(*a*) $\tan y$,
(*b*) $\cos 2y$.
kos $2y$.

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

Answer / *Jawapan* :

(*a*)

(*b*)

22
4

23 (a) Given ${}^{k}C_{h} = {}^{k}C_{g}$, express k in terms of h and g.
Diberi ${}^{k}C_{h} = {}^{k}C_{g}$, *ungkapkan k dalam sebutan h dan g.*

(b) Given ${}^{8}C_{3} = {}^{8}C_{n}$, $n \neq 3$, state the value of n.
Diberi ${}^{8}C_{3} = {}^{8}C_{n}$, $n \neq 3$, *nyatakan nilai bagi n.*

[2 *marks*]
[2 *markah*]

Answer / *Jawapan* :

(*a*)

(*b*)

23
2

For examiner's use only

24 Diagram 9 shows five trains carriage at Zoo Negara. Lisa, her two brothers and their parents wanted to ride the train. Everyone wants to ride in a different carriage.

Rajah 9 menunjukkan lima gerabak keretapi di Zoo Negara. Lisa, dua orang adiknya dan ibu bapa mereka ingin menaiki keretapi tersebut. Setiap orang ingin menaiki gerabak yang berlainan.

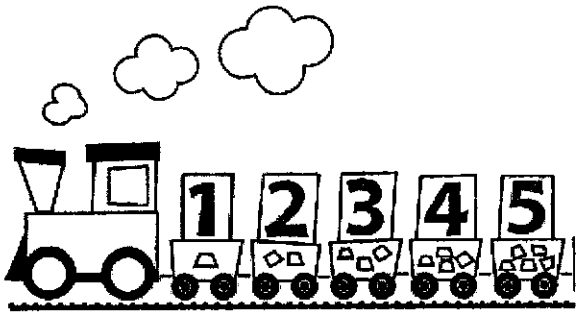


Diagram 9 / *Rajah* 9

Find the number of ways if
Cari bilangan cara, jika

(*a*) Lisa's father rides in carriage 1, while Lisa's mother rides in carriage 5,
bapa Lisa menaiki gerabak 1, *manakala ibu Lisa menaiki gerabak* 5,

(*b*) Lisa's mother and father were sitting on the first two carriages.
ibu dan bapa Lisa menaiki dua gerabak yang pertama.

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

(*a*)

(*b*)

24

3

25 Diagram 10 shows the normal distribution of the marks of Additional Mathematics test for a group of students.

Rajah 10 *menunjukkan taburan normal markah daripada suatu ujian Matematik Tambahan bagi sekumpulan murid.*

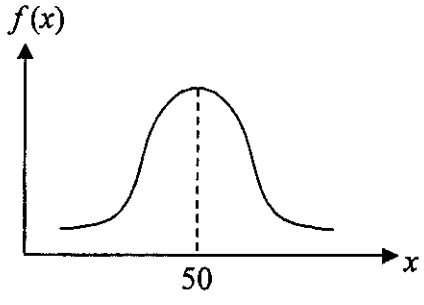


Diagram 10 / *Rajah* 10

The standard deviation of the marks is 1.04. If 6.88% of the student obtained marks less than b, find the value of b.
Sisihan piawai bagi markah tersebut ialah 1.04. *Jika* 6.88% *daripada murid memperoleh markah kurang daripada b, cari nilai bagi b.*

[3 *marks*]
[3 *markah*]

Answer / *Jawapan* :

25

3

Kertas Soalan Tamat

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

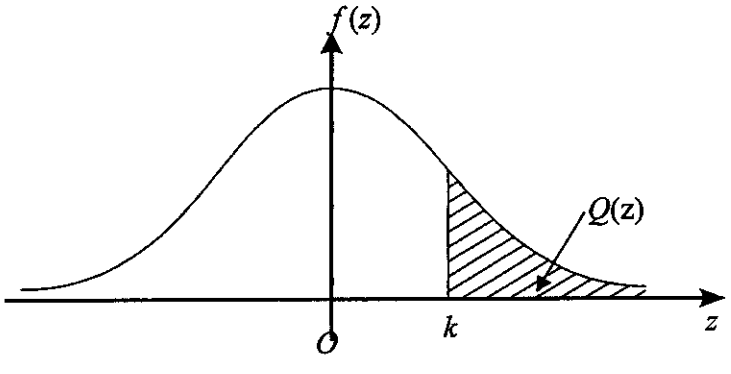
z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
											Minus / *Tolak*								
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859	4	8	12	15	19	23	27	31	35
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483	4	7	11	15	19	22	26	30	34
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121	4	7	11	15	18	22	25	29	32
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776	3	7	10	14	17	20	24	27	31
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451	3	7	10	13	16	19	23	26	29
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148	3	6	9	12	15	18	21	24	27
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867	3	5	8	11	14	16	19	22	25
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611	3	5	8	10	13	15	18	20	23
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379	2	5	7	9	12	14	16	19	21
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170	2	4	6	8	10	12	14	16	18
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985	2	4	6	7	9	11	13	15	17
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823	2	3	5	6	8	10	11	13	14
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681	1	3	4	6	7	8	10	11	13
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559	1	2	4	5	6	7	8	10	11
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0..0475	0.0465	0.0455	1	2	3	4	5	6	7	8	9
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367	1	2	3	4	4	5	6	7	8
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294	1	1	2	3	4	4	5	6	6
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233	1	1	2	2	3	4	4	5	5
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183	0	1	1	2	2	3	3	4	4
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143	0	1	1	2	2	2	3	3	4
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110	0	1	1	1	2	2	2	3	3
2.3	0.0107	0.0104	0.0102								0	1	1	1	1	2	2	2	2
				0.00990	0.00964	0.00939	0.00914				3	5	8	10	13	15	18	20	23
								0.00889	0.00866	0.00842	2	5	7	9	12	14	16	16	21
2.4	0.00820	0.00798	0.00776	0.00755	0.00734						2	4	6	8	11	13	15	17	19
						0.00714	0.00695	0.00676	0.00657	0.00639	2	4	6	7	9	11	13	15	17
2.5	0.00621	0.00604	0.00587	0.00570	0.00554	0.00539	0.00523	0.00508	0.00494	0.00480	2	3	5	6	8	9	11	12	14
2.6	0.00466	0.00453	0.00440	0.00427	0.00415	0.00402	0.00391	0.00379	0.00368	0.00357	1	2	3	5	6	7	9	9	10
2.7	0.00347	0.00336	0.00326	0.00317	0.00307	0.00298	0.00289	0.00280	0.00272	0.00264	1	2	3	4	5	6	7	8	9
2.8	0.00256	0.00248	0.00240	0.00233	0.00226	0.00219	0.00212	0.00205	0.00199	0.00193	1	1	2	3	4	4	5	6	6
2.9	0.00187	0.00181	0.00175	0.00169	0.00164	0.00159	0.00154	0.00149	0.00144	0.00139	0	1	1	2	2	3	3	4	4
3.0	0.00135	0.00131	0.00126	0.00122	0.00118	0.00114	0.00111	0.00107	0.00104	0.00100	0	1	1	2	2	2	3	3	4

For negative z use relation:
Bagi z negative 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 space 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 penting 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.
   Sekiranya anda hendak menukar jawapan, batalkan jawapan yang telah dibuat.
   Kemudian tulis jawapan yang baru.

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. A list of formulae is provided on pages 2 to 4.
   Satu senarai rumus disediakan di halaman 2 hingga 4.

9. You may use a scientific calculator.
   Anda dibenarkan menggunakan kalkulator saintifik.

10. Hand in this question paper to the invigilator at the end of the examination.
    Serahkan kertas peperiksaan ini kepada pengawas peperiksaan di akhir peperiksaan.