NO. KAD PENGENALAN | | | | | | | | | | | | | |

ANGKA GILIRAN | | | | | | | | | |

Nama:……..... Tingkatan:…….....

JABATAN PELAJARAN NEGERI SELANGOR
MAJLIS PENGETUA SEKOLAH MENENGAH

PROGRAM PENINGKATAN PRESTASI AKADEMIK 3472/1
PERCUBAAN SIJIL PELAJARAN MALAYSIA 2012

ADDITIONAL MATHEMATICS

Kertas 1
September
2 jam **Dua jam**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan* **nombor kad pengenalan, angka giliran, nama** *dan* **tingkatan** *anda pada petak yang disediakan.*

2. *Kertas soalan ini adalah dalam dwibahasa.*

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

4. *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.*

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

Kertas ini mengandungi 20 halaman bercetak.

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HALAMAN KOSONG

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/ *ALGEBRA*

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

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

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

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

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

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

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

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

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

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

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

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

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

CALCULUS / *KALKULUS*

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

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

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

4 Area under a curve
Luas di bawah lengkung

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

$= \int_a^b x \ dy$

5 Volume generated / *Isi padu janaan*

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

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

STATISTICS / *STATISTIK*

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

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

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

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

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

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*

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

2 Midpoint / *Titik tengah*

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

3 A point dividing a segment of a line

Titik yang membahagi suatu tembereng garis

$(x, y) = \left(\dfrac{nx_1 + mx_2}{m+n}, \dfrac{ny_1 + my_2}{m+n}\right)$

4 Area of triangle / *Luas segi tiga*

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

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

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

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

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

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

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

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

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

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

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

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

$= 2\cos^2 A - 1$

$= 1 - 2\sin^2 A$

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

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

$= 1 - 2\sin^2 A$

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

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

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

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

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

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

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

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

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

14 Area of triangle / *Luas segi tiga*

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

  [Lihat halaman sebelah

KEBARANGKALIAN HUJUNG ATAS $Q(z)$ BAGI TABURAN NORMAL $N(0,1)$

z	0	1	2	3	4	5	6	7	8	9	1 2 3	4 5 6	7 8 9
											TOLAK		
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641	4 8 12	16 20 24	28 32 36
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247	4 8 12	16 20 24	28 32 36
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859	4 8 12	15 19 23	27 31 35
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483	4 7 11	15 19 22	26 30 34
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121	4 7 11	14 18 22	25 29 32
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776	3 7 10	14 17 20	24 27 31
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451	3 7 10	13 16 19	23 26 29
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148	3 6 9	12 15 18	21 24 27
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867	3 5 8	11 14 16	19 22 25
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611	3 5 8	10 13 15	18 20 23
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379	2 5 7	9 12 14	16 19 21
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170	2 4 6	8 10 12	14 16 18
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985	2 4 6	7 9 11	13 15 17
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823	2 3 5	6 8 10	11 13 14
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681	1 3 4	6 7 8	10 11 13
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559	1 2 4	5 6 7	8 10 11
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455	1 2 3	4 5 6	7 8 9
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367	1 2 3	4 4 5	6 7 8
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294	1 1 2	3 4 4	5 6 6
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233	1 1 2	2 3 4	4 5 5
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183	0 1 1	2 2 3	3 4 4
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143	0 1 1	2 2 2	3 3 4
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110	0 1 1	1 2 2	2 3 3
2.3	.0107	.0104	.0102								0 1 1	1 1 2	2 2 2
				$.0^2990$	$.0^2964$	$.0^2939$	$.0^2914$				3 5 8	10 13 15	18 20 23
								$.0^2889$	$.0^2866$	$.0^2842$	2 5 7	9 12 14	16 18 21
2.4	$.0^2820$	$.0^2798$	$.0^2776$	$.0^2755$	$.0^2734$						2 4 6	8 11 13	15 17 19
						$.0^2714$	$.0^2695$	$.0^2676$	$.0^2657$	$.0^2639$	2 4 6	7 9 11	13 15 17
2.5	$.0^2621$	$.0^2604$	$.0^2587$	$.0^2570$	$.0^2554$	$.0^2539$	$.0^2523$	$.0^2508$	$.0^2494$	$.0^2480$	2 3 5	6 8 9	11 12 14
2.6	$.0^2466$	$.0^2453$	$.0^2440$	$.0^2427$	$.0^2415$	$.0^2402$	$.0^2391$	$.0^2379$	$.0^2368$	$.0^2357$	1 2 3	5 6 7	8 9 10
2.7	$.0^2347$	$.0^2336$	$.0^2326$	$.0^2317$	$.0^2307$	$.0^2298$	$.0^2289$	$.0^2280$	$.0^2272$	$.0^2264$	1 2 3	4 5 6	7 8 9
2.8	$.0^2256$	$.0^2248$	$.0^2240$	$.0^2233$	$.0^2226$	$.0^2219$	$.0^2212$	$.0^2205$	$.0^2199$	$.0^2193$	1 1 2	3 4 4	5 6 6
2.9	$.0^2187$	$.0^2181$	$.0^2175$	$.0^2169$	$.0^2164$	$.0^2159$	$.0^2154$	$.0^2149$	$.0^2144$	$.0^2139$	0 1 1	2 2 3	3 4 4
3.0	$.0^2135$	$.0^2131$	$.0^2126$	$.0^2122$	$.0^2118$	$.0^2114$	$.0^2111$	$.0^2107$	$.0^2104$	$.0^2100$	0 1 1	2 2 2	3 3 4
3.1	$.0^3968$	$.0^3935$	$.0^3904$								3 6 9	13 16 19	22 25 28
				$.0^3874$	$.0^3845$	$.0^3816$	$.0^3789$				3 6 8	11 14 17	20 22 25
								$.0^3762$	$.0^3736$	$.0^3711$	2 5 7	10 12 15	17 20 22
3.2	$.0^3687$	$.0^3664$	$.0^3641$	$.0^3619$	$.0^3598$						2 4 7	9 11 13	15 18 20
						$.0^3577$	$.0^3557$	$.0^3538$	$.0^3519$	$.0^3501$	2 4 6	8 9 11	13 15 17
3.3	$.0^3483$	$.0^3466$	$.0^3450$	$.0^3434$	$.0^3419$						2 3 5	6 8 10	11 13 14
						$.0^3404$	$.0^3390$	$.0^3376$	$.0^3362$	$.0^3349$	1 3 4	5 7 8	9 10 12
3.4	$.0^3337$	$.0^3325$	$.0^3313$	$.0^3302$	$.0^3291$	$.0^3280$	$.0^3270$	$.0^3260$	$.0^3251$	$.0^3242$	1 2 3	4 5 6	7 8 9
3.5	$.0^3233$	$.0^3224$	$.0^3216$	$.0^3208$	$.0^3200$	$.0^3193$	$.0^3185$	$.0^3178$	$.0^3172$	$.0^3165$	1 1 2	3 4 4	5 6 7
3.6	$.0^3159$	$.0^3153$	$.0^3147$	$.0^3142$	$.0^3136$	$.0^3131$	$.0^3126$	$.0^3121$	$.0^3117$	$.0^3112$	0 1 1	2 2 3	3 4 5
3.7	$.0^3108$	$.0^3104$	$.0^3100$	$.0^496$	$.0^492$	$.0^488$	$.0^485$	$.0^482$	$.0^478$	$.0^475$			
3.8	$.0^472$	$.0^469$	$.0^467$	$.0^464$	$.0^462$	$.0^459$	$.0^457$	$.0^454$	$.0^452$	$.0^450$			
3.9	$.0^448$	$.0^446$	$.0^444$	$.0^442$	$.0^441$	$.0^439$	$.0^437$	$.0^436$	$.0^434$	$.0^433$			

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

$A = \{ 9, 25 \}$
$B = \{ -5, -3, m, 5 \}$

1 Based on the above information, the relation between A and B is defined by the set of ordered pairs $\{ (9, -3), (9, m), (25, -5), (25, 5) \}$.

Berdasarkan maklumat di atas, hubungan antara A dan B dinyatakan sebagai set pasangan tertib $\{ (9, -3), (9, m), (25, -5), (25, 5) \}$.

(a) State the type of relation between set A and set B.
Nyatakan jenis hubungan antara set A dan set B.

(b) Find the value of m.
Cari nilai m.

(c) Using the function notation, write a relation between set A and set B.
Dengan menggunakan tata tanda fungsi, tulis satu hubungan antara set A dengan set B.

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

Answer / *Jawapan*:

(a)

(b)

(c)

---

2 Given the function $g : x \to 3x + m$ and $g^{-1} : x \to 2px + 1$, find the value of m and of p.
[3 *marks*]

Diberi fungsi $g : x \to 3x + m$ *dan* $g^{-1} : x \to 2px + 1$, *cari nilai m dan nilai p.*
[3 *markah*]

Answer / *Jawapan*:

3 Given the functions $h : x \to \frac{6}{x}, x \neq 0,$ and $hg : x \to 4x + 1$, find

Diberi fungsi $h : x \to \frac{6}{x}, x \neq 0,$ *dan* $hg : x \to 4x + 1,$ *cari*

(a) $g(x)$,

(b) $gh(2)$.

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

Answer / *Jawapan*:

(a)

(b)

---

4 The straight line $y = 2x$ does not intersect the curve $y = x^2 + kx + 4$.
Find the range of values of k. [3 *marks*]

Garis lurus $y = 2x$ *tidak bersilang dengan lengkung* $y = x^2 + kx + 4$.
Carikan julat nilai k. [3 *markah*]

Answer / *Jawapan*:

5 Diagram 5 shows the graph of a quadratic function $y=(x - m)^2+n$, where m and n are constants.

Rajah 5 menunjukkan graf fungsi kuadratik $y=(x - m)^2+n$, *dengan keadaan m dan n adalah pemalar.*

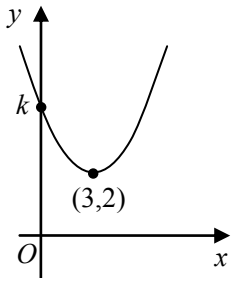


Diagram 5 / *Rajah 5*

Find
Cari

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

(b) the value of k.
nilai k.

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

Answer / *Jawapan*:

(a)

(b)

---

6 Given the quadratic function $f(x) = x^2 - 2qx + 5q$ has a minimum value of $9q$, where $q < 0$.

Diberi fungsi kuadratik $f(x) = x^2 - 2qx + 5q$ *mempunyai nilai minimum* $9q$, *dengan keadaan* $q < 0$.
Find
Cari

(a) the value of q,
nilai q,

(b) the roots of the equation $f(x) = 0$.
punca-punca bagi persamaan $f(x) = 0$.

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

Answer / *Jawapan*:
(a)

(b)

7 Solve the equation:
Selesaikan persamaan:

$$3^x\left(\frac{1}{2}\right)^{x+3} = \frac{81}{128}$$

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

Answer / *Jawapan*:

---

8 Solve the equation $\log_3 2x - \log_3(4x-1) = 1$. [3 *marks*]
Selesaikan persamaan $\log_3 2x - \log_3(4x-1) = 1$. [3 *markah*]

Answer / *Jawapan*:

---

9 The first three terms of a geometric progression are $5x+6$, $2x$ and $x-2$.
Tiga sebutan pertama bagi suatu janjang geometri ialah $5x+6$, $2x$ *dan* $x-2$.

Find
Cari
(a) the positive value of x,
nilai positif bagi x,

(b) the common ratio, using the value of x obtained in 9(a).
nisbah sepunya, dengan menggunakan nilai x *yang diperoleh di* 9(a).

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

Answer / *Jawapan*:
(a)

(b)

10 The sum of the first *n* terms of an arithmetic progression is given by $Sn = \frac{n}{2}[5 - 3n]$.

Hasil tambah n sebutan pertama bagi suatu janjang arithmetik diberi oleh $Sn = \frac{n}{2}[5 - 3n]$.

Find
Cari

(a) the sum of the first 6 terms,
hasil tambah 6 *sebutan pertama,*

(b) the common difference.
beza sepunya.

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

Answer / *Jawapan*:

(a)

(b)

---

11 The second term of a geometric progression is 12. The sum of second term and the third term is 21.
Sebutan kedua suatu janjang geometri ialah 12. *Hasil tambah sebutan kedua dan ketiga ialah* 21.

Find
Cari

(a) the 6^{th} term,
sebutan ke-6,

(b) the sum to infinity of the progression.
hasil tambah hingga ketakterhinggan janjang itu.

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

Answer / *Jawapan*:

(a)

(b)

12 The variables x and y are related by the equation $y = 3x(6 - 2x^2)$. A straight line graph is obtained by plotting $\frac{y}{x}$ against x^2 as shown in Diagram 12.

Pemboleh ubah x dan y dihubungkan oleh persamaan $y = 3x(6 - 2x^2)$. *Graf garis lurus diperoleh dengan memplotkan* $\frac{y}{x}$ *melawan* x^2, *seperti ditunjukkan pada Rajah* 12.

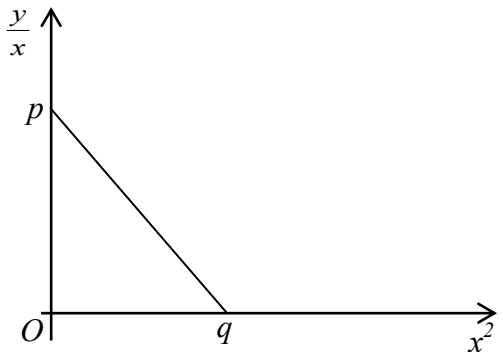


Diagram 12/ *Rajah* 12

Find the value of p and of q. [3 *marks*]
Cari nilai p dan nilai q. [3 *markah*]

Answer / *Jawapan*:

---

13 Diagram 13 shows a straight line PQ.
Rajah 13 *menunjukkan suatu garis lurus PQ*.

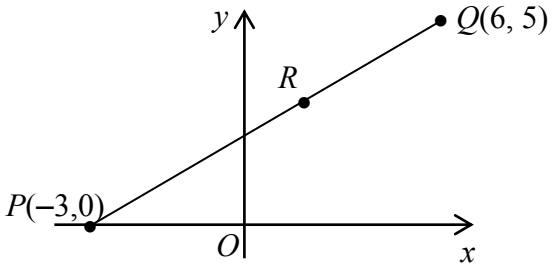


Diagram 13/ *Rajah* 13

The point R lies on PQ such that $PR : RQ = 3 : 2$. Find the coordinates of R. [3 *marks*]
Titik R terletak di atas PQ dengan keadaan $PR : RQ = 3 : 2$. *Cari koordinat R*. [3 *markah*]

Answer / *Jawapan*:

14 Diagram 14 shows a straight line passing through $A(0, -4)$ and $B(6, 0)$.
Rajah 14 *menunjukkan satu garis lurus yang melalui* $A(0, -4)$ *dan* $B(6, 0)$.

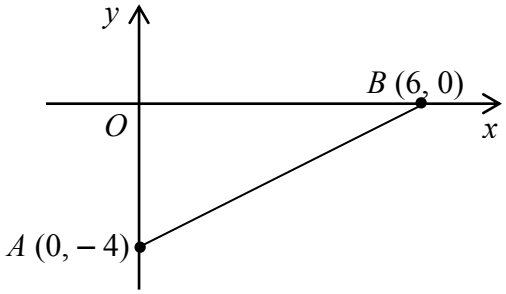


Diagram 14/ *Rajah* 14

(a) Write the equation of the straight line AB in the form $\frac{x}{a}+\frac{y}{b}=1$.

Tulis persamaan garis lurus AB *dalam bentuk* $\frac{x}{a}+\frac{y}{b}=1$.

(b) A point $P(x, y)$ moves such that $PA = 2PB$. Find the equation of the locus P.
Suatu titik $P(x, y)$ *bergerak dengan keadaan* $PA = 2PB$. *Cari persamaan lokus bagi* P.

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

Answer / *Jawapan*:
(a)

(b)

---

15 Given $\underline{p}=8\underline{i}+\underline{j}$, $\underline{q}=-3\underline{i}+9\underline{j}$ and $\underline{p}+\underline{q}-\underline{r}=\underline{i}+7\underline{j}$. Find
Diberi $\underline{p}=8\underline{i}+\underline{j}$, $\underline{q}=-3\underline{i}+9\underline{j}$ *dan* $\underline{p}+\underline{q}-\underline{r}=\underline{i}+7\underline{j}$. *Cari*

(a) $\underline{r}$ in the form $x\underline{i}+y\underline{j}$,
$\underline{r}$ *dalam bentuk* $x\underline{i}+y\underline{j}$,

(b) $|\underline{r}|$.

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

Answer / *Jawapan*:
(a)

(b)

  [Lihat halaman sebelah

16 Diagram 16 shows the vector $\overrightarrow{PR}$.
Rajah 16 *menunjukkan vector* $\overrightarrow{PR}$.

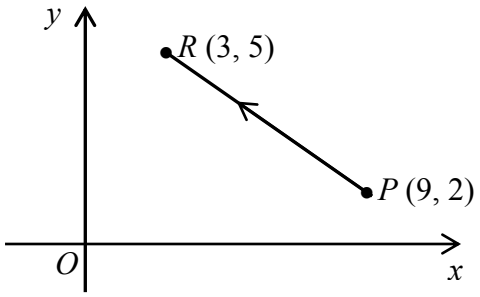


Diagram 16/ *Rajah* 16

(a) Express $\overrightarrow{PR}$ in the form $\begin{pmatrix} x \\ y \end{pmatrix}$.
Ungkapkan $\overrightarrow{PR}$ *dalam bentuk* $\begin{pmatrix} x \\ y \end{pmatrix}$.

(b) It is given that $\overrightarrow{ST} = k\underline{i} + 6\underline{j}$, where k is a constant. $\overrightarrow{ST}$ is parallel to $\overrightarrow{PR}$.
Find the value of k.
Diberi bahawa $\overrightarrow{ST} = k\underline{i} + 6\underline{j}$, *dengan keadaan k ialah pemalar.* $\overrightarrow{ST}$ *adalah selari dengan* $\overrightarrow{PR}$. *Cari nilai k.*

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

Answer / *Jawapan*:

(a)

(b)

17 Diagram 17 shows a sector *AOB* of a circle with centre *O*. The length of arc *AB* is 9.34 cm and the perimeter of sector *AOB* is 30.2 cm.
Rajah 17 *menunjukkan sektor AOB bagi sebuah bulatan berpusat O. Panjang lengkok AB ialah* 9.34 cm *dan perimeter sektor AOB ialah* 30.2 cm.

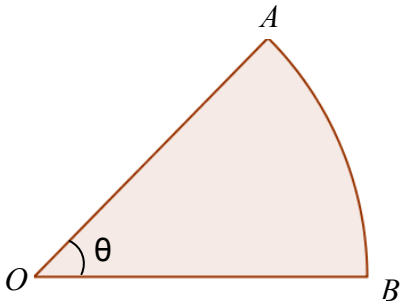


Diagram 17/ *Rajah* 17

Find
Cari

(a) the length, in cm, of radius *OA*,
Panjang, dalam cm, *bagi jejari OA,*

(b) the value of θ , in radian.
nilai θ, *dalam* radian.

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

Answer / *Jawapan*:
(a)

(b)

---

18 Given $\tan \theta = p$, find $\cos^2 \theta$.
Diberi $\tan \theta = p$, *cari* $\cos^2 \theta$.

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

Answer / *Jawapan*:

19 Given $\frac{d}{dx}\left(\frac{2x}{4-x}\right)=g(x)$, find $\int_1^2 g(x)dx$. [3 *marks*]

Diberi $\frac{d}{dx}\left(\frac{2x}{4-x}\right)=g(x)$, *cari* $\int_1^2 g(x)dx$. [3 *markah*]

Answer / *Jawapan*:

---

20 Given $y=2x(x+4)$, find
Diberi $y=2x(x+4)$, *cari*

(a) $\frac{dy}{dx}$,

(b) the value of x when y is minimum,
nilai x *apabila* y *adalah minimum,*

(c) the minimum value of y.
nilai minimum bagi y.

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

Answer / *Jawapan*:

(a)

(b)

(c)

21 The surface area of a sphere is increasing at a constant rate of 9.6π cm^2 s^{-1}.
Find the rate of change of the radius of the sphere at the instant when the radius is 4 cm.
[Surface area of sphere , $A = 4\pi r^2$] [3 *marks*]

Luas permukaan sebuah sfera bertambah pada kadar tetap 9.6π cm^2 s^{-1}.
Cari kadar perubahan jejari sfera pada ketika jejari ialah 4 cm.
[*Luas permukaan sfera* , $A = 4\pi r^2$] [3 *markah*]

Answer / *Jawapan*:

---

22 A set of data consists of 3, 6, 10, 8, 3, 4 and 5.
Determine the interquartile range of the data. [3 *marks*]

Suatu set data terdiri daripada 3, 6, 10, 8, 3, 4 *dan* 5.
Tentukan julat antara kuartil bagi data itu. [3 *markah*]

Answer / *Jawapan*:

23 Kelly has 8 colour pencils, each of a different colour, to be divided equally between 2 girls. Find the number of different ways the division of the colour pencils can be done.
[3 *marks*]

Kelly mempunyai 8 *batang pensel warna, setiap satu berlainan warna, yang dibahagikan sama banyak antara* 2 *orang perempuan. Cari bilangan cara yang berlainan pembahagian pensel warna itu dapat dijalankan.* [3 *markah*]

Answer / *Jawapan*:

---

24 In a selection of a class treasurer, the probability of Siti is chosen is $\frac{1}{4}$, while the probability that either Carol or Siti is chosen is $\frac{2}{5}$.

Find the probability that

Dalam suatu pemilihan seorang bendahari kelas, kebarangkalian Siti dipilih ialah $\frac{1}{4}$ *manakala kebarangkalian Carol atau Siti dipilih ialah* $\frac{2}{5}$.

Cari kebarangkalian bahawa

(a) Carol is chosen,

Carol dipilih,

(b) Siti or Carol is **not** chosen. [3 *marks*]

Siti atau Carol ***tidak*** *dipilih.* [3 *markah*]

Answer / *Jawapan*:

(a)

(b)

25 The discrete random variable X has a binomial probability distribution with $n = 3$, where n is the number of trials. Diagram 25 shows the probability distribution of X.

Pemboleh ubah rawak diskret X mempunyai satu taburan kebarangkalian binomial dengan n = 3, dengan keadaan n ialah bilangan percubaan. Rajah 25 menunjukkan taburan kebarangkalian bagi X.

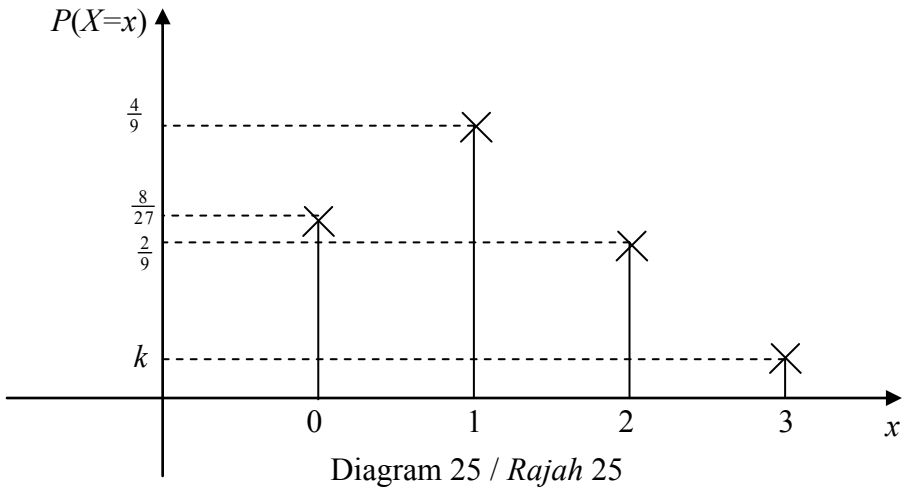


Diagram 25 / *Rajah* 25

Find
Cari

(a) the value of k,
nilai k,

(b) P($X < 2$). [4 *marks*]
[4 *markah*]

Answer / *Jawapan*:

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES

1. This question paper consists of 25 questions.
2. Answer **all** questions.
3. Write your answers in the spaces provided in this question paper.
4. Show your working. It may help you to get marks.
5. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
6. The diagrams in the questions provided are not drawn to scale unless stated.
7. The marks allocated for each question are shown in brackets.
8. A list of formulae and normal distribution table are provided on pages 3 to 6.
9. Four-figure mathematical tables are allowed.
10. You may use a scientific calculator.
11. Hand in this question paper to the invigilator at the end of the examination.

MAKLUMAT UNTUK CALON

1. *Kertas soalan ini mengandungi* 25 *soalan.*
2. *Jawab* **semua** *soalan.*
3. *Jawapan anda hendaklah ditulis pada ruang yang disediakan dalam kertas soalan ini.*
4. *Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.*
5. *Jika anda hendak menukar jawapan, batalkan dengan kemas jawapan yang telah dibuat. Kemudian tulis jawapan yang baharu.*
6. *Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.*
7. *Markah yang diperuntukkan bagi setiap soalan ditunjukkan dalam kurungan.*
8. *Satu senarai rumus dan jadual taburan normal disediakan di halaman* 3 *hingga* 6.
9. *Buku sifir matematik empat angka dibenarkan.*
10. *Anda dibenarkan menggunakan kalkulator saintifik..*
11. *Serahkan kertas soalan ini kepada pengawas peperiksaan pada akhir peperiksaan.*

JABATAN PELAJARAN NEGERI SELANGOR
MAJLIS PENGETUA SEKOLAH MENENGAH

PROGRAM PENINGKATAN PRESTASI AKADEMIK **3472/2**
PERCUBAAN SIJIL PELAJARAN MALAYSIA 2012

ADDITIONAL MATHEMATICS

Kertas 2
September

$2\frac{1}{2}$ jam **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 18 halaman bercetak.

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

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

ALGEBRA / *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 $S_\infty = \dfrac{a}{1 - r}, \quad |r| < 1$

CALCULUS / *KALKULUS*

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

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 generated / *Isi padu janaan*

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

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

STATISTICS / *STATISTIK*

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

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

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

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

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

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*

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

2 Midpoint / *Titik tengah*

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

3 A point dividing a segment of a line
Titik yang membahagi suatu tembereng garis

$(x, y) = \left(\dfrac{nx_1 + mx_2}{m+n}, \dfrac{ny_1 + my_2}{m+n}\right)$

4 Area of triangle / *Luas segi tiga*

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

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

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

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

3 $\sin^2 A + \cos^2 A = 1$

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

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

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

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

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

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

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

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

$= 2\cos^2 A - 1$

$= 1 - 2\sin^2 A$

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

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

$= 1 - 2\sin^2 A$

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

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

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

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

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

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

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

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

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

14 Area of triangle / *Luas segi tiga*

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

KEBARANGKALIAN HUJUNG ATAS $Q(z)$
BAGI TABURAN NORMAL $N(0,1)$

z	0	1	2	3	4	5	6	7	8	9	1 2 3	4 5 6	7 8 9
											TOLAK		
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641	4 8 12	16 20 24	28 32 36
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247	4 8 12	16 20 24	28 32 36
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859	4 8 12	15 19 23	27 31 35
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483	4 7 11	15 19 22	26 30 34
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121	4 7 11	14 18 22	25 29 32
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776	3 7 10	14 17 20	24 27 31
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451	3 7 10	13 16 19	23 26 29
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148	3 6 9	12 15 18	21 24 27
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867	3 5 8	11 14 16	19 22 25
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611	3 5 8	10 13 15	18 20 23
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379	2 5 7	9 12 14	16 19 21
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170	2 4 6	8 10 12	14 16 18
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985	2 4 6	7 9 11	13 15 17
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823	2 3 5	6 8 10	11 13 14
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681	1 3 4	6 7 8	10 11 13
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559	1 2 4	5 6 7	8 10 11
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455	1 2 3	4 5 6	7 8 9
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367	1 2 3	4 4 5	6 7 8
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294	1 1 2	3 4 4	5 6 6
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233	1 1 2	2 3 4	4 5 5
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183	0 1 1	2 2 3	3 4 4
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143	0 1 1	2 2 2	3 3 4
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110	0 1 1	1 2 2	2 3 3
2.3	.0107	.0104	.0102								0 1 1	1 1 2	2 2 2
				$.0^{2}990$	$.0^{2}964$	$.0^{2}939$	$.0^{2}914$				3 5 8	10 13 15	18 20 23
								$.0^{2}889$	$.0^{2}866$	$.0^{2}842$	2 5 7	9 12 14	16 18 21
2.4	$.0^{2}820$	$.0^{2}798$	$.0^{2}776$	$.0^{2}755$	$.0^{2}734$						2 4 6	8 11 13	15 17 19
						$.0^{2}714$	$.0^{2}695$	$.0^{2}676$	$.0^{2}657$	$.0^{2}639$	2 4 6	7 9 11	13 15 17
2.5	$.0^{2}621$	$.0^{2}604$	$.0^{2}587$	$.0^{2}570$	$.0^{2}554$	$.0^{2}539$	$.0^{2}523$	$.0^{2}508$	$.0^{2}494$	$.0^{2}480$	2 3 5	6 8 9	11 12 14
2.6	$.0^{2}466$	$.0^{2}453$	$.0^{2}440$	$.0^{2}427$	$.0^{2}415$	$.0^{2}402$	$.0^{2}391$	$.0^{2}379$	$.0^{2}368$	$.0^{2}357$	1 2 3	5 6 7	8 9 10
2.7	$.0^{2}347$	$.0^{2}336$	$.0^{2}326$	$.0^{2}317$	$.0^{2}307$	$.0^{2}298$	$.0^{2}289$	$.0^{2}280$	$.0^{2}272$	$.0^{2}264$	1 2 3	4 5 6	7 8 9
2.8	$.0^{2}256$	$.0^{2}248$	$.0^{2}240$	$.0^{2}233$	$.0^{2}226$	$.0^{2}219$	$.0^{2}212$	$.0^{2}205$	$.0^{2}199$	$.0^{2}193$	1 1 2	3 4 4	5 6 6
2.9	$.0^{2}187$	$.0^{2}181$	$.0^{2}175$	$.0^{2}169$	$.0^{2}164$	$.0^{2}159$	$.0^{2}154$	$.0^{2}149$	$.0^{2}144$	$.0^{2}139$	0 1 1	2 2 3	3 4 4
3.0	$.0^{2}135$	$.0^{2}131$	$.0^{2}126$	$.0^{2}122$	$.0^{2}118$	$.0^{2}114$	$.0^{2}111$	$.0^{2}107$	$.0^{2}104$	$.0^{2}100$	0 1 1	2 2 2	3 3 4
3.1	$.0^{3}968$	$.0^{3}935$	$.0^{3}904$								3 6 9	13 16 19	22 25 28
				$.0^{3}874$	$.0^{3}845$	$.0^{3}816$	$.0^{3}789$				3 6 8	11 14 17	20 22 25
								$.0^{3}762$	$.0^{3}736$	$.0^{3}711$	2 5 7	10 12 15	17 20 22
3.2	$.0^{3}687$	$.0^{3}664$	$.0^{3}641$	$.0^{3}619$	$.0^{3}598$						2 4 7	9 11 13	15 18 20
						$.0^{3}577$	$.0^{3}557$	$.0^{3}538$	$.0^{3}519$	$.0^{3}501$	2 4 6	8 9 11	13 15 17
3.3	$.0^{3}483$	$.0^{3}466$	$.0^{3}450$	$.0^{3}434$	$.0^{3}419$						2 3 5	6 8 10	11 13 14
						$.0^{3}404$	$.0^{3}390$	$.0^{3}376$	$.0^{3}362$	$.0^{3}349$	1 3 4	5 7 8	9 10 12
3.4	$.0^{3}337$	$.0^{3}325$	$.0^{3}313$	$.0^{3}302$	$.0^{3}291$	$.0^{3}280$	$.0^{3}270$	$.0^{3}260$	$.0^{3}251$	$.0^{3}242$	1 2 3	4 5 6	7 8 9
3.5	$.0^{3}233$	$0^{3}224$	$.0^{3}216$	$.0^{3}208$	$.0^{3}200$	$.0^{3}193$	$.0^{3}185$	$.0^{3}178$	$.0^{3}172$	$.0^{3}165$	1 1 2	3 4 4	5 6 7
3.6	$.0^{3}159$	$.0^{3}153$	$.0^{3}147$	$.0^{3}142$	$.0^{3}136$	$.0^{3}131$	$.0^{3}126$	$.0^{3}121$	$.0^{3}117$	$.0^{3}112$	0 1 1	2 2 3	3 4 5
3.7	$.0^{3}108$	$.0^{3}104$	$.0^{3}100$	$.0^{4}96$	$.0^{4}92$	$.0^{4}88$	$.0^{4}85$	$.0^{4}82$	$.0^{4}78$	$.0^{4}75$			
3.8	$.0^{4}72$	$.0^{4}69$	$.0^{4}67$	$.0^{4}64$	$.0^{4}62$	$.0^{4}59$	$.0^{4}57$	$.0^{4}54$	$.0^{4}52$	$.0^{4}50$			
3.9	$.0^{4}48$	$.0^{4}46$	$.0^{4}44$	$.0^{4}42$	$.0^{4}41$	$.0^{4}39$	$.0^{4}37$	$.0^{4}36$	$.0^{4}34$	$.0^{4}33$			

   [Lihat halaman sebelah

Section A
Bahagian A

[40 *marks*]
[40 *markah*]

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

1 Solve the simultaneous equations $3x + y = 4$ and $2x^2 + x - 3y = 5$.
Give the answers correct to three decimal places. [5 *marks*]

Selesaikan persamaan serentak $3x + y = 4$ *dan* $2x^2 + x - 3y = 5$.
Beri jawapan betul kepada tiga tempat perpuluhan. [5 *markah*]

2 (*a*) Sketch the graph of $y = |2\cos 2x|$ for $0 \le x \le 2\pi$. [4 *marks*]
Lakar graf bagi $y = |2\text{kos}2x|$ *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 for the equation $2 - |2\cos 2x| = \frac{x}{\pi}$ 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 $2 - |2\text{kos}2x| = \frac{x}{\pi}$ *untuk* $0 \le x \le 2\pi$.

Nyatakan bilangan penyelesaian itu. [3 *markah*]

3 Kamal and Mugilan start working on the same day. Kamal earns RM4.00 for the first day. His earnings increases by RM x for every subsequent day. He earns RM40.00 on his 19th day of working. Mugilan earns a fixed salary of RM30.00 per day.

Kamal dan Mugilan mula bekerja pada hari yang sama. Kamal mendapat gaji RM4.00 *pada hari pertama. Gajinya bertambah* RM x *pada setiap hari yang berturutan. Gajinya pada hari yang ke*-19 *adalah* RM40.00. *Mugilan mendapat gaji tetap* RM30.00 *sehari.*

Find
Cari

(*a*) the value of x, [2 *marks*]
nilai x, [2 *markah*]

(*b*) the minimum number of working days when Kamal's total earnings exceed Mugilan's total earnings. [4 *marks*]
bilangan hari bekerja yang minimum apabila jumlah gaji Kamal melebihi jumlah gaji Mugilan. [4 *markah*]

4 (*a*) Given that $y = 3x(2x - 1)$, find the values of x such that $2\frac{dy}{dx} + y = \frac{1}{2}\left(\frac{d^2y}{dx^2}\right)$.
[4 *marks*]

Diberi $y = 3x(2x - 1)$, *cari nilai-nilai* x *dengan keadaan* $2\frac{dy}{dx} + y = \frac{1}{2}\left(\frac{d^2y}{dx^2}\right)$.
[4 *markah*]

(*b*) The gradient function of a curve which passes through $P(2, 4)$ is $3x^2 - x$.
Find the equation of the curve. [3 *marks*]

Fungsi kecerunan bagi suatu lengkung yang melalui $P(2, 4)$ *ialah* $3x^2 - x$.
Cari persamaan lengkung itu. [3 *markah*]

5 A point P moves along an arc of a circle with centre $A(2, -3)$. The arc passes through the point $B(6, 0)$.
Suatu titik P bergerak di sepanjang suatu lengkok bulatan yang berpusat $A(2, -3)$. *Lengkok bulatan itu melalui titik* $B(6, 0)$.

(*a*) Find the equation of the locus of the point P. [4 *marks*]
Cari persamaan lokus bagi titik P. [4 *markah*]

(*b*) Write down the equation of the straight line AB in the form of intercept. [3 *marks*]
Tuliskan persamaan AB dalam bentuk pintasan. [3 *markah*]

   [Lihat halaman sebelah

6 Table 6 shows the frequency distribution of the scores of a group of participants in a competition.
Jadual 6 *menunjukkan taburan kekerapan bagi skor sekumpulan peserta dalam suatu pertandingan.*

Scores ***Skor***	**Number of participants** ***Bilangan peserta***
21 – 25	2
26 – 30	*h*
31 – 35	8
36 – 40	5
41 – 45	4
46 – 50	1

Table 6
Jadual 6

(*a*) It is given that the median score of the distribution is 34.25. Calculate the value of *h*. [3 *marks*]
Diberi bahawa skor median bagi taburan itu ialah 34.25. *Hitung nilai h*. [3 *markah*]

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

Using a scale of 2 cm to 5 scores on the horizontal axis and 2 cm to 1 participant on the vertical axis, draw a histogram to represent the frequency distribution of the scores in Table 6.
Hence, find the mode score. [4 *marks*]

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

(*c*) What is the mode score if the score of each participant is increased by 2? [1 *mark*]
Apakah skor mod jika skor setiap peserta ditambah sebanyak 2? [1 *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, obtained from an experiment. The variables x and y are related by the equation $y = \frac{p^{x+2}}{q}$, where p and q are constants.
Jadual 7 menunjukkan nilai-nilai bagi dua pembolehubah, x dan y, yang diperoleh daripada satu eksperimen. Pembolehubah x dan y dihubungkan oleh persamaan $y = \frac{p^{x+2}}{q}$, *dengan keadaan p dan q ialah pemalar.*

x	–1	0	1	2	3	4
y	1.32	1.58	1.91	2.29	2.75	3.31

Table 7
Jadual 7

(*a*) Based on Table 7, construct a table for the values of $x + 2$ and $\log_{10} y$. [1 *mark*]
Berdasarkan Jadual 7, bina satu jadual bagi nilai-nilai $x + 2$ *dan* $\log_{10} y$. [1 *markah*]

(*b*) Plot $\log_{10} y$ against $x + 2$, using a scale of 2 cm to 1 unit on the $(x + 2)$-axis and 2 cm to 0.05 unit on the $\log_{10} y$-axis.
Hence, draw the line of best fit. [3 *marks*]

Plot $\log_{10} y$ *melawan* $x + 2$, *dengan menggunakan skala* 2 cm *kepada* 1 *unit pada paksi-*$(x + 2)$ *dan* 2 cm *kepada* 0.05 *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) y when $x = 1.5$,
y *apabila* $x = 1.5$,

(ii) p,

(iii) q. [6 *marks*]
[6 *markah*]

   [Lihat halaman sebelah

8 In Diagram 8, the straight line PQ is a tangent to the curve $y = 9 - x^2$ at the point $A(2, 5)$.
Dalam Rajah 8, *garis lurus PQ ialah tangen kepada lengkung* $y = 9 - x^2$ *pada titik* $A(2,5)$.

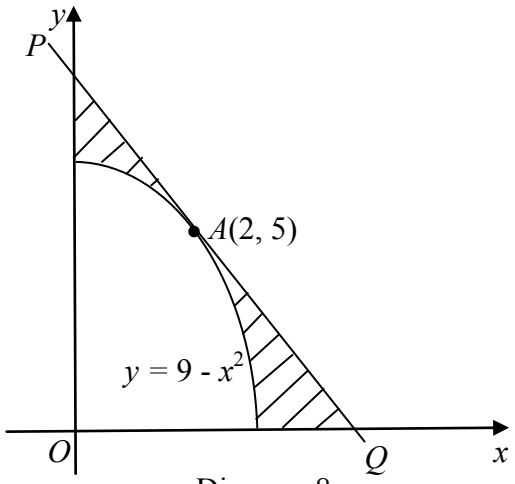


Diagram 8
Rajah 8

Find
Cari

(*a*) the equation of the tangent at A, [3 *marks*]
persamaan tangen pada A, [3 *markah*]

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

(*c*) the volume of revolution, in terms of π, when the region bounded by the curve, the x-axis and the y-axis, is rotated through 360^o about the y-axis. [3 *marks*]

isi padu kisaran, dalam sebutan π, *apabila rantau yang dibatasi oleh lengkung itu, paksi-x dan paksi-y, diputarkan melalui* 360^o *pada paksi-y*. [3 *markah*]

9 Diagram 9 shows a trapezium *OPQR*. The straight line *OQ* intersects the straight line *PR* at the point *T*.

Rajah 9 *menunjukkan trapezium OPQR. Garis lurus OQ dan garis lurus PR bersilang di titik T.*

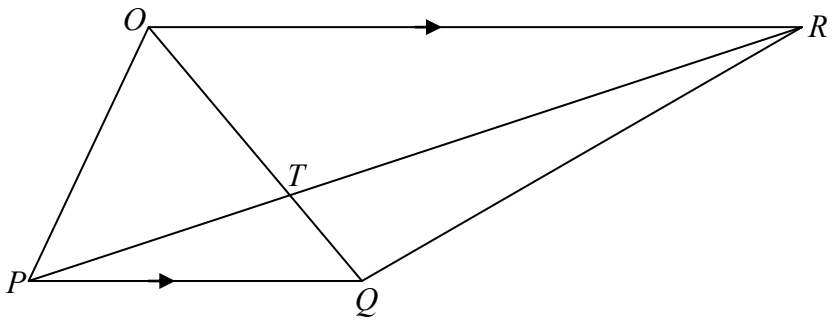


Diagram 9
Rajah 9

It is given that $\overrightarrow{OR} = 6\underline{x}$, $\overrightarrow{OQ} = 3\underline{y}$ and $\overrightarrow{OR} = \overrightarrow{2PQ}$.
Diberi bahawa $\overrightarrow{OR} = 6\underline{x}$, $\overrightarrow{OQ} = 3\underline{y}$ *dan* $\overrightarrow{OR} = \overrightarrow{2PQ}$.

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

(i) $\overrightarrow{QR}$,
(ii) $\overrightarrow{RP}$,
(iii) $\overrightarrow{OP}$.

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

(*b*) If $\overrightarrow{TR} = h\overrightarrow{PR}$ and $\overrightarrow{TQ} = k\overrightarrow{OQ}$ where *h* and *k* are constants, express $\overrightarrow{TR}$ in terms of
Jika $\overrightarrow{TR} = h\overrightarrow{PR}$ *dan* $\overrightarrow{TQ} = k\overrightarrow{OQ}$ *dengan keadaan h dan k ialah pemalar, ungkapkan* $\overrightarrow{TR}$ *dalam sebutan*

(i) *h*, $\underline{x}$ and/*dan* $\underline{y}$.
(ii) *k*, $\underline{x}$ and/*dan* $\underline{y}$.

Hence find the value of *h* and of *k*.
Seterusnya, cari nilai h dan nilai k.

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

10 (*a*) It is found that one out of 10 eggs in a basket is rotten.
Didapati satu daripada 10 *biji telur dalam sebuah bakul adalah rosak.*

(i) If 8 eggs are picked randomly from the basket, calculate the probability that exactly 3 eggs are rotten.
Jika 8 *biji telur dipilih secara rawak daripada bakul tersebut, hitung kebarangkalian bahawa tepat* 3 *biji telur adalah rosak.*

(ii) Given that the variance of the rotten eggs is 5.4, find the total number of eggs in the basket.
Diberi bahawa varians bagi telur yang rosak adalah 5.4*, cari jumlah bilangan telur dalam bakul tersebut.*

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

(*b*) The heights of a group of students have a normal distribution with a mean of 170 cm and a standard deviation of 10 cm.
Tinggi sekumpulan pelajar adalah mengikut taburan normal dengan min 170 cm *dan sisihan piawai* 10 cm.

(i) If a student is chosen at random, calculate the probability that his height is less than 161 cm.
Jika seorang pelajar dipilih secara rawak, hitung kebarangkalian bahawa ketinggiannya kurang daripada 161 cm.

(ii) Given that 55% of the students have heights of more than *k* cm, find the value of *k*.
Diberi bahawa 55% *daripada pelajar mempunyai ketinggian yang melebihi k* cm, *cari nilai k*.

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

11 In Diagram 11, *POQ* and *SOR* aretwo sectors of a circle with centre *O*.
Dalam Rajah 11, *POQ dan SOR ialah dua sektor bagi sebuah bulatan berpusat O*.

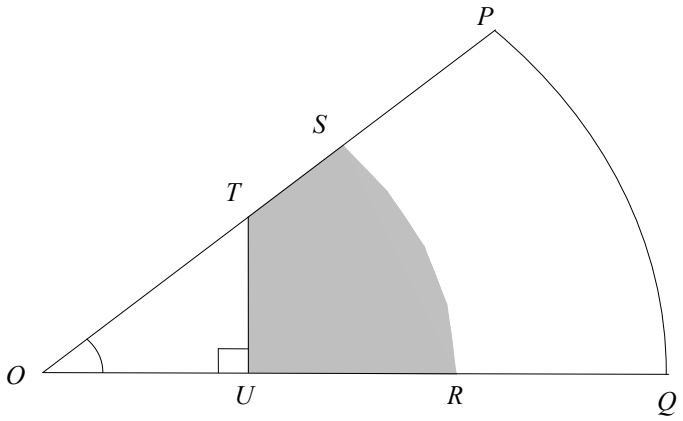


Diagram 11
Rajah 11

It is given that $OT = \sqrt{18}$ cm and $OU = UR = RQ = UT$.
Use $\pi = 3.142$ and give the answers correct to two decimal places.

Diberi $OT = \sqrt{18}$ cm *dan* $OU = UR = RQ = UT$.
Guna $\pi = 3.142$ *dan beri jawapan betul kepada dua tempat perpuluhan.*

Calculate
Hitung

(*a*) $\angle POQ$, in radians, [1 *mark*]
$\angle POQ$, *dalam* radian, [1 *markah*]

(*b*) the perimeter, in cm, of the coloured region, [5 *marks*]
perimeter, *dalam* cm, *kawasan berwarna*, [5 *markah*]

(*c*) the area, in cm^2, of the coloured region. [4 *marks*]
luas, *dalam* cm^2, *kawasan berwarna*. [4 *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 and passes through a fixed point O. Its velocity, v m s $^{-1}$, is given by $v = 6t^2 - 10t - 4$, where t is the time, in seconds, after passing through O. The particle stops instantaneously at a point P.
Suatu zarah bergerak di sepanjang suatu garis lurus dan melalui satu titik tetap O. Halajunya, v m s $^{-1}$, *diberi oleh* $v = 6t^2 - 10t - 4$, *dengan keadaan t ialah masa, dalam saat, selepas melalui O. Zarah itu berhenti seketika di suatu titik P.*

[Assume motion to the right is positive.]
[*Anggapkan gerakan ke arah kanan sebagai positif.*]

Find
Cari

(*a*) the acceleration, in m s $^{-2}$, of the particle at P, [4 *marks*]
pecutan, *dalam* ms $^{-2}$, *bagi zarah itu di P*, [4 *markah*]

(*b*) the maximum velocity, in m s $^{-1}$, of the particle, [3 *marks*]
halaju maksimum, *dalam* m s $^{-1}$, *bagi zarah itu*, [3 *markah*]

(*c*) the distance, in m, travelled during the third second. [3 *marks*]
Jarak, *dalam* m, *yang dilalui dalam saat ketiga*. [3 *markah*]

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

Diagram 13 shows triangle *ABC* and triangle *ABE* where *ADC* and *BDE* are straight lines.
Rajah 13 *menunjukkan segi tiga ABC dan segi tiga ABE dengan keadaan ADC dan BDE ialah garis lurus*.

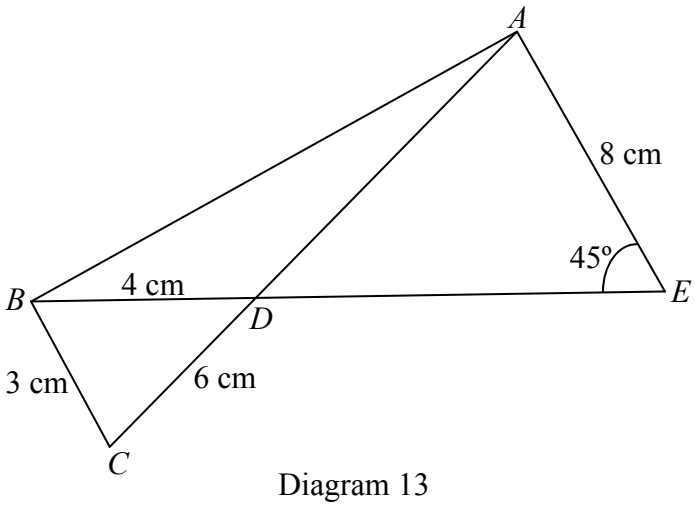


Diagram 13
*R*ajah 13

(*a*) Find
Cari

(i) $\angle BDC$,

(ii) the length, in cm, of *AD*.
panjang, *dalam* cm, *bagi AD*.

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

(*b*) Point *B*' lies on *BD* such that *BC* = *B*'*C*.
Titik B' *terletak pada BD dengan keadaan BC* = *B*'*C*.

(i) Sketch triangle *CB*'*D*.
Lakar segi tiga CB'*D*.

(ii) Find $\angle CB'D$.
Cari $\angle CB'D$.

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

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

   [Lihat halaman sebelah

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

In a month, Ocean Boutique buys x handbags and y pairs of shoes based on the following constraints:
Dalam satu bulan, Butik Ocean membeli x buah beg tangan dan y pasang kasut berdasarkan kekangan berikut:

I The total number of handbags and shoes bought is at least 60.
Jumlah bilangan beg tangan dan kasut yang dibeli adalah sekurang-kurangnya 60.

II The ratio of the number of shoes to the number of handbags should not be more than 3 : 1.
Nisbah bilangan kasut kepada bilangan beg tangan tidak boleh melebihi 3 : 1.

III The cost price of a handbag and a pair of shoes are RM120 and RM60 respectively. The amount allocated for the purchase is RM6000.
Harga kos sebuah beg tangan dan sepasang kasut ialah RM120 *dan* RM60 *masing-masing. Peruntukan yang disediakan untuk pembelian ialah* RM6000.

(*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 $x \geq 0$ *dan* $y \geq 0$, *yang memenuhi semua kekangan di atas.* [3 *markah*]

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

(*c*) The profits made from the sales of a handbag and a pair of shoes are RM20 and RM12 respectively.
Keuntungan yang diperoleh daripada jualan sebuah beg tangan dan sepasang kasut ialah RM20 *dan* RM12 *masing-masing.*

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

(i) the minimum number of handbags if the number of pairs of shoes bought are 40,
bilangan minimum beg tangan jika bilangan pasang kasut yang dibeli ialah 40,

(ii) the maximum profit obtained after all the handbags and shoes bought are sold.
keuntungan maksimum yang diperoleh selepas semua beg tangan dan kasut habis dijual.

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

15 Table 15 shows the price indices and percentage usages of four items, *P*, *Q*, *R* and *S*, which are the main components in the production of a type of badminton racket.

Jadual 15 *menunjukkan indeks harga dan peratus penggunaan bagi empat item, P, Q, R dan S, yang merupakan komponen utama dalam penghasilan sejenis raket badminton.*

Item ***Bahan***	**Price index in the year 2010 based on the year 2008** ***Indeks harga dalam tahun 2010 berasaskan tahun 2008***	**Change of price index from the year 2010 to the year 2012** ***Perubahan indeks harga dari tahun 2010 ke tahun 2012***	**Percentage** ***Peratus*** **(%)**
P	110	Increased by 25% *Bertambah sebanyak* 25%	*h*
Q	120	Unchanged *Tidak berubah*	30
R	125	Unchanged *Tidak berubah*	15
S	150	Decreased by 10% *Berkurang sebanyak* 10%	15

Table 15
Jadual 15

(*a*) Calculate the cost of item *P* in the year 2008 if its cost in the year 2010 is RM180. [2 *marks*]
Hitung kos bagi item P pada tahun 2008 *jika kosnya pada tahun* 2010 *ialah* RM180. [2 *markah*]

(*b*) Calculate
Hitung

(i) the composite index of the cost of making these badminton rackets in the year 2010 based on the year 2008, [3 *marks*]
indeks gubahan bagi kos penghasilan raket badminton ini pada tahun 2010 *berasaskan tahun* 2008, [3 *markah*]

(ii) the production cost of the badminton racket in the year 2010 if its corresponding production cost in the year 2008 is RM400. [2 *marks*]
kos penghasilan raket badminton tersebut pada tahun 2010 *jika kos penghasilan yang sepadan pada tahun* 2008 *ialah* RM400. [2 *markah*]

(*c*) Find the composite index in the year 2012 based on the year 2008. [3 *marks*]
Cari indeks gubahan pada tahun 2012 *berasaskan tahun* 2008. [3 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

   [Lihat halaman sebelah

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. 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.

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

5. The diagrams in the question 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 atau ceraian soalan ditunjukkan dalam kurungan.

7. A list of formulae and normal distribution table are provided on pages 2 to 5.
   Satu senarai rumus dan jadual taburan normal disediakan di halaman 3 *hingga* 6.

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

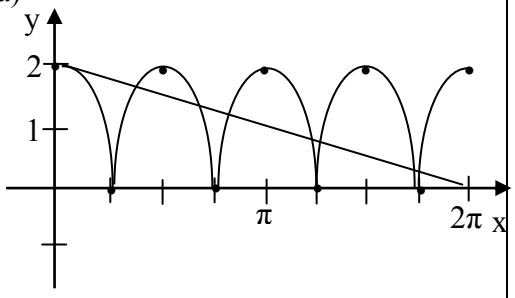
Program Peningkatan Prestasi Akademik Sains & Matematik 2012
Additional Mathematics Marking Scheme – Paper 1 (Ting 5)

1	(a) one to many (b) 3 (c) $f(x)=\sqrt{x}$ *or* $f(x)=x^{\frac{1}{2}}$	**1** **1** **1**	5	(a) $m=3$, $n=2$ (b) $k=11$	**2** **1**
2	$m=-3$, $p=\frac{1}{6}$ $m=-3$ or $p=\frac{1}{6}$ $\frac{x-m}{3}=2px+1$	**3** B2 B1	6	(a) $q=-4$ $-q^2+5q=9q$ (b) $x=2$, $x=-10$ $(x-2)(x+10)=0$	**2** B1 **2** B1
3	(a) $g(x)=\frac{6}{4x+1}$ (b) $\frac{6}{13}$ $\frac{6}{4\left(\frac{6}{x}\right)+1}$ *or* $\frac{6}{4(3)+1}$	**1** **2** B1	7	$x=4$ $\left(\frac{3}{2}\right)^x=\left(\frac{3}{2}\right)^4$ $\frac{3^x}{2^x\cdot 2^3}=\frac{3^4}{2^7}$	**3** B2 B1
4	$-2<k<6$ $(k-6)(k+2)<0$ $(k-2)^2-4(1)4<0$	**3** B2 B1	8	$\frac{3}{10}$ $10x=3$ $\log_3\left(\frac{2x}{4x-1}\right)=1$	**3** B2 B1

9	(*a*) $x = 6$ $\frac{2x}{5x+6} = \frac{x-2}{2x}$ (*b*) $r = \frac{1}{3}$	**2** B1 **1**	13	$\left(\frac{12}{5}, 3\right)$ $\frac{12}{5}$ **or** 3 $x = \frac{3(6)+2(-3)}{3+2}$ or $y = \frac{3(5)+2(0)}{3+2}$	**3** B2 B1
10	(*a*) -39 $S_6 = \frac{6}{2}[5-3(6)]$ (*b*) $d = -3$ $d = -2-1$	**2** B1 **2** B1	14	(*a*) $\frac{x}{6} - \frac{y}{4} = 1$ (*b*) $3x^2 + 3y^2 - 48x - 8y + 128 = 0$ $x^2 + y^2 + 8y + 16 = 4(x^2 - 12x + 36 + y^2)$ $\sqrt{(x-0)^2 + (y+4)^2} = 2\sqrt{(x-6)^2 + (y-0)^2}$	**1** **3** B2 B1
11	(*a*) $3\frac{51}{64}$ $a = 16$ or $r = \frac{3}{4}$ (*b*) 64 $S_\infty = \frac{16}{1-\frac{3}{4}}$	**2** B1 **2** B1	15	(*a*) $\underset{\sim}{r} = 4\underset{\sim}{i} + 3\underset{\sim}{j}$ $5 - x = 1$ **or** $10 - y = 7$ (*b*) 5	**2** B1 **1**
12	$p = 18$, $q = 3$ $p = 18$ **or** $q = 3$ $\frac{y}{x} = -6x^2 + 18$	**3** B2 B1	16	(*a*) $\begin{pmatrix} -6 \\ 3 \end{pmatrix}$ $\vec{PR} = \vec{PO} + \vec{OR}$ (*b*) $k = -12$ $\begin{pmatrix} -6 \\ 3 \end{pmatrix} = \lambda \begin{pmatrix} k \\ 6 \end{pmatrix}$	**2** B1 **2** B1

17	(a) 10.43 $2r + 9.34 = 30.2$ (b) $\theta = 0.8955rad$ $9.34 = 10.43\theta$	**2** B1 **2** B1	22	5 8 or 3 3, 3, 4, 5, 6, 8, 10	**3** B2 B1
18	$\frac{1}{1+p^2}$ $1+p^2 = \frac{1}{\cos^2\theta}$ or $\frac{1}{\sqrt{1+p^2}}$	**2** B1	23	70 ${}^8C_4 \times {}^4C_4$ ${}^8C_4$ *or* ${}^4C_4$	**3** B2 B1
19	$1\frac{1}{3}$ 2 or $\frac{2}{3}$ $\left[\frac{2x}{4-x}\right]_1^2$	**3** B2 B1	24	(a) $\frac{3}{20}$ (b) $\frac{3}{5}$ $1-\frac{2}{5}$	**1** **2** B1
20	(a) $4x + 8$ (b) -2 (c) -8	**1** **1** **1**	25	(a) $\frac{1}{27}$ $\frac{8}{27}+\frac{4}{9}+\frac{2}{9}+k=1$ (b) $\frac{20}{27}$ $\frac{8}{27}+\frac{4}{9}$	**2** B1 **2** B1
21	0.3 cm s^{-1} $9.6\pi = 8\pi r \times \frac{dr}{dt}$ $\frac{dA}{dr} = 8\pi r$	**3** B2 B1			

Program Peningkatan Prestasi Sains & Matematik 2012 (Trial)
Additional Mathematics Marking Scheme - Paper 2

Solution	Marks	Solution	Marks
1 $y = 4 - 3x$ or $x = \frac{4-y}{3}$	P1	**2** a) 	K1 (line)
$2x^2 + x - 3(4-3x) = 5$ **or** $2\left(\frac{4-y}{3}\right)^2 + \left(\frac{4-y}{3}\right) - 3y = 5$	K1	Shape of graph (cos θ)	P1
$2x^2 + 10x - 17 = 0$ **or** $2y^2 - 46y - 1 = 0$		Max = 2 and Min = -2	P1
$x = \frac{-10 \pm \sqrt{10^2 - 4(2)(-17)}}{2(2)}$ **or** $y = \frac{46 \pm \sqrt{(-46)^2 - 4(2)(-1)}}{2(2)}$	K1	2 cycles	P1
$x = 1.341,\ -6.341,$ $y = -0.023,\ 23.023$	N1	Modulus	P1
(Accept : y = -0.022, 23.022) or $y = -0.022,\ 23.022$	N1	b) $y = 2 - \frac{x}{\pi}$	N1
$x = 1.341,\ -6.341,$		Number of solution = 8	N1
	5		**7**
3 a) a = 4, d = x, $T_{19} = 40$		**4**a) $\frac{dy}{dx} = 12x - 3$ **or** $\frac{d^2y}{dx^2} = 12$	K1
$40 = 4 + (19-1)x$	K1		
x = 2	N1	$2(12x-3) + 6x^2 - 3x = 6$	K1
b) $S_n > 30n$		$6x^2 + 21x - 12 = 0$	
$\frac{n}{2}[2(4) + (n-1)2] > 30n$	K1K1	$2x^2 + 7x - 4 = 0$	
$n^2 + 3n > 30n$		$(2x - 1)(x + 4) = 0$	K1
$n^2 - 27n > 0$		$x = \frac{1}{2}, -4$	N1
$n(n-27) > 0$ **Factorise & try to solve**	K1	b) $y = \int (3x^2 - x)dx$	
0 27		$= x^3 - \frac{x^2}{2} + c$	K1
$n > 27$		$4 = 8 - 2 + c$	K1
$n = 28$	N1	$c = -2$	
	6	$y = x^3 - \frac{x^2}{2} - 2$	N1
			7

5 a) $r = \sqrt{[2-(-2)]^2 + (-3-0)^2} = 5$ — K1

Use PA = 5 — K1

$\sqrt{(x-2)^2 + (x+3)^2} = 5$ — K1

$x^2 + y^2 - 4x + 6y - 12 = 0$ — N1

(b) $m = \frac{3}{4}$ — K1

$y - 0 = \frac{3}{4}(x-6)$ — K1

$\frac{x}{6} - \frac{2y}{9} = 1$ — N1

7

6 a) Seen 30.5 **or** 2 + h **or** 8 — P1

$m = 30.5 + \left[\frac{(\frac{20+h}{2})-(2+h)}{8}\right]5 = 34.25$ — K1

h = 4 — N1

(b) Refer to the given histogram:

Correct axes, consistent scale and draw one block correctly — P1

Draw all the blocks correctly — P1

Try to find the mode correctly — K1

Mode = 33.5 — N1

(c) Mod score = 33.5 + 2

= 35.5 — N1

8

x + 2	1	2	3	4	5	6
$\log_{10} y$	0.12	0.20	0.28	0.36	0.44	0.52

N1

Paksi betul, skala seragam & plot 1 titik — K1

Plot semua titiknya dengan betul — N1

Garis lurus penyuaian terbaik — N1

$y = \frac{p^{x+2}}{q}$

$\log_{10} y = (x+2)\log_{10} p - \log_{10} q$ — P1

i) x = 1.5, $\log_{10} y = 0.32$

y = 2.09 — K1 N1

ii) $\log_{10} p = 0.08$

$p = 1.2023$ — K1 N1

iii) $-\log_{10} q = 0.04$

$q = 0.912$ — N1

10

8 a) $\frac{dy}{dx} = -2x = -2(2) = -4$, — K1

$y - 5 = -4(x-2)$ — K1

$y = -4x + 13$ — N1

b)

$Area\Delta = \frac{1}{2} \times 13 \times \frac{13}{4} = \frac{169}{8}$ *or* 21.125

$Area\ under\ curve = \int_0^3 (9 - x^2)dx$

$= \left[9x - \frac{x^3}{3}\right]_0^3$ — K1

$= 27 - 9 - 0$ — K1

$= 18$

$Area = \frac{169}{8} - 18$ — K1

$= \frac{25}{8}$ *or* $3\frac{1}{8}$ *or* 3.125 — N1

c) $Volume = \pi\int_0^9 (9-y)dy$

$= \pi\left[9y - \frac{y^2}{2}\right]_0^9$ — K1

$= \left(81 - \frac{81}{2} - 0\right)\pi$ — K1

$= \frac{81}{2}\pi$ *or* 40.5π — N1

10

9 a) i) $\overrightarrow{QR} = 6\underline{x} - 3\underline{y}$ ii) $\overrightarrow{RP} = \overrightarrow{RQ} + \overrightarrow{QP}$ $= -6\underline{x} + 3\underline{y} - 3\underline{x}$ $= -9\underline{x} + 3\underline{y}$ iii) $\overrightarrow{OP} = \overrightarrow{OR} + \overrightarrow{RP}$ $= 6\underline{x} - 9\underline{x} + 3\underline{y}$ $= -3\underline{x} + 3\underline{y}$ b) i) $\overrightarrow{TR} = h\overrightarrow{PR} = h(3\underline{y} - 9\underline{x})$ $= -9h\underline{x} + 3h\underline{y}$ ii) $\overrightarrow{TR} = \overrightarrow{TQ} + \overrightarrow{QR} = k\overrightarrow{OQ} + \overrightarrow{QR}$ $= k(3\underline{y}) + 6\underline{x} - 3\underline{y}$ $= 6\underline{x} + (3k - 3)\underline{y}$ $6 = -9h \quad . \quad h = -\frac{2}{3}$ $3k - 3 = 3h$ $3k - 3 = -2$ $k = -\frac{1}{3}$	N1 K1 N1 N1 N1 K1 N1 K1N1 N1 **10**	10 a) i) P[X=3] = ${}^{8}C_{3}(0.1)^{3}(0.9)^{5}$ $= 0.03307$ (ii) $npq = 5.4$ $n(0.1)(0.9) = 5.4$ $n = 60$ (b) i) $P[X < 161]$ $= P[Z < \frac{161-170}{10}]$ $= P[Z < -0.9]$ $= 0.1841$ (ii) $P(X > k) = 0.55$ $P(X < k) = 0.45$ $Z = 0.125$ $(Accept\ Z = 0.126)$ $\frac{k - 170}{10} = -0.125$ $k = 168.75$ $(Accept\ k = 168.74)$	K1 N1 K1 N1 K1 N1 K1 P1 K1 N1 **10**
11 a) $\angle POQ = \frac{\pi}{4}$ or 0.7855 rad b) UT = 3 cm **or** UR = 3 cm arc SR = 6(0.7855) = 4.713 ST = $6 - \sqrt{18}$ = 1.7574 P = 3 + 3 + 1.7574 + 4.713 = 12.47 cm c) Area of sector = $\frac{1}{2} \times 6^2 \times 0.7855$ = 14.139 Area of $\Delta = \frac{1}{2} \times 3 \times 3 = 4.5$ Area = 14.139 – 4.5 = 9.639 cm^2	N1 P1 K1 K1 K1 N1 K1 K1 K1 N1 **10**	**12** a) $v = 6t^2 - 10t - 4 = 0$ $3t^2 - 5t - 2 = 0$ $(3t + 1)(t - 2) = 0$ $t = 2$ $a = 12(2) - 10$ $= 14$ m s^{-2} b) $a = 12t - 10 = 0$ $t = \frac{5}{6}$ $v_{max} = 6(\frac{5}{6})^2 - 10(\frac{5}{6}) - 4$ $v_{max} = -8\frac{1}{6}$ m s^{-1} c) $s = 2t^3 - 5t^2 - 4t$ $t = 2, s = -12$ m **or** $t = 3, s = -3$ m d = –3 – (– 12) = 9 m	K1 K1 K1 N1 K1 K1 N1 K1 K1 N1 **10**

13a i) $3^2 = 4^2 + 6^2 - 2(4)(6)\cos \angle BDC$ K1

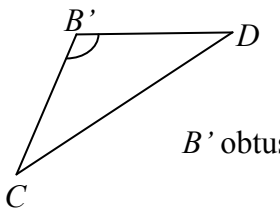
$\angle BDC = 26.38^o$ **or** $26^o\ 23'$ N1

ii) $\angle ADE = 26.38^o$

$\dfrac{AD}{\sin 45^o} = \dfrac{8}{\sin 26.38^o}$ K1

$AD = 12.73$ cm N1

b i)



B' obtuse angle P1

ii) $\dfrac{6}{\sin CB'D} = \dfrac{3}{\sin 26.38^o}$ K1

$\angle CB'D = 180^o - 62.70^o$

$= 117.3^o$ **or** $117^o\ 17'$ **or** $117^o\ 18'$ N1

iii) $\angle B'CD = 180^o - 26.38^o - 117.3^o$

$= 36.32^o$ **or equivalent** K1

Area $= \dfrac{1}{2} \times 3 \times 6 \times \sin 36.32^o$

$= 5.331\ \text{cm}^2$ K1

N1

10

14

(a) I : $x + y \geq 60$ N1

II: $\dfrac{y}{x} \leq \dfrac{3}{1}$

$y \leq 3x$ N1

III: $120x + 60y \leq 6000$

$2x + y \leq 100$ N1

(b) Draw a line correctly K1

Draw all the lines correctly N1

Correct region R N1

(c) (i) 20 N1

(ii) Profit P = 20x + 12y

Let 120= 20 x +12y

Maximum point (20,60) N1

Maximum profit = 20(20)+12(60) K1

= RM 1120 N1

10

15. (a) $\dfrac{180}{Q_{08}} \times 100 = 110$ K1

$Q_{08} = 163.64$ N1

(b)(i)

$\dfrac{110(40) + 120(30) + 125(15) + 150(15)}{100}$ K1K1

$= 121.25$ N1

(ii)

$\dfrac{Q_{10}}{400} \times 100 = 121.25$ K1

$Q_{10} = RM\,485$ N1

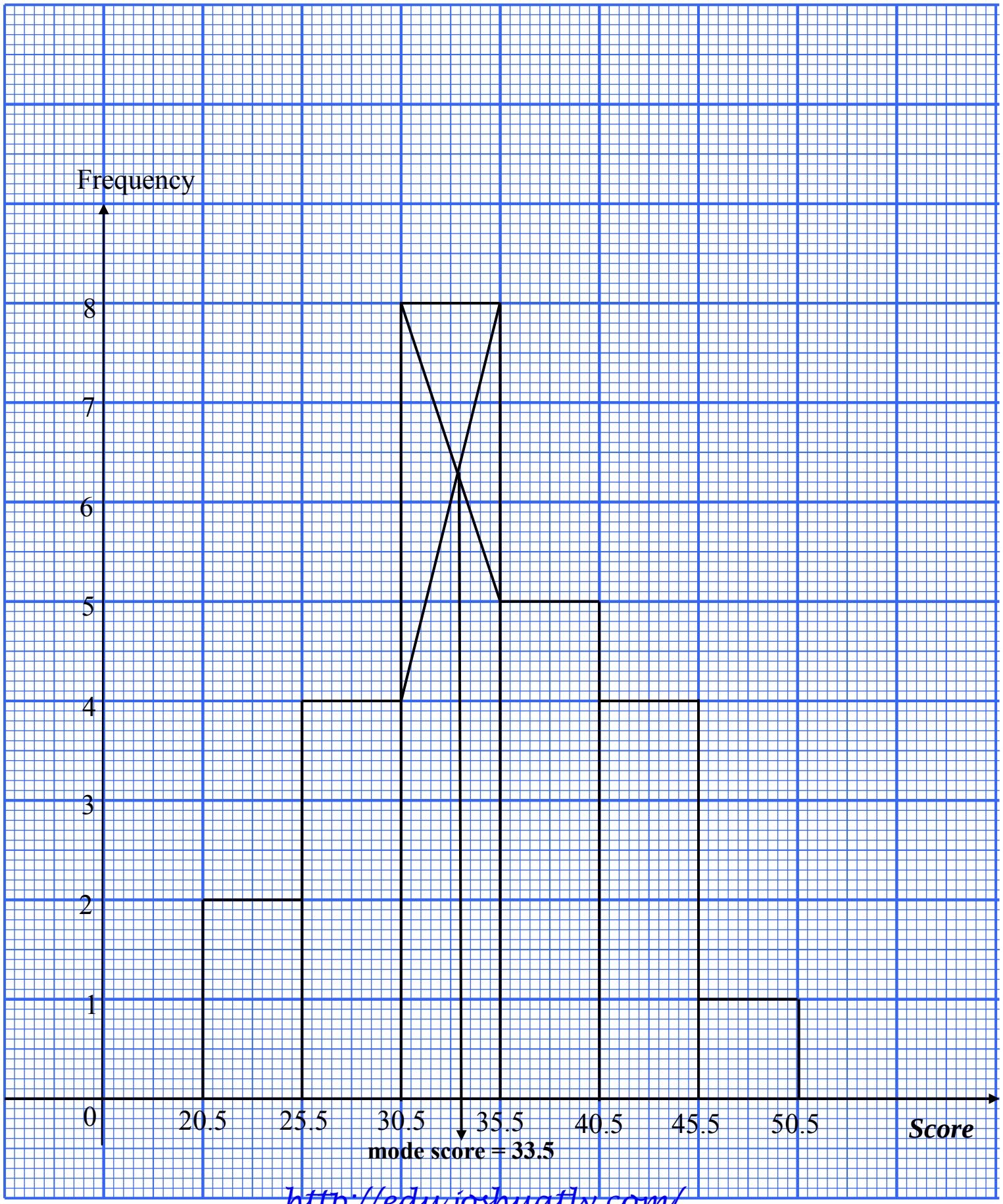
(c) Seen 137.5 and 135 K1

$\dfrac{(137.5 \times 40) + (120 \times 30) + (125 \times 15) + (135 \times 15)}{100}$ K1

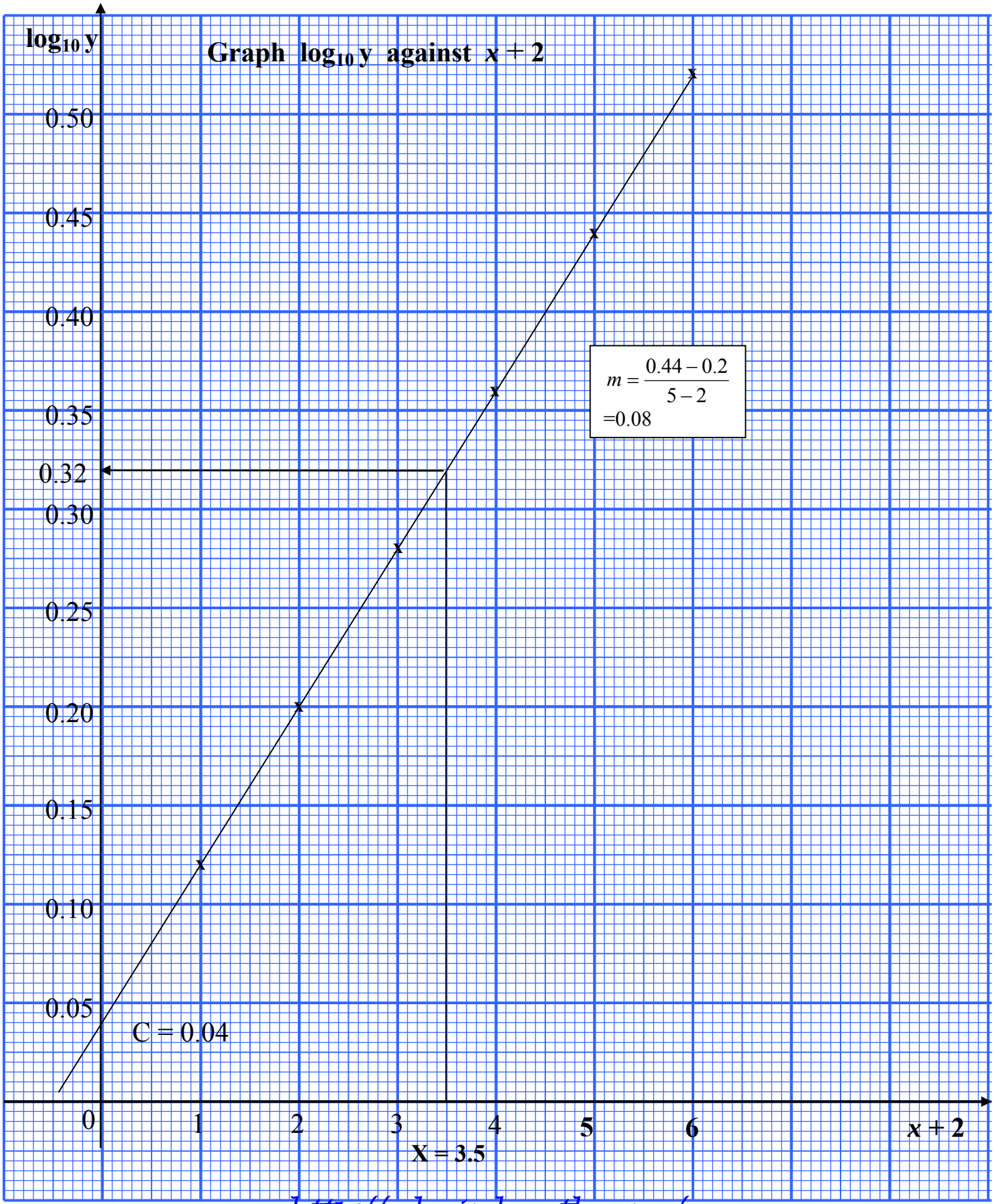
$= 130$ N1

10

Question 6



Question 7



Graph for Question 14