3472/1
ADDITIONAL MATHEMATICS
Kertas 1
September 2014
Dua jam

NAMA	
TING.	

PEPERIKSAAN PERCUBAAN SPM TAHUN 2014

ADDITIONAL MATHEMATICS
TINGKATAN 5
KERTAS 1
2 JAM

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 dibenarkan menjawab keseluruhan atau sebahagian soalan dalam bahasa Inggeris atau bahasa Melayu.*

4. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

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

Kertas soalan ini mengandungi 21 halaman bercetak.

[Lihat halaman sebelah

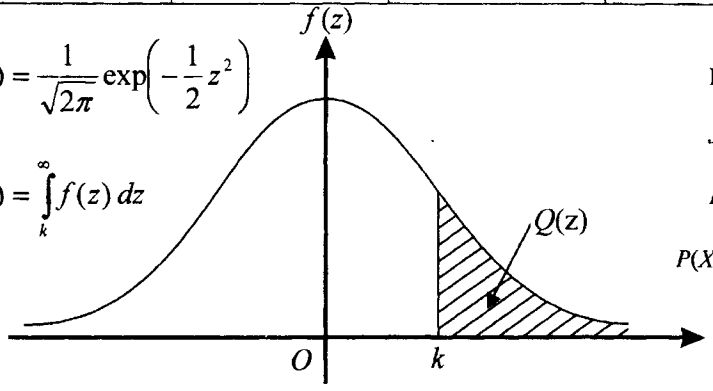
THE UPPER TAIL PROBABILITY $Q(z)$ FOR THE NORMAL DISTRIBUTION $N(0, 1)$
KEBARANGKALIAN HUJUNG ATAS $Q(z)$ BAGI TABURAN NORMAL $N(0, 1)$

z	0	1	2	3	4	5	6	7	8	9	7	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	0.047	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	5	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	0.0384	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	0.0307	0.0239	0.0233	1	1	2	2	3	4	4	5	5
								0.0244											
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*

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

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

[*Lihat halaman sebelah*

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

[*Lihat halaman sebelah*

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

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

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

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

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

[*Lihat halaman sebelah*

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 sector, $L = \frac{1}{2}j^2\theta$

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

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

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

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

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

[*Lihat halaman sebelah*

For Examiner's Use

Answer **All** questions.
Jawab **semua** *soalan.*

1. Diagram 1 shows part of graph of $f(x) = 4 - |x+1|$.
Rajah 1 *menunjukkan sebahagian daripada graph* $f(x) = 4 - |x+1|$.

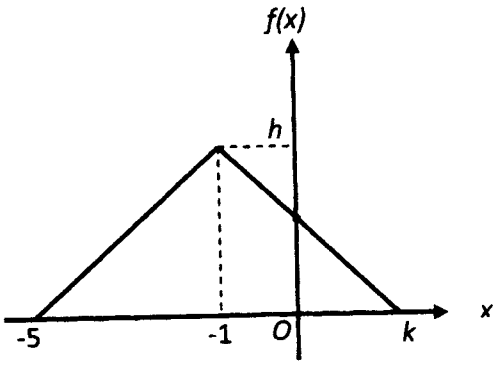


Diagram 1
Rajah 1

Find the value of
Cari nilai bagi

(a) h,

(b) k.

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

Answer / *Jawapan :*

(a)

1

(b)

3

[*Lihat halaman sebelah*

For Examiner's Use

2. Given the function $f : x \to 3x + 1$, , find
Diberi fungsi $f : x \to 3x + 1$, *cari*

(a) $f(-2)$,

(b) the function f^2.
fungsi f^2 .

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

Answer / *Jawapan:*

(*a*)

(*b*)

2

3. The roots of the quadratic equation $x^2 + 6x + 3 = 0$ are α and β.
Punca-punca persamaan kuadratik $x^2 + 6x + 3 = 0$ *ialah* α *dan* β.

Find the value of
Cari nilai

(a) $\alpha + \beta$.

(b) $\dfrac{\alpha^2 + \beta^2}{\alpha\beta}$.

Answer / *Jawapan:*

(*a*)

(*b*)

3

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

[*Lihat halaman sebelah*

For Examiner's Use

4. Find the range of values of x for $3(x^2+5) < 7x-5$.

Cari julat nilai x bagi $3(x^2+5) < 7x-5$.

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

Answer / *Jawapan :*

4
3

5. The equation of a curve is $f(x) = 2x^2 + kx + 6 - k$, *where k is a constant.*
Find the range of values of *k* for which the curve lies completely above the x-axis.
Persamaan bagi satu lengkung ialah $f(x) = 2x^2 + kx + 6 - k$, *dengan keadaaan k ialah pemalar.*
Cari julat nilai k dengan keadaan lengkung itu berada di atas paksi-x sepenuhnya.

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

Answer / *Jawapan :*

5
3

[*Lihat halaman sebelah*

For Examiner's Use

6. Given that $36^x = 144$, find the value of 6^{x-1}.

Diberi, $36^x = 144$ *, cari nilai bagi* 6^{x-1}.

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

Answer / *Jawapan:*

6
3

7. Evaluate
Cari nilai

$$\log_k 8 \times \log_{16} k,$$

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

Answer / *Jawapan*

7
3

[*Lihat halaman sebelah*

For Examiner's Use

8. In a geometric progression, the sum to infinity is four times the first term. Find the common ratio.
Dalam satu janjang geometri, hasil tambah hingga ketakterhinggaan adalah empat kali sebutan pertama. Cari nisbah sepunya.

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

Answer / *Jawapan*

8
3

9. The first three terms of an arithmetic progression are $2k-1$, $4k$ and 13.
Tiga sebutan pertama suatu janjang arithmetik ialah $2k-1$, $4k$ dan 13.

Find
Cari

(a) the value of k,
nilai k,

(b) the value of n such that $T_n = 4998$.
nilai n dengan keadaan $T_n = 4998$.

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

Answer / *Jawapan:*

9
4

[*Lihat halaman sebelah*

For Examiner's Use

10. Find

Cari

$$\int_0^2 \frac{1}{(3-x)^2}\,dx$$

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

Answer / *Jawapan:*

10
3

11. A circle, centre E, has a diameter FG where F is a point (2,1) and G is the point (8,9).

Sebuah bulaatan, berpusat E, mempunyai diameter FG di mana F ialah titik (2,1) dan G ialah titik (8,9).

Find
Cari

(a) the coordinates of E,
koordinat titik E,

(b) the radius of the circle.
jejari bulatan itu.

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

Answer / *Jawapan*
(a)

(b)

11
4

[*Lihat halaman sebelah*

For Examiner's Use

12. The point E divides the line segment which connects the points P(-1, 3) and Q(4,18) internally in the ratio 2 : 3. Find the coordinates of point E .

Titik membahagi dalam tembereng garis yang menyambungkan titik P(-1, 3) dan Q(4,18) dengan nisbah 2 : 3. Cari koordinat titik E.

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

Answer / *Jawapan*

12
3

13. Given $\overrightarrow{OA} = \underset{\sim}{i} + 9\underset{\sim}{j}$, $\overrightarrow{OB} = 5\underset{\sim}{i} - 3\underset{\sim}{j}$ and $\overrightarrow{OC} = k(\underset{\sim}{i} + 3\underset{\sim}{j})$ and C lies on the line AB. Find the value of *k*.

Diberi $\overrightarrow{OA} = \underset{\sim}{i} + 9\underset{\sim}{j}$, $\overrightarrow{OB} = 5\underset{\sim}{i} - 3\underset{\sim}{j}$ and $\overrightarrow{OC} = k(\underset{\sim}{i} + 3\underset{\sim}{j})$ *dan C terletak pada garis AB.* Cari nilai *k*. [4 *marks*]
[4 *markah*]

Answer / *Jawapan*

13
4

[*Lihat halaman sebelah*

14. In Diagram 14 , PQRS is a rectangle. T is a point on PR such that PR = 5PT .

Dalam Rajah 14, PQRS ialah sebuah segi empat tepat. T ialah satu titik pada QR dengan PR = 5PT.

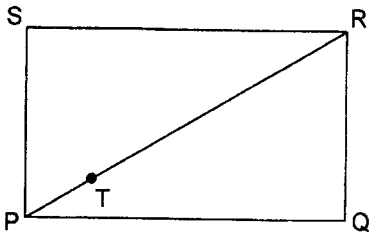


Diagram 14
Rajah 14

Given that $\overrightarrow{PQ}=12\underset{\sim}{x}$ and $\overrightarrow{PR}=12\underset{\sim}{x}+5\underset{\sim}{y}$, express the following vectors in the terms of $\underset{\sim}{x}$ and/or $\underset{\sim}{y}$.

Diberi $\overrightarrow{PQ}=12\underset{\sim}{x}$ dan $\overrightarrow{PR}=12\underset{\sim}{x}+5\underset{\sim}{y}$, ungkapkan vektor yang berikut dalam sebutan $\underset{\sim}{x}$ dan/atau $\underset{\sim}{y}$.

(a) $\overrightarrow{PS}$,
(b) $\overrightarrow{QT}$.

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

Answer / *Jawapan*
(*a*)

(b)

For Examiner's Use

14
3

[*Lihat halaman sebelah*

For Examiner's Use

15. Diagram 15 shows a straight line graph drawn to represent the equation $y = \frac{p}{x+q}$, where p and q are constants.

Rajah 15 menunjukkan satu graf garis lurus yang dilukis untuk mewakili persamaan $y = \frac{p}{x+q}$, dengan keadaan p dan q adalah pemalar.

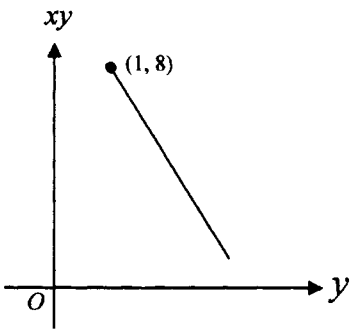


Diagram 15
Rajah 15

Given that the line passes through (1,8) and has gradient -3, find the value of p and of q.
Diberi bahawa garis lurus itu melalui titik (1,8) dan mempunyai kecerunan -3, cari nilai p dan nilai q.

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

Answer / *Jawapan*

15

4

[*Lihat halaman sebelah*

For Examiner's Use

16. Find the acute angle θ such that $\sin\theta = \dfrac{1}{\sec 65^0}$.

Cari sudut tirus θ *dengan keadaan* $\sin\theta = \dfrac{1}{sek\,65^0}$

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

Answer / *Jawapan*

16
2

17. Diagram 17 shows part of the graph of a function $f(x) = \sin px + q$ for $0 \le x \le \pi$.
Rajah 17 menunjukkan sebahagian daripada graf fungsi $f(x) = \sin px + q$ $0 \le x \le \pi$.

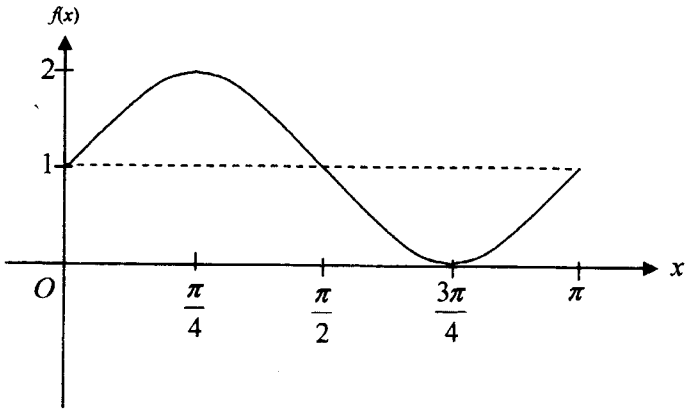


Diagram *17*
Rajah 17

State the value of *p* and of *q*.
Nyatakan nilai p dan nilai *q*.

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

Answer / *Jawapan*

17
3

[*Lihat halaman sebelah*

For Examiner's Use

18. Diagram 18 shows a circle with centre O , radius 4 cm and OAB is a right-angled triangle.
Rajah 18 menunjukkan sebuah bulatan berpusat O dengan jejari 4 cm dan OAB ialah sebuah segi tiga bersudut tegak.

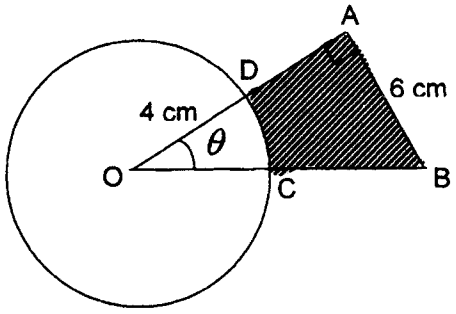


Diagram 18
Rajah 18

Given OD = DA, find the area of the shaded region in term of θ
Diberi OD=DA, cari luas kawasan berlorek dalm sebutan θ

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

Answer / *Jawapan*

18

3

[*Lihat halaman sebelah*

For Examiner's Use

19. The variables *x* and *y* increase in such a way that when $x = -2$, the rate of increase of *y* with respect to time is twice the rate of increase of *x* with respect to time.
Given that $y = kx^2 + 3x$, where k is a constant, find the value of *k*.
Pembolehubah x dan y bertambah dengan keadaan apabila $x = -2$, *kadar pertambahan y terhadap masa adalah dua kali kadar perubahan x terhadap masa.*
Diberi bahawa $y = kx^2 + 3x$ *dengan keadaan k ialah pemalar, cari nilai k.*

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

Answer / *Jawapan*

19
3

20. Given that $y = x^2(3x+1)^6$ and $\frac{dy}{dx} = kx(12x+1)(3x+1)^n$, find the value of *n* and *k*.
Diberi bahawa $y = x^2(3x+1)^6$ *and* $\frac{dy}{dx} = kx(12x+1)(3x+1)^n$, *cari nilai bagi n dan k.*

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

Answer / *Jawapan*

20
3

[*Lihat halaman sebelah*

For Examiner's Use

21. Given the mean, variance and sum of the square of the set data $x_1, x_2, x_3, ...x_n$ are 4, 14 and 300 respectively.
Diberi min, varians dan hasil tambah kuasa dua bagi set data $x_1, x_2, x_3, ...x_n$ *masing-masing ialah 4, 14 dan 300.*
Find
Cari

(a) n ,

(b) the variance if 4 is added to set of data.
nilai varians jika 4 ditambah ke set data itu.

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

Answer / *Jawapan*

(*a*)

(*b*)

21 4

22 In an examination, 65% of the students passed. If a sample of 9 students is randomly selected, find the probability that 6 students from the sample passed the examination.
Dalam suatu peperiksaan, 65 % daripada pelajar lulus. Jika satu sampel yang terdiri daripada 9 orang pelajar dipilih secara rawak, cari kebarangkalian bahawa 6 daripada sampel itu lulus dalam peperiksaan.

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

Answer / *Jawapan*

22 3

[*Lihat halaman sebelah*

For Examiner's Use

23 A box contains 10 balloons of which 3 are white, 5 are red and 2 are yellow.
Sebuah kotak mengandungi 10 belon dengan keadaan 3 berwarna putih, 5 berwarna merah dan 2 berwarna kuning.

Find the number of ways 6 balloons can be chosen if
Cari bilangan cara 6 belon dapat dipilih secara rawak jika

(a) 5 of the balloons are red,
5 daripada belon itu berwarna merah,

(b) there must be two balloons of each colour.
2 belon setiap warna mesti dipilih.

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

Answer / *Jawapan*

(a)

(b)

23
4

---

24 A bag contains 5 blue marbles, 3 white marbles and *k* red marbles. If a marble is picked randomly from the bag, the probability of picking a red marble is $\frac{3}{5}$.

Sebuah beg mengandungi 5 guli bewarna biru, 3 guli putih dan k guli bewarna merah. Sebiji guli dikeluarkan secara rawak dari beg, kebarangkalian mendapat guli merah ialah $\frac{3}{5}$.

Find
Cari

(a) the probability of picking a marble which is not red,
kebarangkalian mendapat sebiji guli yang bukan berwarna merah.,

(b) the value of *k*.
nilai k.

[3 marks]
[*3 markah*]

24
3

[*Lihat halaman sebelah*

Answer / *Jawapan*

(a)

(b)

25. Diagram 25 shows a standardized normal distribution graph.

Rajah 25 menunjukkan sebuah graf taburan normal piawai.

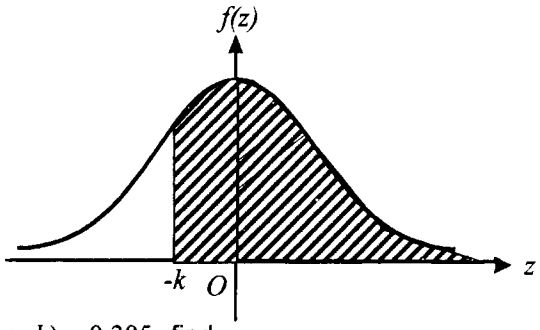


Diagram25
Rajah 25

Given $P(z > k) = 0.305$, find
Diberi $P(z > k) = 0.305$, *cari*

(a) the area of the shaded region,
luas rantau berlorek,

(b) the value of *k*.
nilai k.

[3 marks]
[3 markah]

Answer / *Jawapan*

25

3

(a)

(b)

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

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. Give only **one** answer for each question.
   Bagi setiap soalan beri **satu** *jawapan sahaja.*

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

5. 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.

6. If you wish to change your answer, cross out the answer that you have done.Then write down the new answer.
   Jika anda hendak menukar jawapan, batalkan dengan kemas jawapan yang telah dibuat. Kemudian tulis jawapan yang baru.

7. The diagrams in the questions provided are not drawn to scale unless stated.
   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

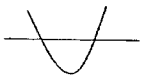
8. The marks allocated for each question are shown in brackets.
   Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan.

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

10. A four-figure table for the Normal Distribution $N(0, 1)$ is provided on page 2.
    Satu jadual empat angka bagi Taburan Normal $N(0, 1)$ *disediakan di halaman* 2.

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

ADDITIONAL MATHEMATICS TRIAL SPM PARER 1 2014

Question	Solutions and marking scheme	Sub Marks	Full Marks
1(a)	~~3~~ 4	1	
(b)	3 B1 : $4-\lvert x+1\rvert=0$	2	3
2(a)	-5	1	
(b)	$9x+4$ B1 : $3(3x+1)+1$	2	3
3(a)	-6	1	
(b)	10. B1 : $\dfrac{(-6)^2-2(3)}{3}$	2	3
4	$-1<x<3$ B2:  or other method B1: $(x-3)(x+1)$	3	3
5	$-12<k<4$ B2: $(k+12)(k-4)$ B1: $k^2-4(2)(6-k)<0$	3	3
6	2 B2: $6^x6^{-1}=12(6^{-1})$ B1: $6^x=12$	3	3
7	$\dfrac{3}{4}$ B2: $\dfrac{3\log 2}{4\log 2}$ B1: $\dfrac{\log_a 8}{\log_a k}\times\dfrac{\log_a k}{\log_a 16}$ or $\log_k 8\times\dfrac{1}{\log_k 16}$	3 2 1	3

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Question	Solutions and marking scheme	Sub Marks	Full Marks
8	$\frac{3}{4}$ B2: $1-r=\frac{1}{4}$ B1: $\frac{a}{1-r}=4a$	3	3
9(a)	2 B1 : $4k-(2k-1)=13-4k$	2	4
(b)	1000 B1 : $3+(n-1)(5)=4998$	2	
10	$\frac{2}{3}$ B1 : $\frac{1}{(3-2)}-\frac{1}{(3-0)}$ B1: $\left[\frac{1}{(3-x)}\right]_0^2$	3	3
11(a)	(5,5) B1: $(\frac{2+8}{2},\frac{1+9}{2})$	2	
(b)	5 B1: $EF=\sqrt{(5-2)^2+(5-1)^2}$ or $FG=\sqrt{(8-2)^2+(9-1)^2}$	2	4
12	(1,9) B2 : $(\frac{-3+8}{5},\frac{9+36}{5})$ B1 : $\left(\frac{3(-1)+2(4)}{2+3},\frac{3(3)+2(18)}{2+3}\right)$ B2: $h=-1$ or $k=9$ B1: $1=\frac{3h+2(4)}{2+3}$ or $k=\frac{3(3)+2(18)}{2+3}$	3	3

Question	Solutions and marking scheme	Sub Marks	Full Marks
13	$k=2$ B3: $9-3k=3(k-1)$ B2: $k-1=4\lambda$ or $3k-9=-12\lambda$ B1: $-\underset{\sim}{i}-9\underset{\sim}{j}+k\underset{\sim}{i}+3k\underset{\sim}{j}=\lambda(-\underset{\sim}{i}-9\underset{\sim}{j}+5\underset{\sim}{i}-3\underset{\sim}{j})$	4	4
14(a)	$5\underset{\sim}{y}$	1	3
(b)	$-\frac{48}{5}\underset{\sim}{x}+\underset{\sim}{y}$ B1: $\frac{6-2}{4-0}$	2	
15	$p=11$ and $q=3$ B3: $p=11$ or $q=3$ B2: $8=-3(1)+p$ B1: $xy=-qy+p$	4	4
16	25^0 B1: $\frac{1}{\cos 65^0}$	2	2
17	$p=2$ and $q=1$ B2 : $p=2$ or $q=1$	3	3
18	$24-8\theta$ or 18.85 cm^2 B2: $\frac{1}{2}\times 8\times 6-\frac{1}{2}\times 4^2\times\theta$ B1: $\frac{1}{2}\times 4^2\times\theta$	3	3

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Question	Solutions and marking scheme	Sub Marks	Full Marks
19	$-\frac{1}{4}$ B2: $2 = 2k(-2) + 3$ B1: $\frac{dy}{dt} \div \frac{dx}{dt} = 2$	3	3
20	$k = 2,\ n = 5$ B2: $2x(12x+1)(3x+1)^5$ B1: $x^2(18)(3x+1)^5 + (3x+1)^6(2x)$	3	3
21(a)	10 B1: $14 = \frac{300}{N} - (4)^2$	2	4
(b)	258.18 B1: $\frac{300+4^2}{11} - (4)^2$	2	
22	0.2716 B2: ${}^9C_6 \times (0.65)^6(0.35)^3$ B1: ${}^9C_6$ or 0.35	3	3
23(a)	5 B1: ${}^5C_1$	2	4
(b)	30 B1: ${}^3C_2 \times {}^5C_2$	2	
24(a)	$\frac{2}{5}$	1	3
(b)	12 B1: $\frac{k}{8+k} = \frac{3}{5}$	2	
25(a)	0.695 B1: $1 - 0.305$	2	3
(b)	0.51	1	

3472/2
ADDITIONAL MATHEMATICS
Paper 2
Aug / Sept 2014
2 ½ hours

PEPERIKSAAN PERCUBAAN SPM TAHUN 2014

ADDITIONAL MATHEMATICS

Tingkatan 5

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.*

Kertas soalan ini mengandungi **20** halaman bercetak.

[Lihat halaman sebelah

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*) $= \int_a^b \pi x^2 dy$

[Lihat halaman sebelah

STATISTICS
STATISTIK

1 $\bar{x} = \dfrac{\Sigma x}{N}$

2 $\bar{x} = \dfrac{\Sigma fx}{\Sigma f}$

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

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

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

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

7 $\bar{I} = \dfrac{\Sigma W_i I_i}{\Sigma W_i}$

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*

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

2 Mid point / *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 a triangle / *Luas segitiga* =

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

5 $\left|\underset{\sim}{r}\right| = \sqrt{x^2 + y^2}$

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

[Lihat halaman sebelah

TRIGONOMETRY
TRIGONOMETRI

1 Arc length, $s = r\theta$
Panjang lengkok, $s = j\theta$

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

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

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

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

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 $\sin(A \pm B) = \sin A\cos B \pm \cos A\sin B$
$\sin(A \pm B) = \sin A\,kos\,B \pm ko\text{s}\,A\sin B$

9 $\cos(A \pm B) = \cos A\cos B \mp \sin A\sin B$
$ko\text{s}(A \pm B) = k\text{os}\,A\,k\text{os}\,B \mp \sin A\sin B$

10 $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A\ tanB}$

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

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

13 $a^2 = b^2 + c^2 - 2bc\cos A$
$a^2 = b^2 + c^2 - 2bc\ kos\,A$

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

[Lihat halaman sebelah

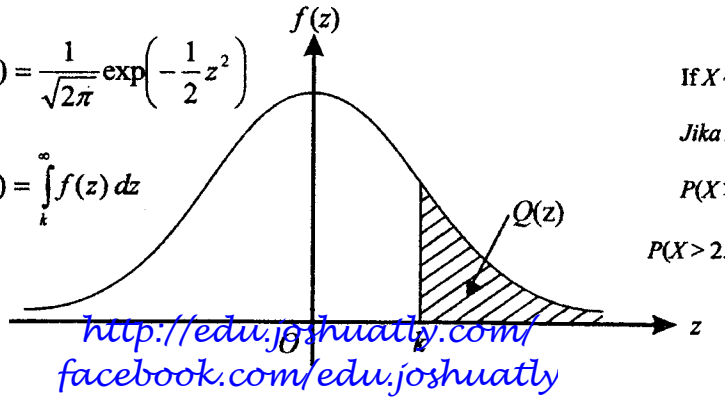
THE UPPER TAIL PROBABILITY $Q(z)$ FOR THE NORMAL DISTRIBUTION $N(0, 1)$
KEBARANGKALIAN HUJUNG ATAS $Q(z)$ BAGI TABURAN NORMAL $N(0, 1)$

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

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

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

Section A

Bahagian A

[40 *marks*]

[40 *markah*]

Answer **all** questions.

Jawab **semua** *soalan.*

1. Solve the simultaneous equations $x + 2y = x^2 - xy = 1$. [5 *marks*]

   Selesaikan persamaan serentak $x + 2y = x^2 - xy = 1$. [5 *markah*]

2. It is given that ..... , 4 374, x , 486 , ... is part of a geometric progression with positive terms and the sum of the first **four** terms is 19 440.

   Diberi bahawa ..... , 4 374, x , 486 , ...ialah sebahagian daripada suatu janjang geometri dengan sebutan-sebutan positif dan hasil tambah ***empat*** *sebutan pertama janjang itu ialah 19 440.*

   Find,
   Cari ,

   (a) the common ratio, [2 *marks*]
   nisbah sepunya, [2 *markah*]

   (b) the first term, [2 *marks*]
   sebutan pertama, [2 *markah*]

   (c) the smallest value of n such that the n^{th} term is less than 0.01. [3 *marks*]
   nilai n yang terkecil supaya sebutan ke-n adalah kurang daripada 0.01.
   [3 *markah*]

[Lihat halaman sebelah

3 (a) Prove that $\frac{2}{1-\cos 2x} = \text{cosec}^2 x$. [2 marks]

Buktikan bahawa $\frac{2}{1-\text{kos } 2x} = \text{kosek}^2 x$. [2 markah]

(b) (i) Sketch the graph of $y = 1 - \cos 2x$ for $0 \le x \le 2\pi$. [3 *marks*]

Lakarkan graf bagi $y = 1 - \cos 2x$ *untuk* $0 \le x \le 2\pi$. [3 *markah*]

(ii) Hence, use the same axes, sketch a suitable straight line to find the number of solutions for the equation $\frac{2}{\text{cosec}^2 x} = 2 - \frac{x}{2\pi}, 0 \le x \le 2\pi$.

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

$\frac{2}{\text{kosek}^2 x} = 2 - \frac{x}{2\pi}, \quad 0 \le x \le 2\pi$.

Nyatakan bilangan penyelesaian itu. [3 *markah*]

4 (a) Find the equation of tangent to the curve $y = 3x^2 - \frac{1}{x}$ at the point $(-1, 4)$.

Cari persamaan tangen kepada lengkung $y = 3x^2 - \frac{1}{x}$ *pada titik* $(-1, 4)$.

[3 marks]
[3*markah*]

(b) A piece of wire of length 360 cm is used to make a frame in the form of a cuboid. The base of the cuboid has sides measuring x cm by $2x$ cm. The height is h cm.

Seutas dawai dengan panjang 360cm digunakan untuk membuat sebuah bingkai berbentuk kuboid. Tapak kuboid itu berukuran x *cm dan* $2x$ *cm. Tingginya ialah* h *cm.*

(i) Show that the volume of the cuboid, in cm^3, is $V = 180x^2 - 6x^3$,
Tunjukkan bahawa isipadu kuboid itu, dalam cm^3, *diberi oleh* $V = 180x^2 - 6x^3$.

(ii) Find the maximum volume of the cuboid.
Cari isipadu maksimum kuboid itu.

[4 marks]

[Lihat halaman sebelah

[4 *markah*]

5. Table 5 shows the cumulative frequency distribution for the scores obtained by 32 students in a test.
Jadual 5 *menunjukkan taburan kekerapan longgokan bagi skor* 32 *orang murid dalam satu ujian.*

Score (*Skor*)	< 20	<40	<60	<80	<100
Number of students (*Bilangan murid*)	0	5	21	29	32

Table 5
Jadual 5

(a) Based on Table 5, copy and complete table 5.1.
Berdasarkan Jadual 5, *salin dan lengkapkan Jadual* 5.1.

Score (*Skor*)	0-19	20-39	40-59	60-79	80-99
Number of students (*Bilangan murid*)					

Table 5.1
Jadual 5.1

[1 *mark*]
[1 *markah*]

(b) Find the mean score of the students.
Cari skor min murid.

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

(c) Use graph paper to answer this part of question.
Gunakan kertas graf untuk menjawab bahagian ini.

Using a scale of 2 cm to 20 scores on the horizontal axis and 2 cm to 2 students on the vertical axis, draw a histogram to represent the frequency distribution of the scores.
Find the mode score.

Dengan menggunakan skala 2 *cm kepada* 20 *skor pada paksi mengufuk dan* 2 *cm kepada* 2 *orang murid pada paksi mencancang, lukis sebuah histogram untuk mewakili taburan frekuensi skor itu.*
Cari skor mod.

[3 *marks*]

[Lihat halaman sebelah

[3 *markah*]

6. In Diagram 6, ABCD is a quadrilateral. The diagonals AC and BD intersect at point R. Point P lies on AD.

Dalam Rajah 6, ABCD ialah sebuah sisiempat. Perpenjuru-perpenjuru AC dan BD bersilang di titik R. Titik P terletak pada AD.

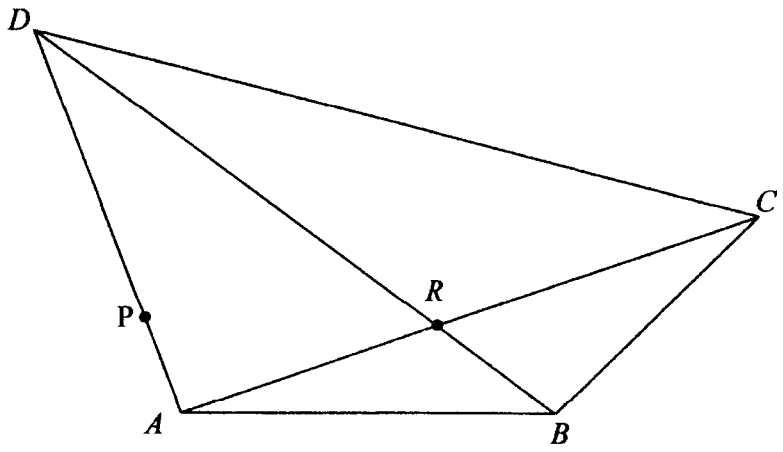


Diagram 6
Rajah 6

It is given that $AP = \frac{1}{4}AD$, $BR = \frac{1}{4}BD$, $\overrightarrow{AB} = \underline{x}$ and $\overrightarrow{AP} = \underline{y}$.
Diberi bahawa $AP = \frac{1}{4}AD$, $BR = \frac{1}{4}BD$, $\overrightarrow{AB} = \underline{x}$ *dan* $\overrightarrow{AP} = \underline{y}$.

(a) Express in terms of $\underline{x}$ and/or $\underline{y}$:
Ungkapkan dalam sebutan $\underline{x}$ *dan/atau* $\underline{y}$:

(i) $\overrightarrow{DB}$

(ii) $\overrightarrow{AR}$

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

(b) Given that $\overrightarrow{DC} = h\underline{x} - \underline{y}$ and $\overrightarrow{AR} = k\overrightarrow{AC}$, where h and k are constants, find the value of h and of k.

Diberi bahawa $\overrightarrow{DC} = h\underline{x} - \underline{y}$ *dan* $\overrightarrow{AR} = k\overrightarrow{AC}$ *,dengan keadaan* h *dan* k *adalah pemalar, cari nilai* h *dan nilai* k.

[4 *marks*]

[Lihat halaman sebelah

[4 *markah*]

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

Table 7 shows the values of two variables, x and y, which are related by the equation $y = hk^{-x}$ where h and k are constants.
Jadual 7 menunjukkan nilai-nilai dua pembolehubah, x dan y, yang dihubungkan oleh persamaan $y = hk^{-x}$, *dengan keadaan h dan k ialah pemalar.*

x	2	3	4	5	6	7
y	7.80	6.00	4.61	3.55	2.73	2.10

Table 7
Jadual 7

(a) Plot $\log_{10} y$ against x, by using a scale of 2 cm to 0.1 unit on the $\log_{10} y$ axis and 2 cm to 1 unit on x-axis.
Hence, draw the line of best fit.
Plot $\log_{10} y$ *melawan* x, *dengan menggunakan skala* 2 *cm kepada* 0.1 *unit pada paksi-*$\log_{10} y$ *dan* 2 *cm kepada* 1 *unit pada paksi-x.*
Seterusnya, lukis garis lurus penyuaian terbaik.

[5 *marks*]
[5*markah*]

(b) Use the graph from 7(a) to find the value of
Guna graf di 7(a) *untuk mencari nilai*

(i) h,

(ii) k,

(iii) y when $x = 4.5$
y *apabila* $x = 4.5$

[5 *marks*]
[5 *markah*]

[Lihat halaman sebelah

8. Solution by scale drawing will **not** be accepted.
Penyelesaian secara lukisan berskala **tidak** *akan diterima.*

Diagram 8 shows a quadrilateral PQRS. POS and PTQ are straight lines. The equation of PS is $y = 2x$ and $\angle SPQ = 90^0$.

Rajah 8 menunjukkan sebuah sisi empat PQRS. POS dan PTQ adalah garis lurus. Persamaan PS ialah $y = 2x$ *dan* $\angle SPQ = 90^0$.

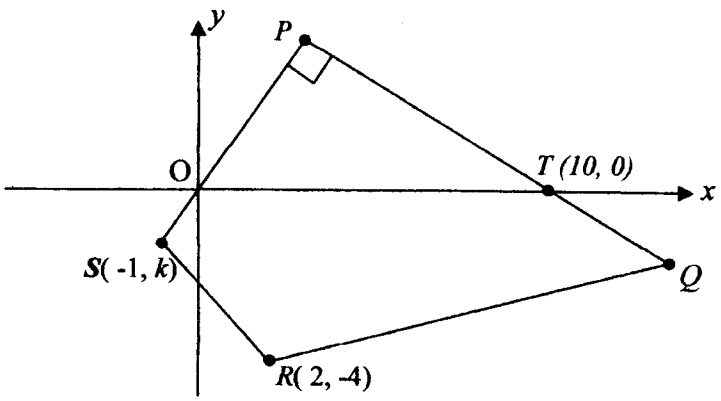


Diagram 8
Rajah 8

(a) Find / Cari

(i) the value of k,
nilai k,

(ii) the coordinates of P,
koordinat titik P,

[4 marks]
[4 *markah*]

(b) It is given that PT : TQ = 2 : 1.
Diberi PT : TQ = 2 : 1
Find / *Cari*

(i) the coordinates of Q,
koordinat Q,

(ii) Area of quadrilateral PQRS.
luas sisi empat PQRS

[4 marks]
[4 *markah*]

(c) A point *E* moves such that its distance from the origin O is always 3 units. Find the equation of the locus of E.
Satu titik E bergerak dengan keadaan jaraknya dari asalan O adalah sentiasa 3 unit. Cari persamaan lokus bagi E.

[2marks]
[2 *markah*]

[Lihat halaman sebelah

9. Diagram 9 shows two circles. The larger circle has centre P and radius 10cm. The smaller circle has centre Q and radius 6cm. The circles touch at T. The straight line RS is a common tangent to the circles at point R and point S.

Rajah 9 menunjukkan dua bulatan. Bulatan yang lebih besar berpusat P dan berjejari 10 cm. Bulatan yang lebih kecil berpusat Q dan berjejari 6 cm. Kedua-dua bulatan bersentuh di T. Garis lurus RS adalah tangen sepunya kepada kedua-dua bulatan itu di titik R dan titik S.

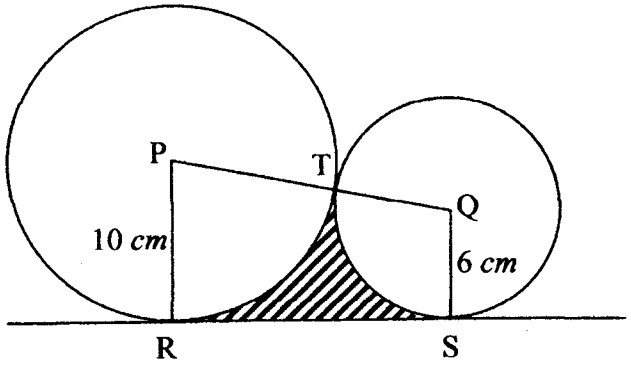


Diagram 9
Rajah 9

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

Given that $\angle QPR = \theta$ radians.
Diberi bahawa $\angle QPR = \theta$ *radian.*

a) Show that $\theta \approx 1.318$ radians. [2 *marks*]
Tunjukkan bahawa $\theta \approx 1.318$ *radian.* [*2 markah*]

b) Find
Cari

(i) the perimeter of the shaded region, [4 *marks*]
perimeter rantau berlorek, [4 *markah*]

(ii) the area, in cm^2, of the shaded region. [4 *marks*]
luas , dalam cm^2, *bagi rantau berlorek.* [4 *markah*]

[Lihat halaman sebelah

10 (a) It is found that 90% of graduates from Universiti Gemilang are employed.

Didapati bahawa 90% daripada graduan Universiti Gemilang mendapat pekerjaan.

If 10 graduates from the university are chosen at random,

Jika 10 *orang murid daripada universiti itu dipilih secara rawak,*

(i) find the probability that at least 9 of them are employed ,

cari kebarangkalian bahawa sekurang-kurangnya 9 orang mendapat pekerjaan,

(ii) determine the standard deviation of the number of graduates being employed.

tentukan sisihan piawai bilangan graduan yang mendapat pekerjaan.

[4 marks]
[4 *markah*]

(b) In a mathematics test taken by 300 stdents of SMK Gemilang, it is found that the marks obtained follow a normal distribution with a mean of 60 marks and a standard deviation of 15 marks.

Dalam suatu ujian matematik yang diambil oleh 300 orang pelajar SMK Gemilang, didapati markah yang diperoleh mengikut taburan normal dengan min 60 markah dan sisihan piawai 15 markah.

(i) Find the number of students who passed the test if the passing mark is 45,

Cari bilangan pelajar yang lulus ujian tersebut jika markah lulus ialah 45.

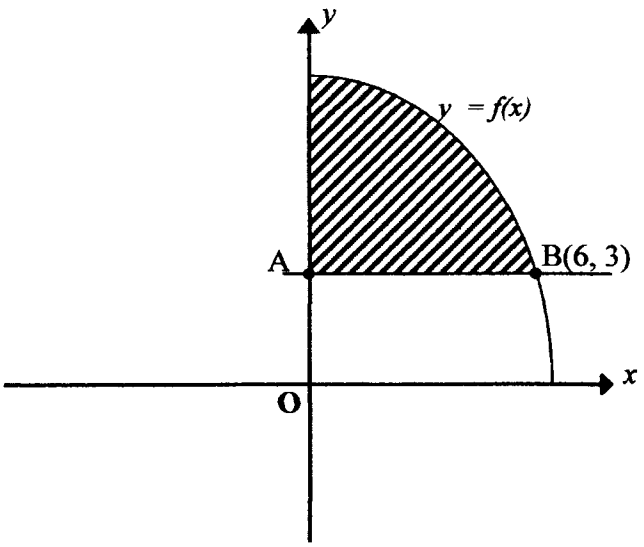
(ii) If 12% of the students passed the test with grade *A*+, determine the minimum mark to obtain grade *A*+.

Jika 12% pelajar lulus dengan gred A+, tentukan markah minimum untuk memperoleh gred A+.

[6 *marks*]
[6 *markah*]

[Lihat halaman sebelah

11. Diagram 11 shows part of the graph of the function $y = f(x)$ which has a gradient function of $-\frac{1}{3}x$ and passes through B(6, 3). The straight line AB is parallel to the x-axis.
Rajah 11 menunjukkan sebahagian daripada graf fungsi $y = f(x)$ yang mempunyai fungsi kecerunan $-\frac{1}{3}x$ dan memalui titik B(6, 3). Garis lurus AB adalah selari dengan paksi-x.



Find
Cari

(a) the equation of curve,
persamaan lengkung itu, [3 marks / *markah*]

(b) area of shaded region,
luas rantau berlorek, [4 marks / *markah*]

(c) the volume of revolution, in terms of π, when the shaded region is rotated through 360^0 about the y-axis.
isi pada kisaran, dalam sebutan π, apabila rantau berlorek diputarkan melalui 360^0 pada paksi-y.

[3 marks / *markah*]

[Lihat halaman sebelah

Section C
Bahagian C

[20 Marks]
[20 *Markah*]

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

12. A particle moves along a straight line such that its displacement, s m, is given by $s = t^3 - \frac{21}{2}t^2 + 18t$, where t is the time, in seconds, after it passes through a fixed point O.

Satu zarah bergerak di sepanjang suatu garis lurus dengan keadaan sesarannya, s m, *diberi oleh* $s = t^3 - \frac{21}{2}t^2 + 18t$ *dengan keadaan t ialah masa, dalam saat, selepas melalui satu titik tetap O.*

(a) Find
Cari

(i) the values of t when the particle stops instantaneously, [3 *marks*]
nilai-nilai t apabila zarah itu berhenti seketika, [3 *markah*]

(ii) the distance between the two points where the particles stops instantaneously,
jarak di antara titik-titik apabila zarah itu dalam keadaan berhenti seketika,
[2 marks]
[2 *markah*]

(iii) the minimum velocity of the particle, [2 *marks*]
halaju minimum zarah itu, [2 *markah*]

(b) Sketch a velocity-time graph for $0 \le t \le 7$. [3 *marks*]
Lakarkan sebuah graf halaju-masa untuk $0 \le t \le 7$. [3 *markah*]

[Lihat halaman sebelah

13. Solution by scale drawing will **not** be accepted.
Penyelesaian secara lukisan berskala **tidak** *akan diterima.*

Diagram 13 shows a quadrilateral *ABCD*.

Rajah 13 *menunjukkan sisi empat ABCD.*

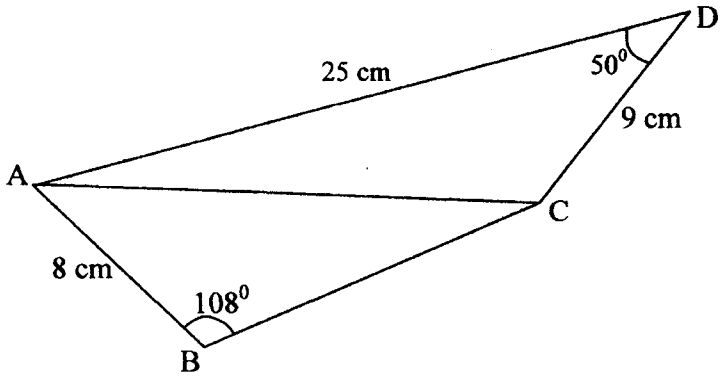


Diagram 13
Rajah 13

Given AB = 8cm, AD = 25 cm, CD = 9 cm and $\angle ABC$ =108°.
Diberi AB = 8cm, AD = 25 cm, CD = 9 cm *dan* $\angle ABC$ =108°.

(a) Find
Cari

(i) the length, in cm, of AC,
panjan AC dalam cm,

(ii) $\angle ACB$,

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

(b) Point A' lies on AC such that $A'B = AB$.
Titik A' terletak pada AC dengan keadaan A'B = AB.

(i) Sketch triangle $A'BC$.
Lakar segi tiga A'BC.

(ii) Calculate the area, in cm^2, of triangle A'BC.
Hitungkan luas segitiga A'BC dalam cm^2.

[6 *marks*]
[6 markah]

[Lihat halaman sebelah

14. Table 14 shows the prices of four ingredients *P*, *Q*, *R* and *S* used for making a particular kind of cake.
Jadual 14 *menunjukkan harga bagi empat bahan P,Q, R dan S yang digunakan untuk membuat sejenis kek.*

Ingredient *Bahan*	Price per kg (RM) *Harga sekilogram (RM)*	
	Year 2012 *Tahun* 2012	Year 2013 *Tahun* 2013
P	8.00	*w*
Q	3.00	4.80
R	*x*	*y*
S	5.00	4.00

Table 14 / *Jadual* 14

(a) The index number of ingredient P in the year 2013 based on the year 2012 is 125. Find the value of *w*. [2 marks]
Nombor indeks bagi bahan P dalam tahun 2013 berasaskan tahun 2012 ialah 125. Carikan w. [2*markah*]

(b) The index number of ingredient R in the year 2013 based on the year 2012 is 150. The price per kiligram of ingredient R in the year 2013 is RM5.00 more than its corresponding price in the year 2012.
Calculate the value of *x* and of *y*.
Indeks nombor bahan R dalam tahun 2013 berasaskan tahun 2012 ialah 150. Harga sekilogram bahan R pada tahun 2013 adalah RM 5.00 lebih mahal daripada harganya yang sepadan dalam tahun 2012.
Hitungkan nilasi x dan nilai y.

[3 marks]
[3*markah*]

(c) The composite index for the cost of making the cake in the year 2013 based on the year 2012 is 131.5.
Indeks gubahan kos membuat kek itu dalam tahun 2013 berasaskan tahun 2012 ialah 139.

Calculate
Hitung

(i) the price of a cake in the year 2013 if its corresponding price in the year 2012 is RM 50.00.

(ii) the value of m if the quantities of ingredients P, Q, R and S used are in the ratio 8 : 4 : m : 3.
nilai m jika kuantiti bahan P, Q, R dan S yang digunakan adalah mengikut nisbah 8 : 4 : m : 3.

[5 marks]
[5*markah*]

[Lihat halaman sebelah

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

In an effort to strengthen Bahasa Melayu and to improve the standard of Bahasa Inggeris, a training centre offers two courses, BM and BI. The number of participants for the BM course is x and the number of participants for BI course is y. The intake of participants is based on the following constraints :

Dalam usaha memperkasakan Bahasa Melayu dan memperkukuhkan Bahasa Inggeris, sebuah pusat latihan menawarkan dua kursus, BM dan BI. Bilangan peserta kursus BM ialah x dan bilangan peserta kursus BI ialah y. Pengambilan peserta adalah berdasarkan kekangan berikut:

I : The number of BM participants is more than 20,
Bilangan peserta BM adalah melebihi 20,

II : The number of BI participants is at least 10,
Bilangan peserta BI adalah sekurang-kurangnya 10,

III : The maximum number of participants is 80,
Jumlah maksimum bilangan peserta ialah 80,

IV : The ratio of the number of BM participants to the number of BI participants is not more than 3 : 1.
Nisbah bilangan peserta BM kepada bilangan peserta BI adalah tidak melebihi 3 : 1.

(a) Write down four inequalities, other than $x \geq 0$, $y \geq 0$, which satisfy all the above constraints. [4 *marks*]
Tulis empat ketaksamaan, selain $x \geq 0$, $y \geq 0$, *yang memenuhi semua kekangan di atas.* [4 *markah*]

(b) Using a scale of 2 cm to 10 participants on both axes, construct and shade the region which satisfy all the constraints. [3 *marks*]
Menggunakan skala 2 cm *kepada* 10 *peserta pada kedua-dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di atas.* [3 *markah*]

(c) Using the graph constructed in 14(b), find
Dengan menggunakan graf yang dibina di 14(b), *cari*

(i) the range of the number of BM participants if the number of BI participants is 20,
julat bilangan peserta BM jika bilangan peserta BI ialah 20,

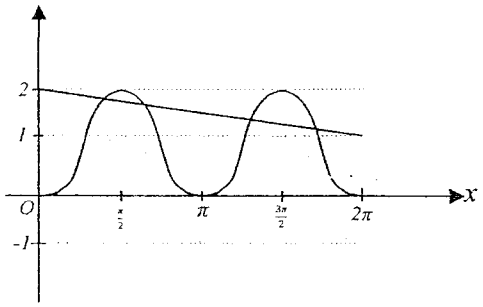
(ii) the maximum total fees that can be collected if the fees for BM and BI courses are RM 200 and RM 400 respectively.
Jumlah maksimum kutipan yuran yang diperoleh jika yuran bagi kursus BM dan BI ialah RM 200 *dan* RM 400 *masing-masing.*

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

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

[Lihat halaman sebelah

ADDITIONAL MATHEMATICS
KERTAS 2 - PERCUBAAN SPM 2014

Question	Working	Marks
1	$x + 2y = 1$, $x^2 - xy = 1$ or equivalent	
	$x = 1 - 2y$ or $y = \frac{(1-x)}{2}$	1
	$(1-2y)^2 - (1-2y)y = 1$ or $x^2 - x(\frac{(1-x)}{2}) = 1$	1
	$y(6y-5) = 0$ or $(3x+2)(x-1) = 0$	1
	$y = 0, \quad y = \frac{5}{6}$ or $x = \frac{-2}{3}, \quad x = 1$	1
	$x = 1, \quad x = -\frac{2}{3}$ or $y = \frac{5}{6}, \quad y = 0$	1
		5
2(a)	$r = \frac{x}{4374} = \frac{486}{x}$	1
	$x = 1458$	
	$r = \frac{1}{3}$	1
(b)	$S_5 = 19440$	
	$a\left(\frac{1-\left(\frac{1}{3}\right)^4}{1-\frac{1}{3}}\right) = 19440$	1
	$a = 13\,122$	1
(c)	$13\,122\left(\frac{1}{3}\right)^n < 0.01$	1
	Taking log both sides + simplify…	1
	$n = 14$	1
		7
3(a)	$\text{LHS} = \frac{2}{1-[1-2\sin^2 x]}$	1
	$= \frac{1}{\sin^2 x}$	1
	$= \text{cosec}^2 x$	
3(b) (i)		
	Shape of curve correct	1
	2 periods with correct magnitude ***OR*** vertical shift 1 unit	1
	All correct	1
3(b) (ii)	$\frac{2}{\text{cosec}^2 x} = 1 - \cos 2x = 2 - \frac{x}{2\pi}$	1
	Straight line $y = 2 - \frac{x}{2\pi}$ correctly sketched	1
	Number of solutions = 4	1
		8

4(a)

$\frac{dy}{dx} = 6x + \frac{1}{x^2}$ & substitute x = -1 — 1

$= -5$

$y - 4 = -5(x + 1)$ — 1

$y = -5x - 1$ — 1

(b)

$V = 2x^2h = 2x^2(90 - 3x)$ — 1

$= 180x^2 - 6x^3$ — 1

$\frac{dV}{dx} = 360x - 18x^2 = 0$

$x = 20$ — 1

$V_{max} = 24\,000\ cm^3$ — 1

7

5(a)

Score	0-19	20-39	40-59	60-79	80-99
No of students	0	5	16	8	3

1

(b)

$$\frac{29.5 \times 5 + 49.5 \times 16 + 69.5 \times 8 + 89.5 \times 3}{32}$$ — 1

55.13 — 1

(c) Refer to Graph in page 8 — 3

6

6(a)(i)

$\overrightarrow{DB} = -4\underline{y} + \underline{x}$ — 1

(ii)

$\overrightarrow{AR} = -\underline{x} + \frac{1}{4}\overrightarrow{BD}$* or $\overrightarrow{AR} = 4\underline{y} + \frac{3}{4}\overrightarrow{DB}$ * *follow through — 1

$= \frac{3}{4}\underline{x} + \underline{y}$ — 1

(b)

Using $\overrightarrow{DA} + \overrightarrow{AC} = \overrightarrow{DC}$

$-4\underline{y} + \frac{1}{k}\left(\frac{3}{4}\underline{x} + \underline{y}\right) = h\underline{x} - \underline{y}$ — 1

$h = \frac{3}{4k}$ or $-4 + \frac{1}{k} = -1$ — 1

$h = \frac{9}{4}$, $k = \frac{1}{3}$ — 1+1

7

7(a)

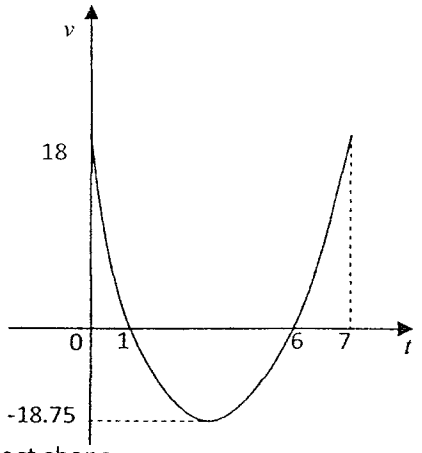
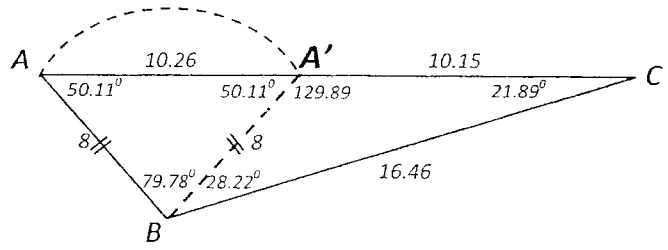
x	2	3	4	5	6	7
Log_{10} y	0.89	0.78	0.66	0.55	0.44	0.32

(at least two decimal places) — 1

Graph
- correct axes with uniform scales — 1
- All points correctly plotted — 1
- Line of best fit — 1

(b)	Refer to graph on page 9	
	Use Y- intercept = $\log_{10} h$	
	gradient = $-\log_{10} k$	1
	Gradient = -0.114±0.01	1
(i)	k = 1.30 ± 0.05	1
(ii)	h = 13.18 ±0.10	1
(iii)	y = 4.05±0.05	1
		1
		10
8(a)(i)	k = -2	1
(ii)	Gradient of PQ = $-\frac{1}{2}$	
	Finding equation of PQ : $y = -\frac{1}{2}x + 5$	1
	any method to find intersection point between line SP and QP	1
	P(2, 4)	1
(b) (i)	$10 = \frac{1(2)+2(a)}{3}$ or $0 = \frac{1(4)+2(b)}{3}$	1
	Q(14, -2)	1
(ii)	$Area = \frac{1}{2}\|\ldots\ldots\ldots\|$ Menggunakan formula dengan betul	1
	= 60	1
(c)	$\sqrt{(x-0)^2+(y-0)^2}$ = 3 or equivalent	1
	$x^2+y^2 = 9$	1
		10
9(a)	$\angle QPR = \cos^{-1}(\frac{4}{16})$	1
	θ ≈ 1.318 rad	1
(b)(i)	RS = 16 sin θ or $\sqrt{16^2-4^2}$	1
	= 15.492	
	Arc length RT = s = (10) (1.318) OR arc length TS = 6(1.824)	1
	perimeter= 15.492 + 10.944 + 13.18	1
	39.62 cm	1
(ii)	$Area\ of\ trapezium = \frac{1}{2}(10+6)\ (15.492))$	1
	$Area\ of\ sector = \frac{1}{2}(10)^2(1.318)$ OR $\frac{1}{2}(6)^2(1.824)$	1
	123.936 - 65.900 - 32.832	1
	25.20 cm^2	1
		10

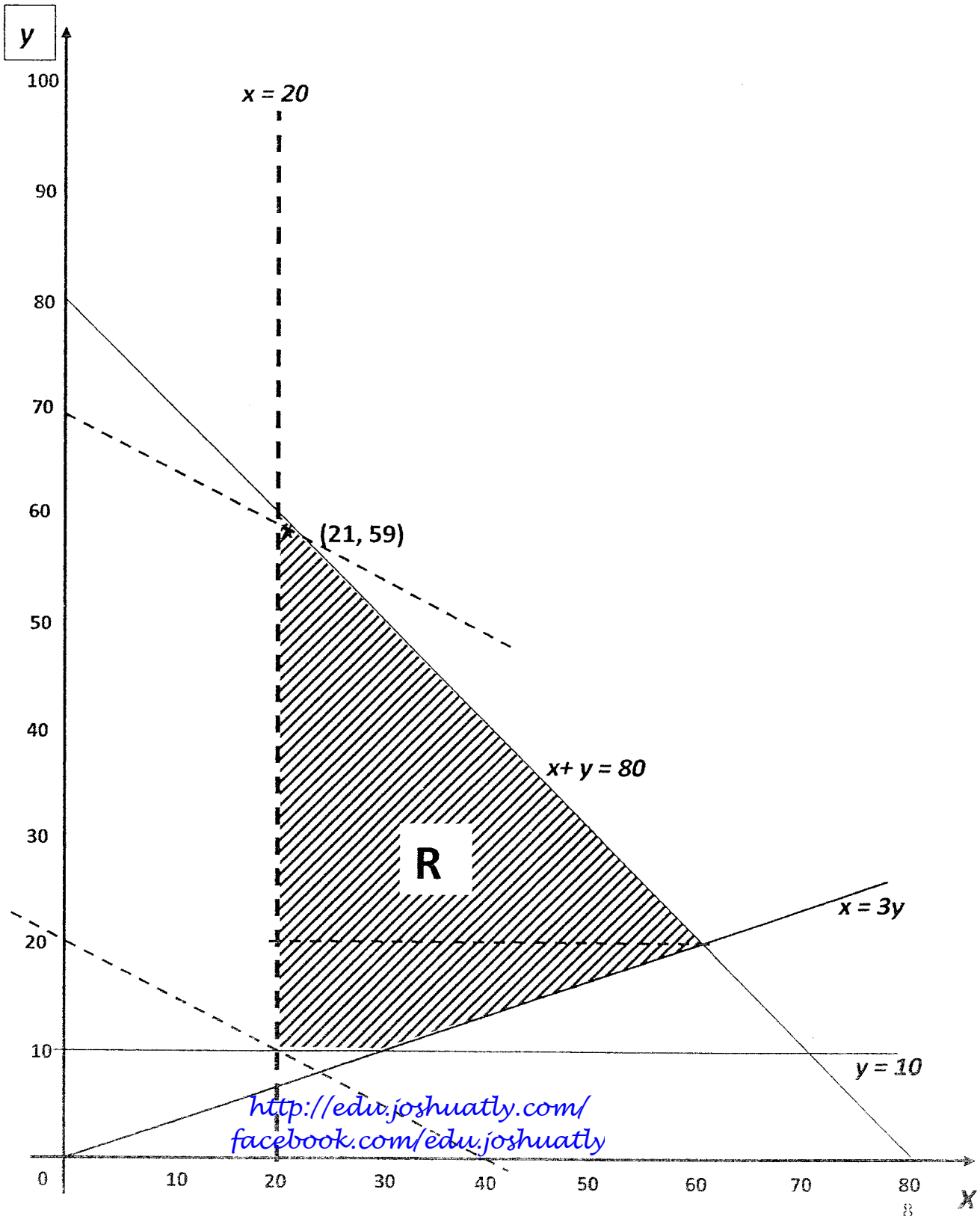
10(a)(i)	p = 0.9 or q = 0.1	1
	$P(X \geq 9) = 10_{C_9}(0.9)^9(0.1)^1 + 10_{C_{10}}(0.9)^{10}(0.1)^0$	1
	0.7361	1
(ii)	$\sigma = \sqrt{10(0.9)(0.1)}$	1
	0.9487	
(b)(i)	$P(X > 45) = P\left(z > \frac{45-60}{15}\right)$	1
	$= P(z > -1)$	
	$= 0.8413$	
	No. of students who passed = 0.8413 x 300 = 252 orang	1
		1
(ii)	P (X > k) = 0.1200	1
	$\frac{k-60}{15} = 1.175$	1
	k = 77.63 ≈ 78 marks	1
		10
11(a)(i) (ii)	f'(x) or $\frac{dy}{dx} = -\frac{1}{3}x$	1
	$y = \int -\frac{1}{3}x\,dx$	1
	$y = -\frac{1}{6}x^2 + c$	
	$y = -\frac{1}{6}x^2 + 9$	1
(b)	$A_x = \int_0^6 y\,dx$	
	$= \int_0^6 (-\frac{1}{6}x^2 + 9)dx$	1
	$= \left[-\frac{x^3}{18} + 9x\right]_0^6$	
	= 42	1
	Shaded area = 42 – 18	1
	= 24 unit^2	1
(c)	$V_y = \int_3^9 \pi x^2 dy$	1
	$= \pi[54y - 3y^2]_3^9$	1
	= 108π	1
		10

12(a)(i)	$v = 3t^2 - 21t + 18$	1
	$3(t-1)(t-6)=0$	1
	$t=1,\ t=6$	1
(ii)	$(1)^3 - \frac{21}{2}(1)^2 + 18(1)$ or $(6)^3 - \frac{21}{2}(5)^2 + 18(6)$	1
	62.5	1
(iii)	$6t - 21 = 0$	1
	-18.75 m/s	1
(b)		
	Correct shape	1
	Correct minimum point and the roots or y-intercept	1
	All correct	1
		10
13(a)(i)	$AC^2 = 25^2 + 9^2 - 2(25)(9)\cos 50^0$	1
	$AC = 20.41$ cm	1
(ii)	$\frac{20.41}{\sin 108^0} = \frac{8}{\sin C}$	1
	$\angle ACB = 21.89^0$	1
(b) (i)		1 1
(ii)	$\angle BA'C = 129.89^0$	1
	Finding BC = 16.46cm (*Using Sine rule or* ***any relevant method*** *to find a second side*)	1
	Area of $\Delta A'BC = \frac{1}{2}(8)(10.15)\sin 129.89°$ OR $\frac{1}{2}(8)(16.46)\sin 28.22°$	1
	$= 31.15$ $= 31.13$	1
	OR $\frac{1}{2}(10.15)(16.46)\sin(\ldots)$ OR area of ΔABC − area of $\Delta AA'B$	
	$= 31.14$ 63.61 31.49 $= 31.15$	
		10

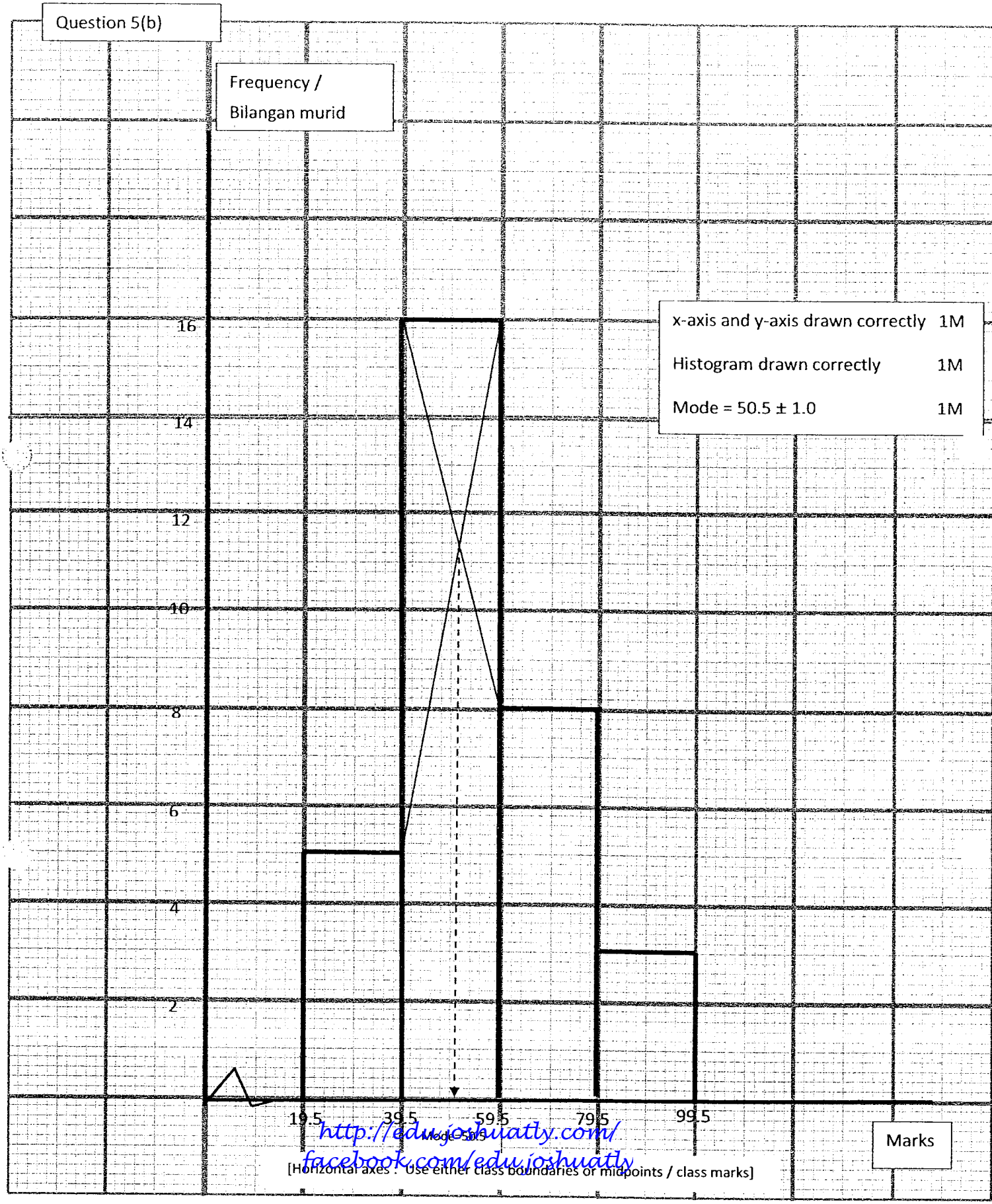
14(a)	$w = 8 \times \frac{125}{100}$	1
	$= 10.00$	1
(b)	$y = x + 5$	
	$\frac{y}{x} \times 100 = 150$ *any one eqn correct	1
	Solving, $x = 10$	1
	$y = 15$	1
(c)(i)	$50 \times \frac{131.5}{100}$	1
	RM 65.75	1
(ii)	$131.5 = \frac{125(8)+160(4)+150(m)+80(3)}{(15+m)}$	1
	Solving...	1
	$m = 5$	1
		10
15(a)	(a) $x > 20$	1
	$y \geq 10$	1
	$x + y \leq 80$	1
	$x \leq 3y$ (or $y \geq \frac{1}{3}x$)	1
(b)	(b) Axes correct and one *straight line correct	1
	Draw correctly all 4 straight lines	1
	Region *R* is correctly shaded and labelled.	1
	(*Please refer to appendix*)	
	(c) (i) $20 < x \leq 60$	1
	(ii) 200 (21) + 400 (59)	1
	The maximum fees collected is **RM 27 800**	1
	Sila rujuk graf (Lampiran 1)	
		10

Appendix / Lampiran 1

Graph for *Question 15 [LINEAR PROGRAMMING]*



Question 5(b)

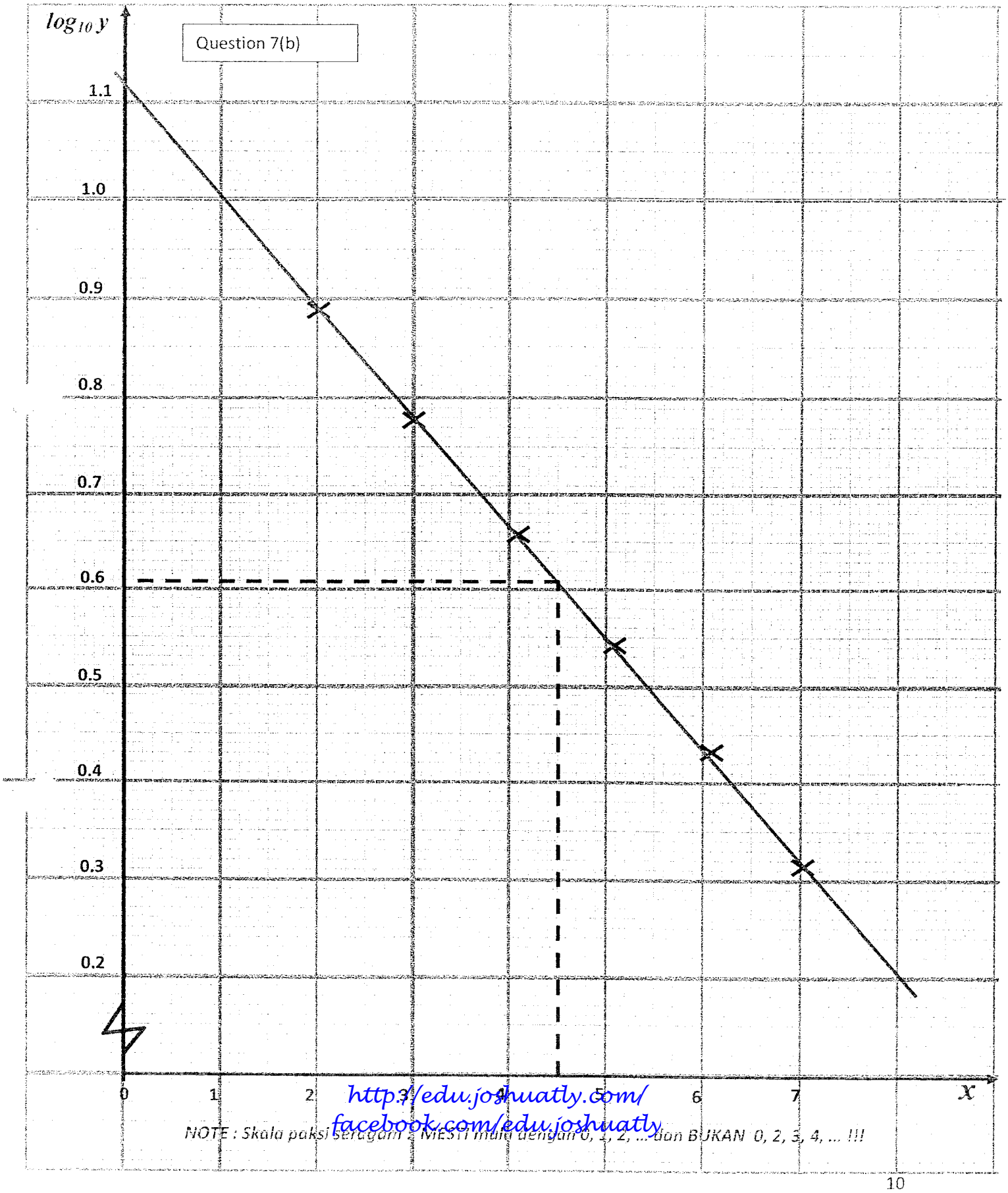


x-axis and y-axis drawn correctly 1M

Histogram drawn correctly 1M

Mode = 50.5 ± 1.0 1M

[Horizontal axes : Use either class boundaries or midpoints / class marks]



NOTE : Skala paksi seragam - MESTI mula dengan 0, 1, 2, ... dan BUKAN 0, 2, 3, 4, ... !!!