NAMA : _____

TINGKATAN : _____

MAJLIS PENGETUA SEKOLAH MALAYSIA
CAWANGAN PULAU PINANG

MODUL LATIHAN BERFOKUS SPM 2014 3472/1

ADDITIONAL MATHEMATICS

Kertas 1
September
2 jam

Dua jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan* **nama** *dan* **tingkatan** *anda pada ruangan yang disediakan.*
2. *Kertas soalan 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 soalan ini.*

Untuk Kegunaan Pemeriksa

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

Kertas soalan ini mengandungi **23** halaman bercetak dan **1** halaman tidak bercetak.

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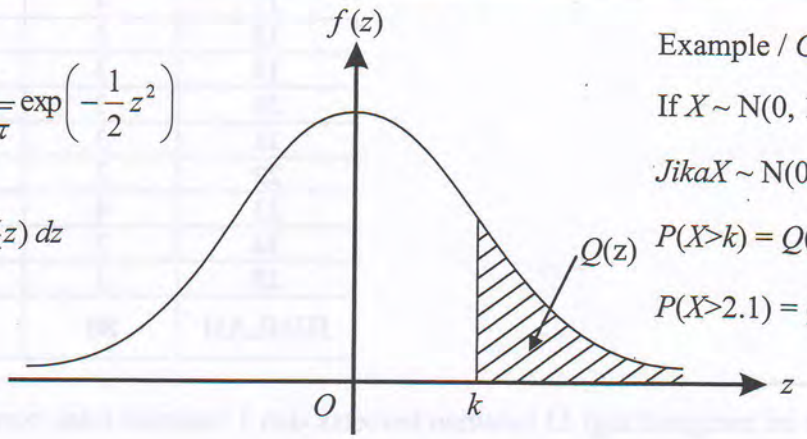
THE UPPER TAIL PROBABILITY Q(z) FOR THE NORMAL DISTRIBUTION N(0, 1)
KEBARANGKALIAN HUJUNG ATAS Q(z) BAGI TABURAN NORMAL N(0, 1)

z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
											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

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

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



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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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

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

$= \int_a^b x\,dy$

5 Volume of revolution
Isi padu kisaran

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

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

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

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

GEOMETRY
GEOMETRI

1 Distance / *Jarak*

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

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*

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

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

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

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TRIGONOMETRY
TRIGONOMETRI

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 $\sin^2 A + \cos^2 A = 1$
$\sin^2 A + kos^2 A = 1$

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

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

6 $\sin 2A = 2\sin A\cos A$
$\sin 2A = 2\sin A\, kos\, A$

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

$kos\ 2A = kos^2 A - \sin^2 A$
$= 2kos^2 A - 1$
$= 1 - 2\sin^2 A$

8 $\sin(A \pm B) = \sin A\cos B \pm \cos A\sin B$
$\sin(A \pm B) = \sin A\, kos\, B \pm kos\, A\, \sin B$

9 $\cos(A \pm B) = \cos A\cos B \mp \sin A\sin B$
$kos(A \pm B) = kosA\, kosB \mp \sin A\, \sin B$

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 $a^2 = b^2 + c^2 - 2bc\cos A$
$a^2 = b^2 + c^2 - 2bc\, kosA$

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

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For Examiner's Use

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

1 Diagram 1 shows the relation between set P and set Q.
Rajah 1 *menunjukkan hubungan antara set P dan set Q.*

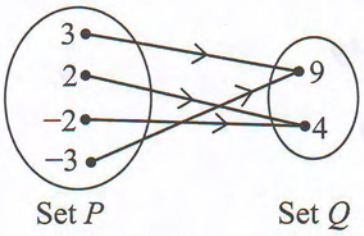

Diagram 1
Rajah 1

(a) State the relation in the form of ordered pairs.
Nyatakan hubungan itu dalam bentuk pasangan tertib.

(b) Using the function notation, write a relation between set P and set Q.
Dengan menggunakan tata tanda fungsi, tulis satu hubungan antara set P dan set Q.

[2 marks]
[2 *markah*]

Answer / *Jawapan*:

(a)

(b)

1 2

2 Given that $f : x \to 2x + 7$, find
Diberi $f : x \to 2x + 7$, *cari*

(a) $f(5)$,

(b) the value of h such that $2f^{-1}(h) = f(h)$
nilai h dengan keadaan $2f^{-1}(h) = f(h)$

[3 marks]
[3 *markah*]

Answer / *Jawapan*:

(a)

(b)

2 3

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For Examiner's Use

3 Given $f(x) = x + 3$ and $gf(x) = x^2 + 6x + 11$, find
Diberi $f(x) = x + 3$ *dan* $gf(x) = x^2 + 6x + 11$, *cari*

(a) the value of m if $gf(m) = 2$,
nilai m jika $gf(m) = 2$,

(b) $g(x)$.

[4 marks]
[4 *markah*]

Answer / *Jawapan*:

(a)

(b)

3

4

4 It is given that 3 is one of the roots of the quadratic equation $x^2 + px + 18 = 0$.
Diberi bahawa 3 *ialah satu daripada punca persamaan kuadratik* $x^2 + px + 18 = 0$.

(a) Find the value of p.
Cari nilai p.

(b) Hence, find the other root.
Seterusnya, cari punca yang satu lagi.

[4 marks]
[4 *markah*]

Answer / *Jawapan*:

(a)

(b)

4

4

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For Examiner's Use

5 Given that the straight line $y = mx + 7$ intersects the curve $y = x^2 + 16$ at two different points, find the range of values of m.

[3 marks]

Diberi garis lurus $y = mx + 7$ *menyilang lengkung* $y = x^2 + 16$ *pada dua titik yang berbeza, cari julat nilai-nilai m.*

[3 *markah*]

Answer / *Jawapan*:

5

3

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For Examiner's Use

6 Diagram 6 shows the graph of a quadratic function $y = f(x)$.
Rajah 6 menunjukkan graf fungsi kuadratik $y = f(x)$.

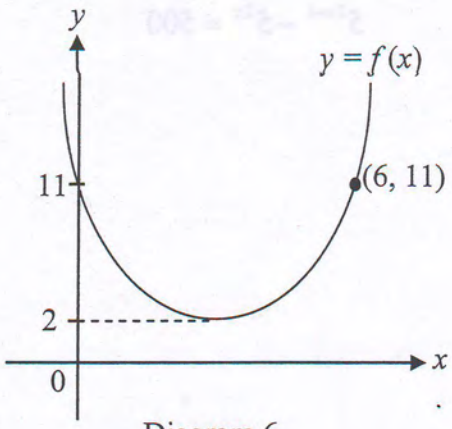

Diagram 6
Rajah 6

Point (6, 11) lies on the curve and the curve intersects the y-axis at point (0, 11).
Titik (6, 11) *terletak pada lengkung dan lengkung tersebut menyilang paksi-y pada titik* (0, 11).

(a) State the equation of the axis of symmetry.
Nyatakan persamaan paksi simetri.

(b) State the minimum point of $f(x)$.
Nyatakan titik minimum bagi $f(x)$.

(c) Express $f(x)$ in the form of $(x + p)^2 + q$, where p and q are constants.
Ungkapkan $f(x)$ *dalam bentuk* $(x + p)^2 + q$, *dengan keadaan* p *dan* q *ialah pemalar.*

[3 marks]
[3 *markah*]

Answer / *Jawapan*:

(a)

(b)

(c)

6

3

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For Examiner's Use

7 Solve the equation :

Selesaikan persamaan :

$$5^{2x+1} - 5^{2x} = 500$$

[3 marks]
[3 *markah*]

Answer / *Jawapan*:

7

3

8 Given $\log_2 R = 3 + \log_4 P$, express R in terms of P.

Diberi $\log_2 R = 3 + \log_4 P$, *ungkapkan R dalam sebutan P*.

[4 marks]
[4 *markah*]

Answer / *Jawapan*:

8

4

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For Examiner's Use

9 The first three terms of an arithmetic progression are −137, −131, −125. The nth term of this progression is positive. Find the least value of n.

Tiga sebutan pertama bagi suatu janjang aritmetik ialah −137, −131, −125. *Sebutan ke-n janjang ini adalah positif. Cari nilai n yang terkecil.*

[3 marks]
[3 *markah*]

Answer / *Jawapan*:

9

3

10 The sum of the first n terms of an arithmetic progression 3, 7, 11, ... is 820.
Hasil tambah n sebutan pertama bagi suatu janjang aritmetik 3, 7, 11, ... *ialah* 820.

Find
Cari

(a) the common difference of the progression,
beza sepunya janjang itu,

(b) the value of n.
nilai n,

[4 marks]
[4 *markah*]

Answer / *Jawapan*:

(a)

(b)

10

4

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For Examiner's Use

11 Given the geometric progression $-7, \frac{14}{3}, -\frac{28}{9}$, find the sum to infinity of the progression.

Diberi janjang geometri $-7, \frac{14}{3}, -\frac{28}{9}$, *cari hasil tambah hingga ketakterhinggaan bagi janjang itu.*

[3 marks]
[3 *markah*]

Answer / *Jawapan*:

11

3

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For Examiner's Use

12 The variables x and y are related by the equation $y = \frac{2}{x^2 + 8}$.

Diagram 12 shows the graph of $\frac{1}{y}$ against x^2.

Pemboleh ubah x dan y dihubungkan oleh persamaan $y = \frac{2}{x^2 + 8}$.

Rajah 12 *menunjukkan graf* $\frac{1}{y}$ *melawan* x^2.

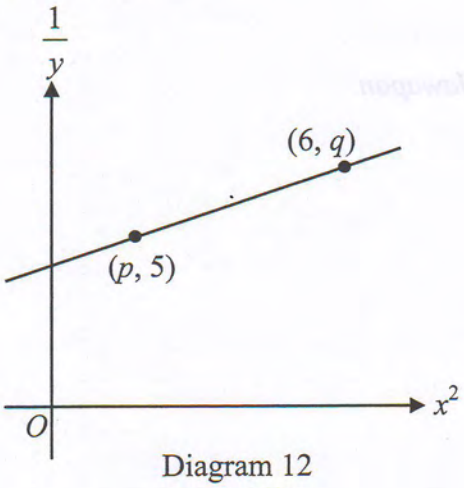

Diagram 12
Rajah 12

(a) Express the equation $y = \frac{2}{x^2 + 8}$ in linear form used to obtain the straight line graph shown in Diagram 12.

Ungkapkan persamaan $y = \frac{2}{x^2 + 8}$ *dalam bentuk linear yang digunakan untuk memperoleh graf garis lurus seperti ditunjukkan dalam Rajah* 12.

(b) Find the value of p and of q.
Cari nilai p dan nilai q.

[4 marks]
[4 *markah*]

Answer / *Jawapan*:

(a)

(b)

12

4

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For Examiner's Use

13 A point $P(8, t)$ divides internally the line joining $M(4, 1)$ and $N(r, 7)$ such that $3MP=2PN$.

Suatu titik $P(8, t)$ membahagi dalam garis yang menyambungkan $M(4, 1)$ dan $N(r, 7)$ dengan keadaan $3MP = 2PN$.

Find the value of r and of t.

Cari nilai r dan nilai t.

[3 marks]
[3 *markah*]

Answer / *Jawapan*:

13

3

14 Solve the equation $\cos 2x - 5\sin x = 3$ for $0° \le x \le 360°$.

Selesaikan persamaan $\cos 2x - 5\sin x = 3$ *untuk* $0° \le x \le 360°$.

[4 marks]
[4 *markah*]

Answer / *Jawapan*:

14

4

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For Examiner's Use

15 In Diagram 15, *PRQ* is a semicircle with centre *O* and radius *r* cm.
Dalam Rajah 15, *PRQ ialah sebuah semibulatan berpusat O dan berjejari r* cm.

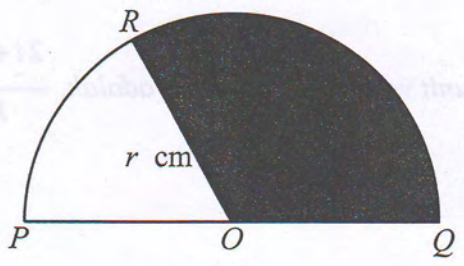

Diagram 15
Rajah 15

The length of the arc *PR* is 7.2 cm and $\angle ROQ$ is 2.692 radians.
Panjang lengkok PR ialah 7.2 cm *dan* $\angle ROQ$ *ialah* 2.692 *radian.*

[Use / *Guna* $\pi = 3.142$]

Calculate
Hitung

(a) the value of *r*,
nilai r,

(b) the area, in cm^2, of the shaded region.
luas, dalam cm^2, *kawasan berlorek.*

[4 marks]
[4 *markah*]

Answer / *Jawapan*:

(a)

(b)

15

4

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For Examiner's Use

16 Given that $\underset{\sim}{v} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and the unit vector in the direction of $\underset{\sim}{v}$ is $\frac{2\underset{\sim}{i}+3\underset{\sim}{j}}{k}$, find the value of k.

Diberi $\underset{\sim}{v} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ *dan unit vektor pada arah* $\underset{\sim}{v}$ *adalah,* $\frac{2\underset{\sim}{i}+3\underset{\sim}{j}}{k}$, *cari nilai k.*

[2 marks]
[2 *markah*]

Answer / *Jawapan*:

16

2

17 Diagram 17 shows triangle AOB. The point P lies on AB such that $n\,AP = 3PB$.
Rajah 17 *menunjukkan segi tiga AOB. Titik P terletak pada AB dengan keadaan* $n\,AP = 3PB$.

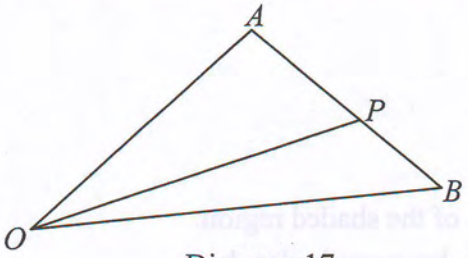

Diagram 17
Rajah 17

Given that $\overrightarrow{OA} = 5\underset{\sim}{a}$ and $\overrightarrow{OB} = 4\underset{\sim}{b}$ find

Diberi $\overrightarrow{OA} = 5\underset{\sim}{a}$ *dan* $\overrightarrow{OB} = 4\underset{\sim}{b}$, *cari*

(a) $\overrightarrow{AB}$

(b) the value of n if $\overrightarrow{OP} = 2\underset{\sim}{a} + \frac{12}{5}\underset{\sim}{b}$.

nilai n jika $\overrightarrow{OP} = 2\underset{\sim}{a} + \frac{12}{5}\underset{\sim}{b}$.

[4 marks]
[4 *markah*]

Answer / *Jawapan*:

17

(a)

4

(b)

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For Examiner's Use

18 If $\frac{d}{dx}\left(\frac{1}{2x+5}\right)^3 = \frac{k}{(2x+5)^4}$, find the value of k.

Jika $\frac{d}{dx}\left(\frac{1}{2x+5}\right)^3 = \frac{k}{(2x+5)^4}$, *cari nilai k.*

[2 marks]
[2 *markah*]

Answer / *Jawapan*:

18

2

19 Two variables, p and q, are related by the equation $p = 6q + \frac{4}{q}$. If p increases at a constant rate of 3 unit s $^{-1}$, find the rate of change of q, in unit s $^{-1}$, when $q = 2$.

Dua pemboleh ubah, p dan q, dihubungkan oleh persamaan $p = 6q + \frac{4}{q}$. *Jika p meningkat dengan kadar tetap* 3 unit s $^{-1}$, *cari kadar perubahan q, dalam* unit s $^{-1}$, *ketika* $q = 2$.

[3 marks]
[3 *markah*]

Answer / *Jawapan*:

19

3

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For Examiner's Use

20 Given that $\int_{-1}^{k}(4x-1)\,dx=12$, where $k>-1$, find the value of k.

Diberi $\int_{-1}^{k}(4x-1)\,dx=12$, *dengan keadaan* $k>-1$, *cari nilai k.*

[3 marks]
[3 *markah*]

Answer / *Jawapan*:

20

3

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21 Diagram 21 shows the curve $y = f(x)$ cutting the x-axis at $x = 0$, $x = a$ and $x = b$.
Rajah 21 *menunjukkan lengkung* $y = f(x)$ *memotong paksi-x di* $x = 0$, $x = a$ *dan* $x = b$.

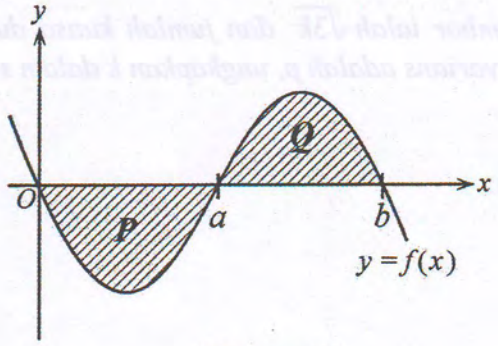

Diagram 21
Rajah 21

Given that the area of the shaded region P is 6 unit^2 and the area of the shaded region Q is 4 unit^2, find
Diberi luas rantau berlorek P ialah 6 unit^2 *dan luas rantau berlorek Q ialah* 4 unit^2, *cari*

(a) the value of $\int_b^a f(x)dx$,
nilai $\int_b^a f(x)dx$,

[1 mark]
[1 *markah*]

(b) the value of $\int_0^a -2f(x)dx + \int_a^b f(x)dx$.
nilai $\int_0^a -2f(x)dx + \int_a^b f(x)dx$.

[2 marks]
[2 *markah*]

Answer / *Jawapan*:

(a)

(b)

21

3

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For Examiner's Use

22 The mean of five numbers is $\sqrt{3k}$ and the sum of the squares of the numbers is 120. Given that the variance is p, express k in terms of p.

Min bagi lima nombor ialah $\sqrt{3k}$ *dan jumlah kuasa dua nombor-nombor tersebut ialah* 120. *Diberi varians adalah p, ungkapkan k dalam sebutan p.*

[2 marks]
[2 *markah*]

Answer / *Jawapan*:

22

2

23 Diagram 23 shows four letter cards and three numbered cards. A code is to be formed by using four letters A, B, C and D followed by three digit numbers 1, 2 and 3.

Rajah 23 *menunjukkan empat keping kad berhuruf dan tiga keping kad bernombor. Satu kod hendak dibentuk dengan menggunakan empat huruf* A, B, C *dan* D *diikuti dengan tiga nombor* 1, 2 *dan* 3.

A	B	C	D	1	2	3

Diagram 23
Rajah 23

Find
Cari

(a) the number of different codes that can be formed,
bilangan kod yang berbeza dapat dibentuk,

(b) the number of different codes if the letters A and C are next to each other.
bilangan kod yang berbeza jika huruf A *dan* C *bersebelahan antara satu sama lain.*

[4 marks]
[4 *markah*]

Answer / *Jawapan*:

(a)

23

4

(b)

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For Examiner's Use

24 The probability that Ahmad qualifies for the final of a 100 m event is $\frac{1}{3}$ while the probability that Siva qualifies is $\frac{1}{4}$. Find the probability that

Kebarangkalian bahawa Ahmad layak ke pertandingan akhir acara 100 m *ialah* $\frac{1}{3}$ *manakala kebarangkalian Siva layak ialah* $\frac{1}{4}$. *Cari kebarangkalian bahawa*

(a) both of them do not qualify for the final,
kedua-dua mereka tidak layak ke pertandingan akhir,

(b) only one of them qualifies for the final.
hanya seorang daripada mereka layak ke pertandingan akhir.

[3 marks]
[3 *markah*]

Answer / *Jawapan*:

(a)

(b)

24

3

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For Examiner's Use

25 Diagram 25 shows a standard normal distribution graph.
Rajah 25 menunjukkan graf taburan normal piawai.

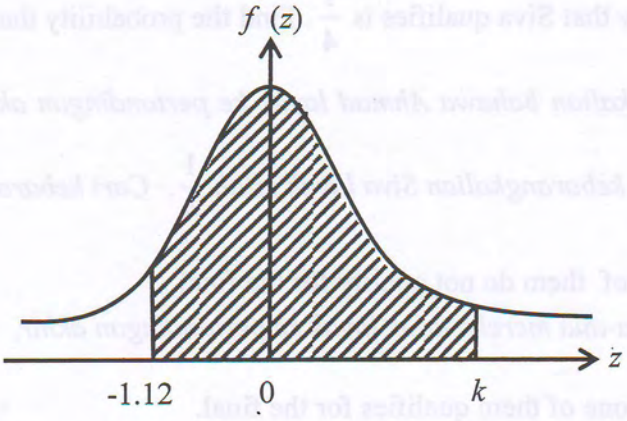

Diagram 25
Rajah 25

The probability represented by the area of the shaded region is 0.7285.
Kebarangkalian yang diwakili oleh luas kawasan berlorek ialah 0.7285.

Find
Cari

(a) $P(z \geq k)$,

(b) the value of k.
nilai k.

[3 marks]
[3 *markah*]

Answer / *Jawapan*:

(a)

(b)

25

3

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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HALAMAN KOSONG

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INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of **25** questions.
   Kertas soalan ini mengandungi **25** *soalan.*

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

3. Write your answers in the spaces provided in this question paper.
   Jawapan hendaklah ditulis pada ruang yang disediakan dalam kertas soalan ini.

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 work that you have done.
   Then write down the new answer.
   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. The Upper Tail Probability $Q(z)$ For The Normal Distribution N(0, 1) Table is provided on page **2**.
   Jadual Kebarangkalian Hujung Atas $Q(z)$ *Bagi Taburan Normal* N(0, 1) *disediakan di halaman* **2.**

9. A list of formulae is provided on pages 3 to 5.
   Satu senarai rumus disediakan di halaman 3 *hingga* 5.

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 soalan ini kepada pengawas peperiksaan di akhir peperiksaan.

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3472/2
ADDITIONAL MATHEMATICS
Kertas 2
September
$2\frac{1}{2}$ jam

MAJLIS PENGETUA SEKOLAH MALAYSIA
CAWANGAN PULAU PINANG

MODUL LATIHAN BERFOKUS SPM 2014

ADDITIONAL MATHEMATICS
KERTAS 2
Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan 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 soalan ini.*
4. *Calon dikehendaki menceraikan halaman* 19 *dan ikat sebagai muka hadapan bersama-sama dengan kertas jawapan.*

Kertas soalan ini mengandungi 19 halaman bercetak dan 1 halaman tidak bercetak.

[Lihat halaman sebelah

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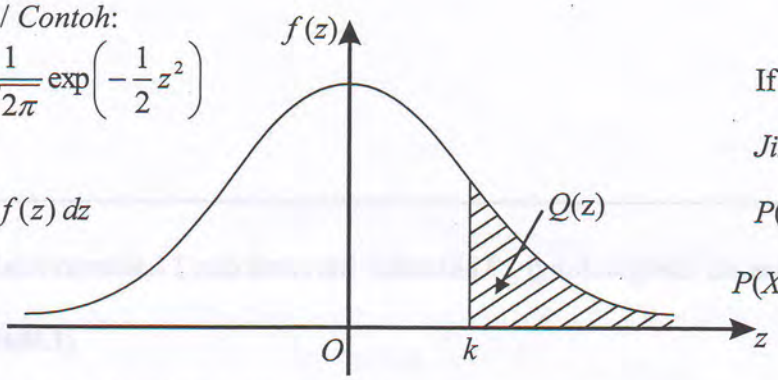
THE UPPER TAIL PROBABILITY Q(z) FOR THE NORMAL DISTRIBUTION N(0, 1)
KEBARANGKALIAN HUJUNG ATAS Q(z) BAGI TABURAN NORMAL N(0, 1)

z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
											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

Example / *Contoh*:

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

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



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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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

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

$= \int_a^b x \, dy$

5 Volume of revolution
Isi padu kisaran

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

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

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

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

GEOMETRY
GEOMETRI

1 Distance /*Jarak*

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

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*

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

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

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

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TRIGONOMETRY
TRIGONOMETRI

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 $\sin^2 A + \cos^2 A = 1$

$sin^2 A + kos^2 A = 1$

4 $\sec^2 A = 1 + \tan^2 A$

$sek^2 A = 1 + tan^2 A$

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

$kosek^2 A = 1 + kot^2 A$

6 $\sin 2A = 2 \sin A \cos A$

$sin\ 2A = 2\ sin\ A\ kos\ A$

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

$= 2\cos^2 A - 1$

$= 1 - 2\sin^2 A$

$kos\ 2A = kos^2 A - sin^2 A$

$= 2\ kos^2 A - 1$

$= 1 - 2\ sin^2 A$

8 $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$

$sin(A \pm B) = sin\ A\ kos\ B \pm kos\ A\ sin\ B$

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

$kos(A \pm B) = kos\ A\ kos\ B \mp sin\ A\ sin\ B$

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 $a^2 = b^2 + c^2 - 2bc \cos A.$

$a^2 = b^2 + c^2 - 2bc\ kos\ A.$

14 Area of triangle / *Luas segi tiga*

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

[Lihat halaman sebelah

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Section A
Bahagian A

[40 marks]
[40 *markah*]

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

1 Solve the simultaneous equations $x - \frac{1}{2}y = 3$ and $x^2 - y = 15$.
Give the answers correct to two decimal places. [5 marks]

Selesaikan persamaan serentak $x - \frac{1}{2}y = 3$ *dan* $x^2 - y = 15$.
Beri jawapan betul kepada dua tempat perpuluhan. [5 *markah*]

2 Two farms, *A* and *B*, starts to sell chickens at the same time.

Dua ladang, A dan B, mula menjual ayam pada masa yang sama.

(a) Farm *A* sells *k* chickens in the first month and its sales increase constantly by *x* chickens every subsequent month. It sells 520 chickens in the 9th month and the total sales for the first 12 months are 4740 chickens.
Find the value of *k* and of *x*. [5 marks]

Ladang A menjual k ekor ayam pada bulan pertama dan jualannya bertambah secara malar sebanyak x ekor ayam setiap bulan berikutnya. Jualannya pada bulan ke-9 ialah 520 ekor ayam dan jumlah jualannya bagi 12 bulan pertama ialah 4740 ekor ayam.
Cari nilai k dan nilai x. [5 *markah*]

(b) Farm *B* sells 48 chickens in the first month and its sales increase constantly by 74 chickens every subsequent month.
If both farms sell the same number of chickens in the *n*th month, find the value of *n*.
[2 marks]

Ladang B menjual 48 ekor ayam pada bulan pertama dan jualannya bertambah secara malar sebanyak 74 ekor ayam setiap bulan berikutnya.
Jika kedua-dua ladang itu menjual bilangan ayam yang sama pada bulan ke-n, cari nilai n.
[2 *markah*]

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3. Solution by scale drawing is **not** accepted.
Penyelesaian secara lukisan berskala **tidak** *diterima.*

Diagram 3 shows the straight line BC which intersects the x-axis at point B and intersects the y-axis at point C. The straight line AD is perpendicular to the straight line BC.
Rajah 3 menunjukkan garis lurus BC yang bersilang dengan paksi-x pada titik B dan bersilang dengan paksi-y pada titik C. Garis lurus AD berserenjang dengan garis lurus BC.

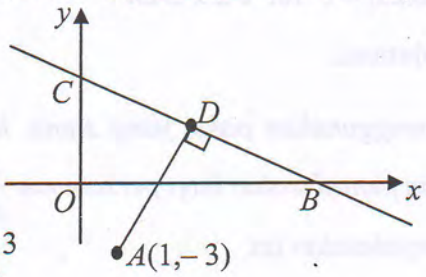

Diagram 3
Rajah 3

The equation of BC is $x + 2y = 10$.
Persamaan BC ialah $x + 2y = 10$.

Find
Cari

(a) the equation of the straight line AD, [3 marks]
persamaan garis lurus AD, [3 *markah*]

(b) the coordinates of D, [2 marks]
koordinat D [2 *markah*]

(c) the area, in unit^2, of triangle ABD. [3 marks]
luas, dalam unit^2*, bagi segi tiga ABD.* [3 *markah*]

4. A curve has a gradient function $\frac{k - x^3}{x^5}$, where k is a constant. The tangent to the curve at the point $(-1, 2)$ is perpendicular to the straight line passing through points $(2, 4)$ and $(-7, 1)$.

Suatu lengkung mempunyai fungsi kecerunan $\frac{k - x^3}{x^5}$, *dengan keadaan k ialah pemalar. Tangen kepada lengkung itu pada titik* $(-1, 2)$ *adalah berserenjang dengan garis lurus yang melalui titik* $(2, 4)$ *dan* $(-7, 1)$.

Find
Cari

(a) the value of k, [3 marks]
nilai k, [3 *markah*]

(b) the equation of the curve. [3 marks]
persamaan lengkung itu. [3 *markah*]

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5. (a) Sketch the graph of $y = |3\sin 2x|$ for $0 \le x \le 2\pi$. [4 marks]

Lakar graf bagi $y = |3\sin 2x|$ *untuk* $0 \le x \le 2\pi$. [4 *markah*]

(b) Hence, using the same axes, sketch a suitable straight line to find the number of solutions to the equation $\frac{x}{\pi} + |\sin 2x| = 1$ for $0 \le x \le 2\pi$.

State the number of solutions.

[3 marks]

Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $\frac{x}{\pi} + |\sin 2x| = 1$ *untuk* $0 \le x \le 2\pi$.

Nyatakan bilangan penyelesaian itu.

[3 *markah*]

6 Table 6 shows the marks obtained by 40 students in a test.

Jadual 6 menunjukkan markah yang diperoleh 40 orang murid dalam satu ujian.

Marks *Markah*	10 – 14	15 – 19	20 – 24	25 – 29	30 – 34
Number of students *Bilangan murid*	6	8	9	12	5

Table 6
Jadual 6

(a) Use graph paper to answer this part of the question.
Gunakan kertas graf untuk menjawab ceraian soalan ini.

Using a scale of 2 cm to 5 marks on the horizontal axis and 2 cm to 2 students on the vertical axis, draw a histogram to represent the frequency distribution of the marks in Table 6.
Hence, find the mode mark. [4 marks]

Dengan menggunakan skala 2 cm *kepada* 5 *markah pada paksi mengufuk dan* 2 cm *kepada* 2 *murid pada paksi mencancang, lukis sebuah histogram bagi mewakili taburan kekerapan markah dalam Jadual* 6.
Seterusnya, cari markah mod. [4 *markah*]

(b) Without drawing an ogive, calculate the median mark of the distribution. [3 marks]

Tanpa melukis ogif, hitungkan markah median bagi taburan ini. [3 *markah*]

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Section B
Bahagian B

[40 marks]
[40 *markah*]

Answer any **four** questions from this section.
Jawab mana-mana **empat** *soalan daripada bahagian ini.*

7 Use the graph paper to answer this question
Gunakan kertas graf untuk menjawab soalan ini.

Table 7 shows the values of two variables, x and y, obtained from an experiment. Variables x and y are related by the equation $y = kh^{(x-1)}$, where k and h are constants.

Jadual 7 menunjukkan nilai-nilai bagi dua pemboleh ubah, x dan y, yang diperoleh daripada satu eksperimen. Pemboleh ubah x dan y dihubungkan oleh persamaan $y = kh^{(x-1)}$, *dengan keadaan k dan h ialah pemalar.*

x	2	3	4	5	6	7
y	2.75	4.25	6.61	10.72	15.85	25.11

Table 7
Jadual 7

(a) Based on Table 7, construct a table for the values of $(x - 1)$ and $\log_{10} y$. [2 marks]

Berdasarkan Jadual 7, bina satu jadual bagi nilai-nilai $(x - 1)$ *dan* $\log_{10} y$. [2 *markah*]

(b) Plot $\log_{10} y$ against $(x - 1)$, using a scale of 2 cm to 1 unit on the $(x - 1)$-axis and 2 cm to 0.2 unit on the $\log_{10} y$ -axis.

Hence, draw the line of best fit. [3 marks]

Plot $\log_{10} y$ *melawan* $(x - 1)$, *dengan menggunakan skala* 2 cm *kepada* 1 *unit pada paksi-*$(x - 1)$ *dan* 2 cm *kepada* 0.2 *unit pada paksi-*$\log_{10} y$.

Seterusnya, lukis garis lurus penyuaian terbaik. [3 *markah*]

(c) Use the graph in 7(*b*) to find the value of

Guna graf di 7(*b*) *untuk mencari nilai*

(i) k,

(ii) h.

[5 marks]
[5 *markah*]

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8 Diagram 8 shows a triangle POQ. The point R lies on OP and the point S lies on PQ. The straight line QR intersects the straight line OS at point T.

Rajah 8 menunjukkan segi tiga POQ. Titik R terletak pada OP dan titik S terletak pada PQ. Garis lurus QR bersilang dengan garis lurus OS pada titik T.

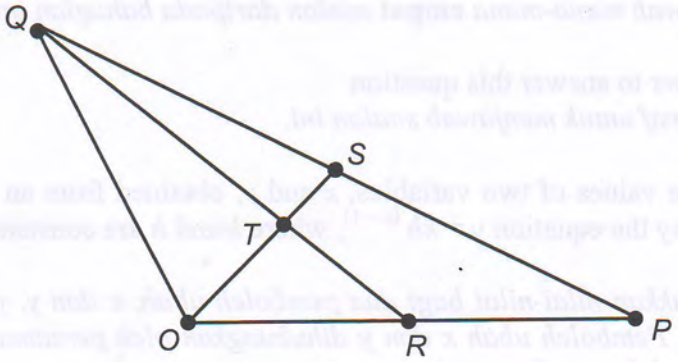

Diagram 8
Rajah 8

It is given that $OP : OR = 2 : 1$, $PQ : PS = 2 : 1$, $OS : OT = 3 : 2$, $\overrightarrow{OP} = 8\underline{u}$ and $\overrightarrow{OQ} = 6\underline{v}$.
Diberi bahawa $OP : OR = 2 : 1$, $PQ : PS = 2 : 1$, $OS : OT = 3 : 2$, $\overrightarrow{OP} = 8\underline{u}$ *dan* $\overrightarrow{OQ} = 6\underline{v}$.

(a) Express in terms of $\underline{u}$ and $\underline{v}$:
Ungkapkan dalam sebutan $\underline{u}$ *dan* $\underline{v}$:

(i) $\overrightarrow{QR}$, [3 marks]

(ii) $\overrightarrow{OS}$. [3 *markah*]

(b) Find the ratio $QT : QR$ [3 marks]
Cari nisbah $QT : QR$ [3 *markah*]

(c) It is given that $\underline{u} = 3\underline{i}$ and $\underline{v} = -2\underline{i} + 6\underline{j}$.
Diberi bahawa $\underline{u} = 3\underline{i}$ *dan* $\underline{v} = -2\underline{i} + 6\underline{j}$.

(i) Express $\overrightarrow{OS}$ in terms of $\underline{i}$ and $\underline{j}$.
Ungkapkan $\overrightarrow{OS}$ *dalam sebutan* $\underline{i}$ *dan* $\underline{j}$.

(ii) Find the unit vector in the direction of $\overrightarrow{OS}$.
Cari vector unit dalam arah $\overrightarrow{OS}$.

[4 marks]
[4 *markah*]

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9 Diagram 9 shows the straight line $y = -x + 9$ intersecting the curve $y = (x - 3)^2$ at point A and point B.

Rajah 9 menunjukkan garis lurus $y = -x + 9$ yang menyilang lengkung $y = (x - 3)^2$ pada titik A dan titik B.

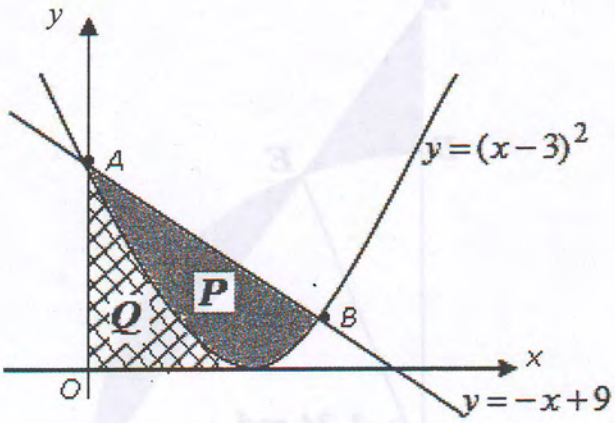

Diagram 9
Rajah 9

Calculate
Hitung

(a) the coordinates of point A and point B, [3 marks]

koordinat titik A dan titik B, [3 *markah*]

(b) the area of the shaded region P, [4 marks]

luas rantau yang berlorek P, [4 *markah*]

(c) the volume of revolution, in terms of π, when the shaded region Q is rotated through 360° about the x-axis. [3 marks]

Isi padu kisaran, dalam sebutan π, apabila rantau berlorek Q diputarkan 360° pada paksi-x. [3 *markah*]

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10 Diagram 10 shows a right-angle triangle *ABC* and a quadrant *DCB* of a circle, centre *B* and radius 5 cm.

Rajah 10 *menunjukkan sebuah segi tiga bersudut tegak ABC dan sukuan sebuah bulatan DCB berpusat B dan berjejari* 5 cm.

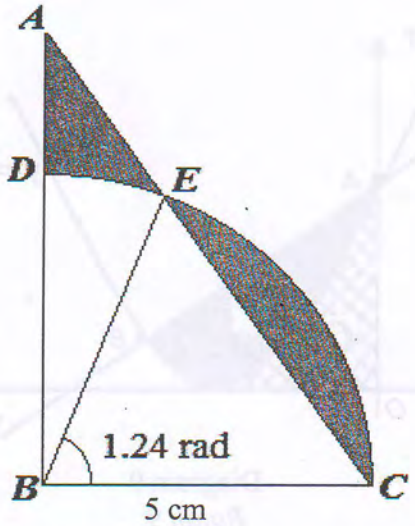

Diagram 10
Rajah 10

The length of *BA* is 7 cm and $\angle EBC = 1.24$ radians.

Panjang BA ialah 7 cm *dan* $\angle EBC = 1.24$ radian.

[Use / *Guna* $\pi = 3.142$]

Calculate
Hitung

(a) the perimeter, in cm, of the shaded region, [4 marks]

perimeter, dalam cm, *kawasan berlorek,* [4 *markah*]

(b) the area, in cm^2, of sector *CBE,* [2 marks]

luas, dalam cm^2, *sektor CBE,* [2 *markah*]

(c) the area, in cm^2, of the shaded region. [4 marks]

luas, dalam cm^2, *kawasan berlorek.* [4 *markah*]

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11 (a) A random variable, X, has a binomial distribution with 8 trials where the probability of success in each trial is p. The mean number of successes is 2.
Calculate

Pemboleh ubah rawak, X, mengikut suatu taburan binomial dengan 8 cubaan dengan keadaan kebarangkalian kejayaan dalam setiap cubaan ialah p. Min bilangan kejayaan ialah 2.
Hitung

(i) the value of p,
nilai p,

(ii) $P(X > 2)$.

[5 marks]
[5 *markah*]

(b) The masses of durians from a farm have a normal distribution with a mean of 1.6 kg and a standard deviation of 0.8 kg.
Calculate

Jisim bagi buah durian dari sebuah ladang adalah mengikut taburan normal dengan min 1.6 kg *dan sisihan piawai* 0.8 kg.
Hitung

(i) the probability that a durian chosen at random from this farm has a mass of more than 2.5 kg.

kebarangkalian bahawa sebiji durian yang dipilih secara rawak dari ladang ini mempunyai jisim lebih daripada 2.5 kg.

(ii) the value of m if 88 % of the durians have masses less than m kg.

nilai m jika 88 % *daripada durian itu mempunyai jisim kurang daripada m* kg.

[5 marks]
[5 *markah*]

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Section C
Bahagian C

[20 marks]
[20 *markah*]

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

12 A particle moves along a straight line passes through a fixed point O with a velocity of 12 m s^{-1}. Its acceleration, a m s^{-2}, is given by $a = 2t - 8$, where t is the time, in seconds, after passing through O.

Suatu zarah bergerak di sepanjang suatu garis lurus dan melalui satu titik tetap O dengan halaju 12 m s^{-1}. *Pecutannya,* a m s^{-2}, *diberi oleh* $a = 2t - 8$, *dengan keadaan t ialah masa, dalam saat, selepas melalui O.*

[Assume motion to the right is positive]

[*Anggapkan gerakan ke arah kanan sebagai positif*]

Find

Cari

(a) the minimum velocity, in m s^{-1}, of the particle, [4 marks]

halaju minimum, dalam m s^{-1}, *zarah tersebut,* [4 *markah*]

(b) the time, in seconds, when the particle is instantaneously at rest, [2 marks]

masa, dalam saat, apabila zarah berhenti seketika, [2 *markah*]

(c) the total distance, in m, travelled by the particle in the first 4 seconds. [4 marks]

jumlah jarak, dalam m, *yang dilalui oleh zarah itu dalam* 4 *saat pertama.* [4 *markah*]

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13 Table 13 shows the prices, price indices and percentage expenditure of five household items, cooking oil, rice, salt, sugar and flour.

Jadual 13 *menunjukkan harga, indeks harga dan peratus perbelanjaan bagi lima bahan runcit, minyak masak, beras, garam, gula dan tepung.*

Item *Bahan*	**Price (RM)** *Harga* (RM)		**Price index in the year 2012 based on the year 2010** *Indeks harga pada tahun* 2012 *berasaskan tahun* 2010	**Percentage expenditure (%)** *Peratus perbelanjaan* (%)
	Year 2010 *Tahun* 2010	**Year 2012** *Tahun* 2012		
Cooking oil *Minyak masak*	2.00	2.50	x	27
Rice *Beras*	1.60	2.00	125	34
Salt *Garam*	0.40	y	137.5	10
Sugar *Gula*	0.80	1.20	150	10
Flour *Tepung*	z	2.40	120	19

Table 13
Jadual 13

(a) Find the values of x, y and z. [4 marks]

Cari nilai x, y dan z. [4 *markah*]

(b) Calculate the composite index for the household items for the year 2012 based on the year 2010.

[2 marks]

Hitung indeks gubahan bagi bahan-bahan tersebut pada tahun 2012 *berasaskan tahun* 2010. [2 *markah*]

(c) The total expenditure of these items for the year 2010 is RM 2 600
Find the corresponding total expenditure in the year 2012. [2 marks]

Jumlah perbelanjaan bagi semua bahan tersebut dalam tahun 2010 *ialah* RM 2 600.
Cari jumlah perbelanjaan yang sepadan pada tahun 2012. [2 *markah*]

(d) If the expenditure of all the items increases by 18% from the year 2012 to the year 2014, find the composite index for the year 2014 based on the year 2010.

[2 marks]

Jika perbelanjaan bagi semua bahan meningkat 18% *dari tahun* 2012 *ke tahun* 2014, *cari indeks gubahan pada tahun* 2014 *berasaskan tahun* 2010.

[2 *markah*]

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14 Solution by scale drawing is **not** accepted.
Penyelesaian secara lukisan berskala **tidak** *diterima.*

Diagram 14 shows triangle *ABC*.

Rajah 14 *menunjukkan sebuah segi tiga ABC.*

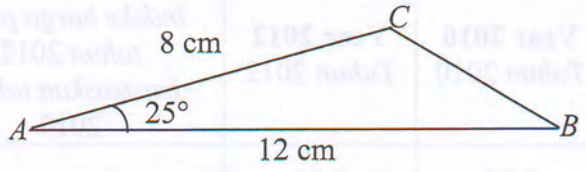

Diagram 14
Rajah 14

It is given that $AB = 12$ cm, $AC = 8$ cm, $\angle CAB = 25°$ and $\angle ACB$ is obtuse.

Diberi bahawa $AB = 12$ cm, $AC = 8$ cm, $\angle CAB = 25°$ *dan* $\angle ACB$ *ialah sudut cakah.*

(a) Calculate
Hitung

(i) the length, in cm, of *BC*,

panjang, dalam cm, *bagi BC,*

(ii) $\angle ACB$,

[5 marks]
[5 *markah*]

(b) The straight line *BC* is extended to a point *D* such that $AD = AC = 8$ cm.

Garis lurus BC dipanjangkan ke suatu titik D dengan keadaan $AD = AC = 8$ cm.

(i) Sketch the triangle *ABD*.

Lakarkan segi tiga ABD.

(ii) Find $\angle ADB$.
Cari $\angle ADB$.

(iii) Calculate the area, in cm^2, of triangle *ABD*
Hitung luas, dalam cm^2, *segi tiga ABD.*

[5 marks]
[5 *markah*]

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15 Use graph paper to answer this question.

Gunakan kertas graf untuk menjawab soalan ini.

The members of the Historical society plan to organize a trip to Muzium Negara. They agree to rent x buses and y vans. The rental of a bus is RM 600 and the rental of a van is RM 200. The rental of the vehicles is based on the following constraints :

Ahli-ahli Persatuan Sejarah bercadang untuk merancang satu lawatan ke Muzium Negara. Mereka bersetuju untuk menyewa x buah bas dan y buah van. Sewaan sebuah bas ialah RM 600 *dan sewaan sebuah van ialah* RM 200. *Sewaan kenderaan adalah berdasarkan kepada kekangan berikut :*

I The total number of vehicles to be rented is not more than 8.

Jumlah kenderaan yang akan disewa tidak melebihi 8 *buah.*

II The number of buses is at most 4 times the number of vans.

Bilangan bas selebih-lebihnya adalah 4 *kali bilangan van.*

III The maximum allocation for the rental of the vehicles is RM 3 000.

Peruntukan maksimum untuk sewaan kenderaan ialah RM 3 000.

(a) Write three inequalities, other than $x \geq 0$ and $y \geq 0$, which 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 1 vehicle on both axes, construct and shade the region R which satisfies all of the above constraints.

[3 marks]

Menggunakan skala 2 cm *kepada* 1 *kenderaan pada kedua-dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di atas.*

[3 *markah*]

(c) Using the graph constructed in 15(b), find

Menggunakan graf yang dibina di 15(b), *cari*

(i) the minimum number of vans rented if 3 buses are rented,

bilangan minimum van yang disewa jika 3 *buah bas disewa.*

(ii) the maximum number of students that can be carried if a bus can accommodate 32 passengers and a van can accommodate 7 passengers.

bilangan maksimum ahli yang boleh dibawa jika sebuah bas boleh dimuatkan dengan 32 *orang penumpang dan sebuah van boleh dimuatkan dengan* 7 *orang penumpang.*

[4 marks]
[4 *markah*]

END OF ASSESSMENT MODULE

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HALAMAN KOSONG

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NAMA : _____ **TINGKATAN :** _____

NO. KAD PENGENALAN

						-			-				

ANGKA GILIRAN

Arahan Kepada Calon

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

2 Tandakan (√) untuk soalan yang dijawab.

3 Ceraikan helaian ini dan ikat sebagai muka hadapan bersama-sama dengan helaian jawapan.

Kod Pemeriksa				
Bahagian	Soalan	Soalan Dijawab	Markah Penuh	Markah Diperoleh (*Untuk Kegunaan Pemeriksa*)
A	1		5	
	2		7	
	3		8	
	4		6	
	5		7	
	6		7	
B	7		10	
	8		10	
	9		10	
	10		10	
	11		10	
C	12		10	
	13		10	
	14		10	
	15		10	
Jumlah				

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INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of three sections: **Section A, Section B** and **Section C.**

   Kertas soalan 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 on the papers provided. If the papers are insufficient, you may ask for extra papers from the invigilator.

   Jawapan anda hendaklah ditulis di dalam kertas jawapan yang disediakan. Sekiranya kertas jawapan tidak mencukupi, sila dapatkan helaian tambahan daripada pengawas 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. 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 and sub-part of a question are shown in brackets.

   Markah yang diperuntukkan bagi setiap soalan dan ceraian soalan ditunjukkan dalam kurungan.

7. The Upper Tail Probability $Q(z)$ For The Normal Distribution N(0, 1) Table is provided on page **2**.

   Jadual Kebarangkalian Hujung Atas $Q(z)$ *Bagi Taburan Normal* N(0, 1) *disediakan di halaman* **2.**

8. A list of formulae is provided on pages 3 to 5.

   Satu senarai rumus disediakan di halaman 3 *hingga* 5.

9. Graph papers are provided.

   Kertas graf disediakan.

10. You may use a scientific calculator.

    Anda dibenarkan menggunakan kalkulator saintifik.

11. Tie the papers and the graph papers together and hand in to the invigilator at the end of the examination.

    Ikat kertas jawapan bersama-sama dengan kertas graf dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.

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