NAMA : …….. TINGKATAN :……..

SULIT
3472/1
Additional Mathematics
Paper 1
Ogos/September 2012
2 Jam

PEPERIKSAAN PERCUBAAN BERSAMA SIJIL PELAJARAN MALAYSIA 2012

ANJURAN
MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM)
CAWANGAN PERLIS

ADDITIONAL MATHEMATICS

Paper 1
Kertas 1

Two hours
Dua jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis* **nama** *dan* **tingkatan** *anda pada ruangan yang disediakan.*

2. *Kertas soalan ini adalah dalam dwibahasa.*

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

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

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

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

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

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

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/*Isipadu janaan*

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

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

GEOMETRY

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

2 Midpoint/*Titik tengah*

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

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

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

4 Area of triangle/ *Luas 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 $\hat{\underline{r}} = \dfrac{x\,\underline{i} + y\,\underline{j}}{\sqrt{x^2 + y^2}}$

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

TRIGONOMETRY/ *TRIGONOMETRI*

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

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

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

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

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

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

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

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

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

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

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

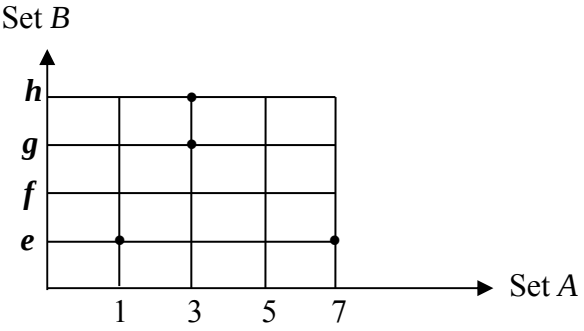
12 $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

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

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

1 Diagram 1 shows the relation between set A and set B in graph form.
Rajah 1 *menunjukkan hubungan antara set* A *dan set* B *dalam bentuk graf.*



Diagram/ *Rajah* 1

State/ *Nyatakan*
(a) the objects of ***e***.
objek-objek bagi ***e***.
(b) the range of the relation.
julat hubungan itu.

[2 marks/ *markah*]

Answer/ *Jawapan* :

---

2 Given the functions $f : x \to 2x + 3$ and $g : x \to x^2 - 5x + 6$, find
Diberi fungsi $f : x \to 2x + 3$ *dan* $g : x \to x^2 - 5x + 6$, *cari*

(a) $f^{-1}(5)$
(b) $gf(x)$

[4 marks/ *markah*]

Answer/ *Jawapan* :

3 Given the function $f : x \to 2x+1$ and the composite function $fg : x \to \frac{3x-5}{2}$, find $g(x)$.

Diberi fungsi $f : x \to 2x+1$ *dan fungsi gubahan* $fg : x \to \frac{3x-5}{2}$, *cari* $g(x)$.

[3 marks/ *markah*]

Answer/ *Jawapan* :

---

4 Given that $g(x) = 0$ is a quadratic equation with roots $\frac{1}{3}$ and -5.

Write the quadratic equation in the general form.

Diberi $g(x) = 0$ *adalah persamaan kuadratik dengan punca* $\frac{1}{3}$ *dan* -5.

Tuliskan persamaan kuadratik itu dalam bentuk am.

[2 marks/ *markah*]

Answer/ *Jawapan* :

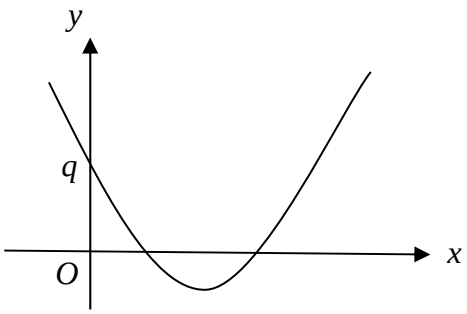
5 Find the value of h if the equation $(h+2)x^2 + 6hx + 9 = 0$ has two equal roots.
Cari nilai h *jika persamaan* $(h+2)x^2 + 6hx + 9 = 0$ *mempunyai dua punca yang sama.*

[3 marks/ *markah*]

Answer/ *Jawapan* :

---

6 Diagram 6 shows the graph of the quadratic function $y = 2(x-5)^2 - p$ which has a minimum value of −3.
Rajah 6 *menunjukkan graf fungsi kuadratik* $y = 2(x-5)^2 - p$ *yang mempunyai nilai minimum* −3.



Diagram/ *Rajah* 6

Find/ *Cari*
(a) the value of p,
nilai p,
(b) the value of q,
nilai q,
(c) the equation of the axis of symmetry
persamaan paksi simetri

[3 marks/ *markah*]

Answer/ *Jawapan* :

7 Find the range of values of x for which $x(3x + 6) \leq 4 + 2x$.
Cari julat nilai x bagi $x(3x + 6) \leq 4 + 2x$.

[3 marks/ *markah*]

Answer/ *Jawapan* :

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8 Given $9^{2n+1} = 27^{n}$, find the value of n.
Diberi $9^{2n+1} = 27^{n}$, *cari nilai n.*

[2 marks/ *markah*]

Answer/ *Jawapan*:

9 Solve the equation $\log_2 x^2 = 2 + \log_2 (2x + 5)$.
Selesaikan persamaan $\log_2 x^2 = 2 + \log_2 (2x + 5)$.

[4 marks/ *markah*]

Answer/ *Jawapan*:

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10 Given $\log_9 y + 2 = \log_3 x$, express y in terms of x.
Diberi $\log_9 y + 2 = \log_3 x$, *ungkapkan* y *dalam sebutan* x.

[3 marks/ *markah*]

Answer/ *Jawapan*:

11 The first two terms of an arithmetic progression are −1 and 3.
Dua sebutan pertama suatu janjang aritmetik ialah −1 *dan* 3.

Find/ *Cari*

(a) the common difference,
beza sepunya,

(b) the sum from the sixth term to the eighteenth term of the progression.
hasil tambah daripada sebutan keenam hingga sebutan kelapan belas janjang tersebut.

[4 marks/ *markah*]

Answer/ *Jawapan*:

---

12 The sum of the first n terms of a geometric progression 2, −6, 18, **...** is −3280.
Find the value of n.

Hasil tambah n sebutan pertama sebuah janjang geometri 2, −6, 18, **...** *ialah* −3280.
Cari nilai bagi n.

[3 marks/ *markah*]

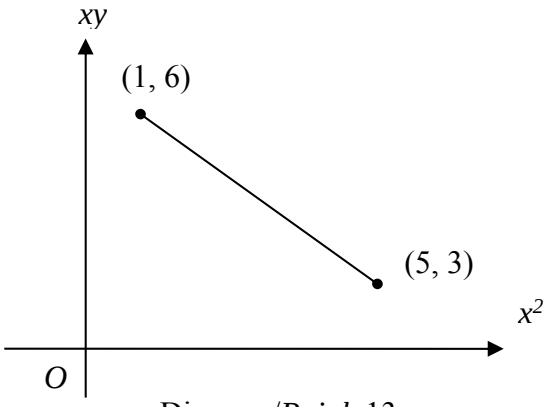
Answer/ *Jawapan*:

13 The variables x and y are related by the equation $y = px + \frac{q}{x}$.

A straight line graph is obtained by plotting xy against x^2, as shown in Diagram 13.

Pembolehubah-pembolehubah x dan y dihubungkan oleh persamaan $y = px + \frac{q}{x}$.

Satu graf garis lurus diperolehi dengan memplotkan xy *melawan* x^2 *seperti dalam Rajah* 13.



Diagram/*Rajah* 13

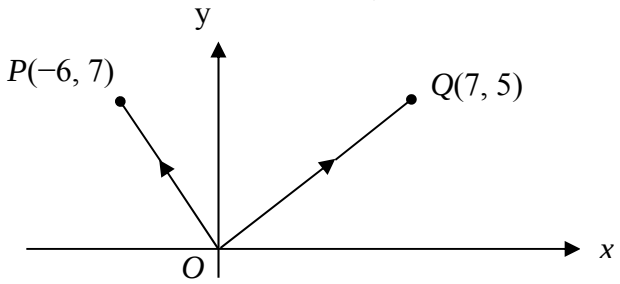
Find the value of p and of q.
Cari nilai p dan q.

[4 marks/ *markah*]

Answer/ *Jawapan*:

14 Diagram 14 shows two vectors, $\overrightarrow{OP}$ and $\overrightarrow{OQ}$.

Rajah menunjukkan dua vektor, $\overrightarrow{OP}$ *dan* $\overrightarrow{OQ}$



Diagram/ Rajah 14

Express $\overrightarrow{PQ}$ in the form $x\underline{i} + y\underline{j}$.

Ungkapkan $\overrightarrow{PQ}$ *dalam bentuk* $x\underline{i} + y\underline{j}$

[2 marks/ *markah*]

Answer/ *Jawapan*:

---

15 Given vectors $\underline{a} = 4\underline{i} + 6\underline{j}$ and $\underline{b} = 2\underline{i} + p\underline{j}$, where p is a constant.

Diberi vektor $\underline{a} = 4\underline{i} + 6\underline{j}$ *dan* $\underline{b} = 2\underline{i} + p\underline{j}$ *dengan keadaan p ialah pemalar.*

(a) Find the value of p if $\underline{a}$ and $\underline{b}$ are parallel.

Cari nilai p jika $\underline{a}$ *dan* $\underline{b}$ *adalah selari.*

(b) By using the value of p in (a), find the value of $|\underline{a} - \underline{b}|$.

Dengan menggunakan nilai p dalam (a), *cari nilai* $|\underline{a} - \underline{b}|$.

[4 marks/ *markah*]

Answer/ *Jawapan*:

16 Solve the equation $\cos^2 x\,(4\tan x - 2\tan^2 x) = 1$ for $0^o \le x \le 360^o$.
Selesaikan persamaan $\kos^2 x\,(4\tan x - 2\tan^2 x) = 1$ *bagi* $0^o \le x \le 360^o$.

[4 marks/ *markah*]

Answer/ *Jawapan*:

---

17 The following information refers to the equations of two straight lines, *CD* and *FG*, which are perpendicular to each other.
Maklumat berikut adalah berkaitan dengan persamaan dua garis lurus, CD dan FG, yang berserenjang antara satu sama lain.

$$CD:\ y = p - \frac{q}{4}x$$

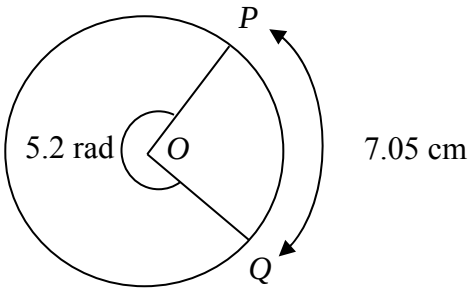
$$FG:\ y = \left(\frac{3p}{2}\right)x + q \quad \text{where } p \text{ and } q \text{ are constants}$$

Express q in terms of p.
Ungkapkan q dalam sebutan p.

[2 marks/ *markah*]

Answer/ *Jawapan*:

18 Diagram 18 shows a circle with centre O.
Rajah 18 *menunjukkan sebuah bulatan berpusat* O.



Diagram/ *Rajah* 18

It is given that the angle of the major sector POQ = 5.2 rad and the length of minor arc PQ = 7.05 cm.
Diberi bahawa sudut sektor major POQ = 5.2 rad *dan panjang lengkok minor* PQ = 7.05 cm.

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

Find/ *Cari*

(a) the length, in cm, of the radian of the circle.
panjang, dalam cm, jejari bagi bulatan itu.

(b) the area, in cm^2 , of minor sector POQ.
luas, dalam cm^2 , sektor minor POQ.

[4 marks/ *markah*]

Answer/ *Jawapan*:

19 Given that $f(x) = 4x^3(2x-3)^4$, find $f'(1)$.
Diberi bahawa $f(x) = 4x^3(2x-3)^4$, *cari* $f'(1)$.

[4 marks/ *markah*]

Answer/ *Jawapan*:

---

20 The area of a circle increases at a rate of 8 cm^2s^{-1}.
Find the rate of change of the radius of the circle when the area of the circle is 16π cm^2.
Luas suatu bulatan meningkat dengan kadar 8 cm^2s^{-1}.
Cari kadar perubahan jejari bulatan itu apabila luas bulatan tersebut ialah 16π cm^2.

[3 marks/ *markah*]

Answer/ *Jawapan*:

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21 Given that $\int_1^3 f(x)dx = 8$. Find the value of p if $\int_1^3 [f(x) + px^2]dx = 60$.
Diberi bahawa $\int_1^3 f(x)dx = 8$. *Cari nilai bagi p jika* $\int_1^3 [f(x) + px^2]dx = 60$.

[4 marks/ *markah*]

Answer/ *Jawapan*:

22 The mean and standard deviation of a set of data $y_1, y_2, y_3, ..., y_n$ are 11 and 4 respectively.
For a new set of data, $9y_1 - 6, 9y_2 - 6, 9y_3 - 6, ..., 9y_n - 6$, find

Min dan sisihan piawai bagi suatu set data $y_1, y_2, y_3, ..., y_n$ *ialah* 11 *dan* 4 *masing-masing*.
Bagi satu set data yang baru, $9y_1 - 6, 9y_2 - 6, 9y_3 - 6, ..., 9y_n - 6$, cari

(a) the mean,
min,

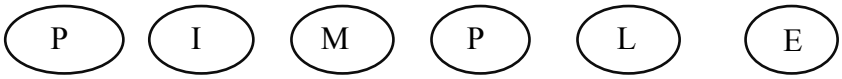
(b) the variance.
varians.

[2 marks/ *markah*]

Answer/ *Jawapan*:

---

23 Diagram shows six cards of different letters.
Rajah menunjukkan enam kad dengan huruf-huruf berbeza.



(a) Find the number of possible arrangements, in a row, of all the cards.
Cari bilangan susunan yang mungkin, dalam satu baris, bagi semua kad itu.

(b) Find the number of these arrangements in which the vowels are side by side.
Cari bilangan susunan ini, di mana vokal terletak bersebelahan.

[4 marks/ *markah*]

Answer/ *Jawapan*:

24 The probabilities of Lee, Mariam and Raja passed a test are $\frac{2}{3}$, $\frac{1}{5}$ and $\frac{3}{4}$ respectively.

Calculate the probability that
Kebarangkalian bahawa Lee, Mariam and Raja lulus suatu ujian ialah masing-masing $\frac{2}{3}$, $\frac{1}{5}$ *dan* $\frac{3}{4}$.
Hitungkan kebarangkalian bahawa

(a) all of them failed the test.
semua mereka gagal ujian itu.

(b) only two of them passed the test.
hanya seorang daripada mereka lulus ujian itu.

[3 marks/ *markah*]

Answer/ *Jawapan*:

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25 The ages of a group 50 students attending a course are normally distributed with a mean of 18.5 years and a standard deviation of 3.0 years.
Umur bagi sekumpulan pelajar menghadiri sebuah kursus adalah bertabur secara normal dengan min 18.5 *tahun dan sisihan piawai* 3.0 *tahun.*

(a) A student is chosen at random, calculate the propability that he is more than 17 years old,
Seorang pelajar dipilih secara rawak, kira kebarangkalian bahawa umurnya lebih daripada 17 *tahun*

(b) Find the mean number of students who are more than 17 years old.
Cari min bilangan pelajar yang umurnya lebih daripada 17 tahun.

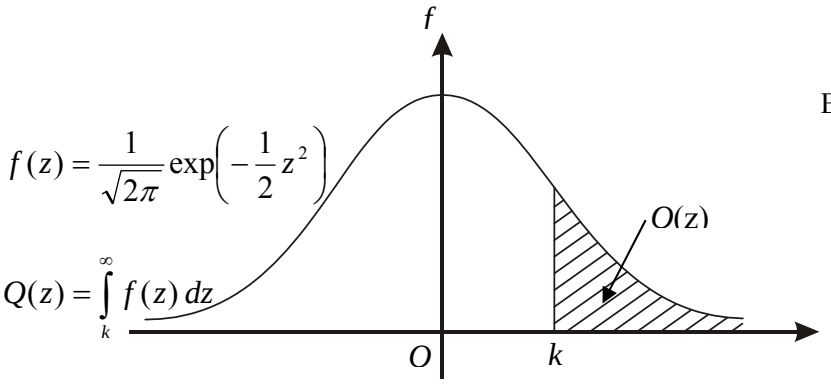
[4 marks/ *markah*]

Answer/ *Jawapan*:

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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

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



Example / *Contoh*:

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

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

$X > k) = Q(k)$

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

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

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

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

3. Write your answers in the space provided in the question paper.
Tulis jawapan anda dalam ruang yang disediakan dalam kertas soalan.

4. Show your working. It may help you to get marks.
Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.

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

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

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

8. A list of formulae is provided on page 2 and 3.
Satu senarai rumus disediakan di halaman 2 *dan* 3.

9. A normal distribution table is provided on page 17.
Satu sifir taburan normal disediakan.

10. You may use a non-programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

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

SULIT
3472/2
Additional Mathematics
Paper 2
Ogos
2012

$2\frac{1}{2}$ Jam

PEPERIKSAAN PERCUBAAN BERSAMA SIJIL PELAJARAN MALAYSIA 2012

ANJURAN
MAJLIS PENGETUA SEKOLAH MALAYSIA (MPSM)
CAWANGAN NEGERI PERLIS

ADDITIONAL MATHEMATICS

Paper 2
Kertas 2

Two and a half hours
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.*

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

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/*Isipadu janaan*

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

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

GEOMETRY

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

2 Midpoint/*Titik tengah*

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

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

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

4 Area of triangle/ *Luas 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 $\hat{\underline{r}} = \dfrac{x\,\underline{i} + y\,\underline{j}}{\sqrt{x^2 + y^2}}$

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

TRIGONOMETRY/ *TRIGONOMETRI*

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

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

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

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

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

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

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

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

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

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

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

Section / *Bahagian* A
[40 marks / *markah*]

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

1 Solve the simultaneous equations $y-3x=1$ and $xy+y+2x=0$.
Give the answers correct to three decimal places.
Selesaikan persamaan serentak $y-3x=1$ *dan* $xy+y+2x=0$.
Beri jawapan anda betul kepada tiga tempat perpuluhan.

[5 marks / *markah*]

2 (a) Given the equation of the curve $y=x^3-3x-1$.

Diberi persamaan satu lengkung $y=x^3-3x-1$
Find / *Cari*

(i) equation of tangent to the curve at $x = 2$.
persamaan tangen bagi garis lengkung itu apabila $x = 2$

[2 marks / *markah*]

(ii) coordinates of turning point.
koordinat titik pertukaran [2 marks / *markah*]

(b) Given gradient function of the curve, $\frac{dy}{dx}=1-2x$ passes through point (−1, 6).
Find the equation of the curve.
Diberi fungsi kecerunan satu garis lengkung, $\frac{dy}{dx}=1-2x$ *dan melalui titik* (1, 6).
Cari persamaan bagi garis lengkung itu. [3 marks / *markah*]

3 Two students, Jazmina and Mei Ling, start to save money at the same time.
Dua orang pelajar, Jazmina dan Mei Ling mula menyimpan wang pada masa yang sama.

(a) Jazmina saves RM x in the first month and her savings increase constantly by RM y every subsequent month. She saves RM120 in the 12th month and her total savings for the first 6 months are RM210. Calculate the values of x and of y.
Jazmina menyimpan wang sebanyak RM x *pada bulan pertama dan simpanannya bertambah secara malar sebanyak* RM y *setiap bulan berikutnya. Simpanannya pada bulan ke-*12 *ialah* RM120 *dan jumlah simpanannya bagi* 6 *bulan pertama ialah* RM210. *Cari nilai x dan y.*

[4 marks / *markah*]

(b) Mei Ling saves RM24 in the first month and her saving increase constantly by RM8 every subsequent month. If Jazmina and Mei Ling save the same amount of money in the nth month, find the value of n.
Mei Ling menyimpan wang sebanyak RM24 pada bulan pertama dan simpanannya bertambah secara malar sebanyak RM8 setiap bulan berikutnya. Jika Jazmina dan Mei Ling menyimpan dengan jumlah wang yang sama pada bulan ke-n, cari nilai n.

[2 marks / *markah*]

4 (a) Sketch the graph of $y = |2\sin 2x|$ for $0 \le x \le \frac{3}{2}\pi$.

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

(b) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $|2\sin 2x| - 1 = \frac{2x}{3\pi}$ for $0 \le x \le \frac{3}{2}\pi$.
State the number of solutions.
Seterusnya, dengan menggunakan paksi yang sama, lakar satu graf yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $|2\sin 2x| - 1 = \frac{2x}{3\pi}$ *untuk* $0 \le x \le \frac{3}{2}\pi$. *Nyatakan bilangan penyelesaian itu.*

[3 marks / *markah*]

5 Table 5 shows the marks obtained by 32 students in an examination.
Jadual 5 *menunjukkan markah yang diperoleh oleh* 32 *orang murid dalam suatu peperiksaan.*

Marks *Markah*	Number of Students *Bilangan murid*
1 – 20	4
21 –40	6
41 – 60	10
61 – 80	8
81 - 100	4

Table/ *Jadual* 5

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

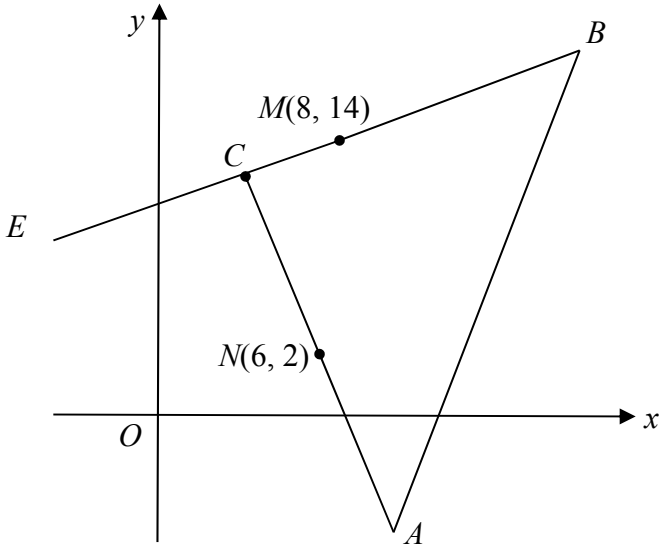
Using a scale of 2 cm to 20 marks on the horizontal axis and 2 cm to 1 student on the vertical axis, draw a histogram to represent the distribution of the marks.
Find the mode score.
Dengan menggunakan skala 2 *cm kepada* 10 *markah pada paksi mengufuk dan* 2 *cm kepada* 1 *orang pelajar pada paksi mencancang, lukis sebuah histogram untuk mewakili taburan markah tersebut.*
Cari skor mod.

[4 marks / *markah*]

(b) Calculate the variance of the marks.
Hitung varians bagi markah tersebut. [3 marks / *markah*]

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

In diagram 6, $M(8, 14)$ and $N(6, 2)$ are the points on the lines BC and AC respectively. BCE is a straight line with gradient $\frac{2}{3}$. The straight line AC is perpendicular to the straight line BE.
Dalam rajah 6, $M(8, 14)$ *dan* $N(6, 2)$ *ialah titik-titik pada garis-garis BC dan AC masing-masing. BCE adalah garis lurus dengan kecerunan* $\frac{2}{3}$ *. Garis lurus AC adalah berserenjang dengan garis lurus BE.*



Diagram/ *Rajah* 6

Find /*cari*

(a) (i) the y-intercept of the line BC,
pintasan-y bagi garis BC,

[2 marks/ *markah*]

(ii) the equation of straight line AC .
Hence , find the coordinates of C .
persamaan garis lurus AC .
Seterusnya cari koordinat C.

[4 marks/ *markah*]

(b) A point $P(x, y)$ moves such that it is always 2 units from point M. Find the equation of the locus of point P.

Satu titik $P(x, y)$ *bergerak dengan keadaan jaraknya dari M adalah sentiasa* 2 *unit Cari persamaan lokus bagi titik P.*

[3 marks/ *markah*]

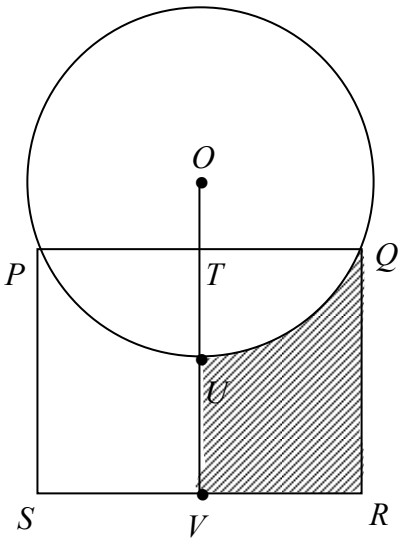
Section B/*Bahagian* B

[40 marks/ *markah*]

Answer any **four** questions from this section.

Jawab mana-mana ***empat*** *soalan daripada bahagian ini.*

7 Diagram 7 shows a circle centre O with radius 8cm and a rectangle $PQRS$, with $RS = 12\text{cm}$ and $QR = 7\text{cm}$. The line $OTUV$ is parallel to QR.
*Rajah 7 menunjukkan sebuah bulatan berpusat O dengan jejari 8*cm *dan sebuah segi empat tepat PQRS dengan* $RS = 12\text{cm}$ *dan* $QR = 7\text{cm}$. Garis lurus $OTUV$ selari dengan QR.



Diagram/ *Rajah* 7

Find/ *Cari*

(a) $\measuredangle POQ$ in radians
$\measuredangle POQ$ *dalam radian* [2 marks / *markah*]

(b) the perimeter, in cm, of the shaded region
perimeter, dalam cm, rantau berlorek [4 marks / *markah*]

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

8 Use a graph paper to answer this question.
Guna kertas graf untuk menjawab soalan ini.

Table 8 shows the experimental values of two variables, x and y.
The variables x and y are related by the equation $y = \frac{k}{x^n}$ where k and n are constant.
Jadual 8 menunjukkan nilai-nilai bagi pembolehubah x dan y yang diperolehi dari suatu ujikaji.
Pembolehubah x dan y dihubung oleh suatu persamaan $y = \frac{k}{x^n}$ *dengan keadaan k dan n adalah pemalar.*

x	2	3	4	5	6	7
y	49.0	31.6	24.0	19.1	15.8	13.2

Table/ *Jadual* 8

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

(b) Plot the graph of $\log_{10} y$ against $\log_{10} x$ using a scale of 2cm to 0.1 unit on the $\log_{10} x$-axis and 2cm to 0.2 unit on the $\log_{10} y$-axis.
Hence draw the line of best fit.

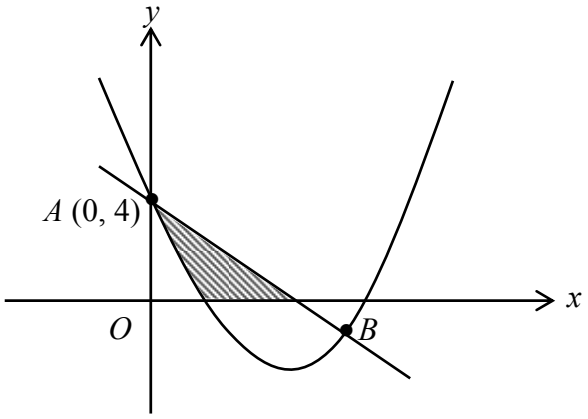
Plot graf bagi $\log_{10} y$ *melawan* $\log_{10} x$ *dengan mengguna skala* 2*cm kepada* 0.1 *unit pada paksi* $\log_{10} x$ *dan* 2*cm kepada* 0.2 *unit pada paksi* $\log_{10} y$.
Lukis garis lurus penyesuaian terbaik.
[3 marks / *markah*]

(b) Using your graph in (a), find
Guna graf anda di (a) *, cari*

(i) the value of k ,
nilai bagi k,

(ii) the value of n.
nilai bagi n.
[5 marks / *markah*]

9 Diagram 9 shows the straight line $y = -x + 4$ intersecting the curve $y = (x-2)^2 - 2x$ at point A (0, 4) and B.
Rajah 9 menunjukkan garis lurus $y = -x + 4$ *bersilang dengan lengkung* $y = (x-2)^2 - 2x$ *pada titik* A (0, 4) and B.



Diagram/ *Rajah* 9

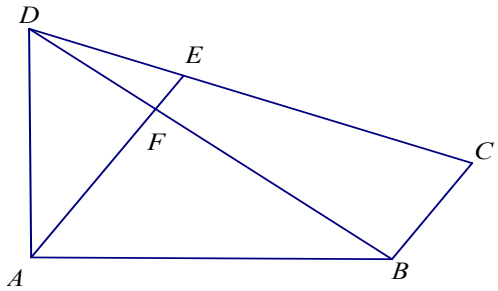
Find/*Cari*

(a) the coordinates of point B,
koordinat titik B [3 marks / *markah*]

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

(c) volume of revolution, in terms of π ,when the region bounded by the curve, x- axis and y- axis is rotated through 360^o about the x-axis.
Isipadu kisaran, dalam sebutan , *apabila rantau yang dibatasi oleh lengkung itu, paksi-x dan paksi-y diputarkan melalui* 360^o *pada paksi-x.*
[3 marks / *markah*]

10



Diagram/*Rajah* 10

In diagram 10, *ABCD* is a quadrilateral. *AFE* and *BFD* are straight lines.
Dalam rajah 10, ABCD ialah sebuah sisi empat. AFE dan BFD ialah garis lurus.

It is given that $\overrightarrow{AB} = 4\underline{x}$, $\overrightarrow{AD} = 2\underline{y}$, $\overrightarrow{CD} = -6\underline{x} + \underline{y}$, $\overrightarrow{BC} = \frac{1}{3}\overrightarrow{AE}$

Diberi bahawa $\overrightarrow{AB} = 4\underline{x}$, $\overrightarrow{AD} = 2\underline{y}$, $\overrightarrow{CD} = -6\underline{x} + \underline{y}$, $\overrightarrow{BC} = \frac{1}{3}\overrightarrow{AE}$

(Continued on the next page/*bersambung di muka surat sebelah)*

(a) Express in terms of $\underline{x}$ and $\underline{y}$

Ungkapkan dalam sebutan $\underline{x}$ *dan/atau* $\underline{y}$

(i) $\overrightarrow{BD}$

(ii) $\overrightarrow{AE}$

(b) Using $\overrightarrow{AF} = h\overrightarrow{AE}$ and $\overrightarrow{BF} = k\overrightarrow{BD}$ where h and k are constants, find the value of h and of k.

Dengan menggunakan $\overrightarrow{AF} = h\overrightarrow{AE}$ *dan* $\overrightarrow{BF} = k\overrightarrow{BD}$, *dengan keadaan h dan k adalah pemalar, cari nilai h dan nilai k.*

(c) Given that $|\underline{x}| = 3$ units, $|\underline{y}| = 2$ units and $\angle BAD = 90°$, find $|\overrightarrow{BD}|$.

Diberi $|\underline{x}| = 3$ *units,* $|\underline{y}| = 2$ *units and* $\angle BAD = 90°$, *cari* $|\overrightarrow{BD}|$.

11 (a) Senior citizens make up 20% of the population of a settlement. 10 people are randomly selected from the settlement.It is given that the variance of the senior citizens is 130.

Warga emas adalah 20% daripada populasi sebuah penempatan. 10 orang telah dipilih secara rawak daripada penempatan itu. Diberi bahawa varians warga emas ialah 130.

Find/*Cari*

i) the probability that at least two of them are senior citizens.
Kebarangkalian bahawa sekurang-kurangnya dua daripada mereka adalah warga emas.

ii) the population of the settlement
populasi penempatan itu.

[5 marks / *markah*]

b) The mass of the workers in a factory is normally distributed with a mean of 67.56 kg and a standard deviation of 6.5kg.

Jisim pekerja dalam sebuah kilang adalah mengikut taburan normal dengan min 67 .56 kg dan sisihan piawai 6.5 kg.

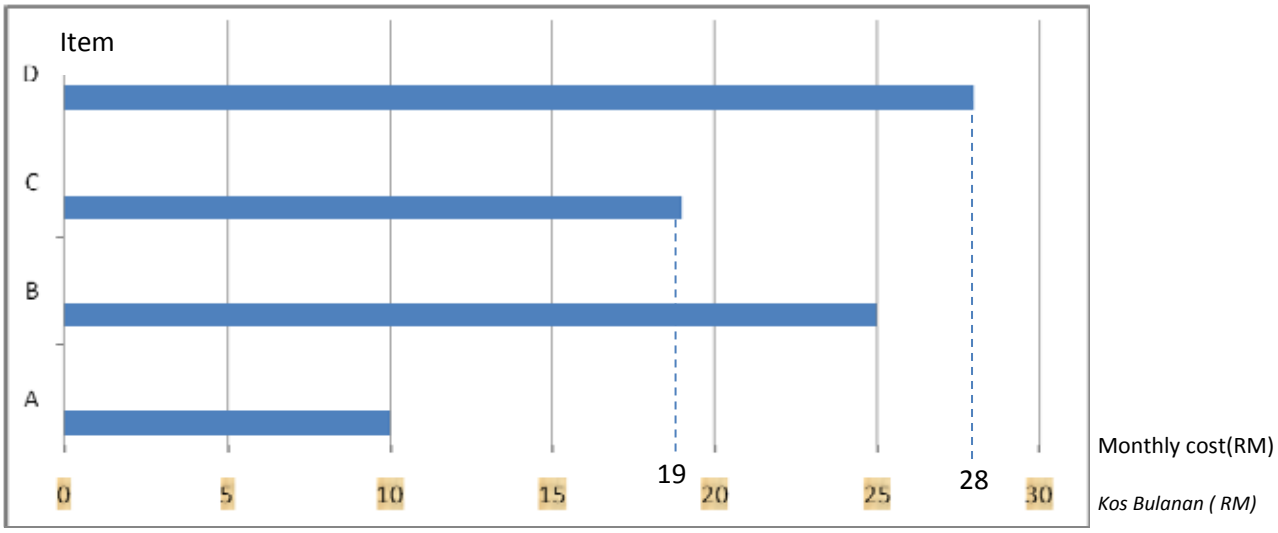
(i) Calculate the probability that a worker chosen at random from this group has a mass of less than 62 kg.
Hitung kebarangkalian bahawa seorang pekerja yang dipilih secara rawak daripada kumpulan itu mempunyai jisim kurang daripada 62 kg.

(ii) If 120 of the workers in the factory weigh between 62 kg and 69 kg., find the total number of the workers in the factory.
Jika 120 orang pekerja kilang itu mempunyai jisim antara 62 kg dan 69 kg.,,cari jumlah bilangan pekerja kilang itu.

[5marks/*markah*]

Section C/ *Bahagian C*
[20 marks/ *markah*]
Answer **two** questions from this section.
*Jawab **dua** soalan daripada bahagian ini.*

12 The bar chart below shows the monthly cost of items A, B, C and D, used to make a type of bag, for the year 2008.
Table 12 shows the prices and the price indices of these items.
Carta Palang di bawah menunjukkan kos bulanan item-item A, B, C dan D ,yang digunakan untuk menghasilkan sejenis beg, untuk tahun 2008.
Jadual 12 *menunjukkan harga dan indek harga untuk item-item itu.*



Item	Price in the year 2008 *Harga dalam tahun 2008*	Price in the year 2010 *Harga dalam tahun 2010*	Price index in the year 2010 based on the year 2008 *Indek Harga pada tahun 2010 ber-dasarkan tahun 2008*
A	0.50	0.80	160
B	1.50	1.80	*x*
C	3.50	4.90	140
D	*y*	10.80	135

Table 12/ *Jadual* 12

(a) Find the value of
Cari nilai
(i) *x*
(ii) *y* [3 marks / *markah*]

(b) Calculate the composite index for the cost of making the bag in the year 2010 based on the year 2008.
Hitung indek gubahan bagi kos penghasilan beg itu pada tahun 2010 berdasarkan tahun 2008.
[3 marks / *markah*]

(Continued on the next page/*bersambung di muka surat sebelah)*

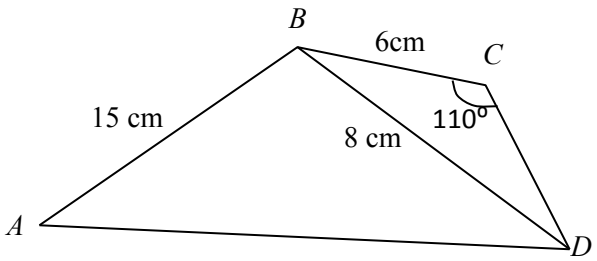
(c) The composite index for the cost of making the bag increases by 55% from the year 2010 to the year 2012.
Indek gubahant untuk kos membuat beg itu meningkat sebanyak 55% *dari tahun* 2010 *ke tahun* 2012.

(i) the composite index of making the bag in the year 2012 based on the year 2008,
indeks gubahan bagi kos membuat beg itu pada tahun 2012 berasaskan tahun 2008.

(ii) the price of the bag in the year 2012 if its corresponding price in the year 2008 is RM 45.
Harga beg itu pada tahun 2012 jika harganya yang sepadan pada tahun 2008 ialah RM 45.

[4 marks / *markah*]

13 Diagram 13 shows a quadrilateral *ABCD*.
Rajah 13 *menunjukkan suatu sisiempat ABCD.*



Diagram/ *Rajah* 13

The area of triangle *ABD* =43 cm^2 and $\angle$ *ABD* is obtuse. It is given that *AB* =15 cm, *BD* =8 cm , *BC*= 6 cm and $\angle$ *BCD* = 110°.
Luas segitiga ABD ialah 43 cm^2 dan $\angle$ *ABD adalah sudut cakah. Diberi AB*=15 cm, , *BC*= 6 cm *and* $\angle$ *BCD* = 110°.
Find/ *Cari*

(a) $\angle$ *ABD,*

[3 marks/*markah*]

(b) the length, in cm, of *AD,*
panjang, dalam cm, AD,

[2 marks/*markah*]

(c) $\angle$ *CBD,*

[3 marks/*markah*]

(d) the area of triangle *BCD.*
luas segitigat BCD.

[2 marks/*markah*]

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

A factory produces two types of pencil, BB pencil and HB pencil , using machine *P* and machine *Q*. Table 14 shows the time taken by machine *P* and machine *Q* to produce the pencils.
Sebuah kilang menghasilkan 2 jenis pensil, pencil BB dan pensil HB, menggunakan mesin P dan mesin Q. Jadual 14 *menunjukkan tempoh masa yang diambil oleh mesin P dan mesin Q untuk menghasilkan pensil-pensil itu.*

Types of pencil *Jenis pensil*	Time taken (minutes) *Tempoh masa (minit)*	
	Machine *P* *Mesin P*	Machine *Q* *Mesin Q*
BB	10	3
HB	6	7

Table / *Jadual* 14

The factory produces *x* BB pencil and *y* HB pencil per day. The production of the pencil per day is based on the following constraints.
Kilang itu menghasilkan x pensil BB dan y pensil HB sehari. Penghasilan pensil untuk sehari adalah berdasarkan kekangan berikut.

I : The total time used by machine *Q* is at least 210 minutes
Jumlah masa yang diperlukan oleh mesin Q ialah sekurang-kurangnya 210 *minit*

II : The total time used by machine *P* is not more than 600 minutes
Jumlah masa yang diperlukan oleh mesin P ialah tidak melebihi 600 *minit.*

III : The number of HB pencil produced is not more than two times the number of BB pencil
Bilangan pensil HB yang dihasilkan tidak melebihi dua kali bilangan pensil BB

(a) Write three inequalities, other than $x \geq 0$ and $y \geq 0$, which satisfy all the above constraints
Tuliskan tiga ketaksamaan , selain daripada $x \geq 0$ *dan* $y \geq 0$ *yang memenuhi semua kekangan di atas.*

[3 marks/*markah*]

(b) Using the scale of 2 cm to 10 pencil on both axes , construct and shade the region R which satisfies all the above constraints.
Dengan menggunakan skala 2 cm kepada 10 pensil pada kedua-dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di atas.

[3 marks/*markah*]

(Continued on the next page/*bersambung di muka surat sebelah)*

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

(i) the maximum number of BB pencil if 40 HB pencil are produced per day
bilangan maksima pensil BB jika 40 *pencil HB dihasilan sehari*.

(ii) the minimum cost needed for the factory in a day to produce the pencils if the cost of one BB pencil is RM0.80 and one pencil HB is RM0.50.
kos minima yang diperlukan oleh kilang dalam sehari untuk menghasilkan pensil jika kos bagi sebatang pensil BB ialah RM0.80 *dan sebatang pensil HB ialah* RM0.50.

[4 marks/*markah*]

15 A particle moves in a straight line and passes through a fixed point *O*. Its velocity *v* ms^{-1} is given by $v = 2t^2 - 11t + 12$, where *t* is the time in seconds after leaving *O*.
Suatu zarah bergerak sepanjang suatu garis lurus melalui satu titik tetap O. Halaju zarah itu v ms^{-1} *diberi oleh* $v = 2t^2 - 11t + 12$, *dengan keadaan t ialah masa dalam saat selepas melalui O.*

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

Find/*Cari*

(a) the initial velocity of the particle,
halaju awal zarah itu, [1 mark / *markah*]

(b) the values of *t* when the particle is momentarily at rest,
nilai-nilai t apabila zarah itu berhenti seketika, [2 marks / *markah*]

(c) the distance between the two positions where the particle is momentarily at rest,
jarak antara kedua kedudukan di mana zarah itu berhenti seketika,
[3 marks / *markah*]

(d) the velocity of the particle when its acceleration is 9 ms^{-1}.
halaju zarah itu apabila pecutannya ialah 9 ms^{-1}. [4 marks / *markah*]

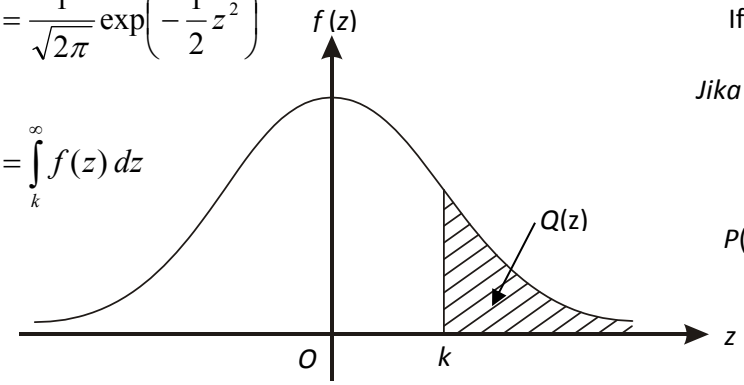
END OF QUESTION PAPER
KERTAS SOALAN TAMAT

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

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

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

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



Example / *Contoh*:

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

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

$X > k) = Q(k)$

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

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of 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**, four questions in **Section B** and two questions in **Section C.**
Jawab ***semua*** *soalan dalam* ***Bahagian A, empat*** *soalan dalam* ***Bahagian B*** *dan* ***dua*** *soalan dalam* ***bahagian C.***

3. Write your answer on the answer sheets provided. If the answer sheets is insufficient, you may ask for extra paper from the invigilator.
Jawapan anda hendaklah ditulis dalam kertas jawapan yang disediakan. Sekiranya kertas jawapan tidak mencukupi, sila dapatkan kertas tambahan daripada pengawas peperiksaan.

4. Show your working. It may help you to get marks.
Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.

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

6. The marks allocated for each question and sub-part of a question are shown in brackets.
Markah yang diperuntukkan bagi setiap soalan dan ceraian soalan ditunjukkan dalam kurungan.

7. A list of formulae is provided on page 2 and 3.
Satu senarai rumus disediakan di halaman 2 dan 3.

8. Graph papers and the normal distribution table are provided.
Kertas graf dan sifir taburan normal disediakan.

9. You may use a non-programmable scientific calculator.
Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

10. Tie the answer sheets and graph papers together and hand in to the invigilator at the end of the examination.

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

PEPERIKSAAN PERCUBAAN BERSAMA SPM NEGERI PERLIS 2012 ADDITIONAL MATHEMATICS PAPER 1			
No.	Answer	Sub-mark	Total marks
1.	(a) 1 and 7 (b) {e, g, h}	1 1	2
2.	(a) 1 B1 : $2x + 3 = 5$ or $f^{-1}(x) = \frac{x-3}{2}$ (b) $4x^2 + 2x$ B1 : $(2x + 3)^2 - 5(2x + 3) + 6$	2 2	4
3.	$\frac{3x-7}{4}$ B2: $4g(x)+2=3x-5$ B1: $2g(x)+1=\frac{3x-5}{2}$	3	3
4.	$3x^2 + 14x - 5$ B1 : $(3x - 1)(x + 5) = 0$	2	2
5.	$h = -1$ or $h = 2$ B2 : $(h + 1)(h - 2) = 0$ B1 : $(6h)^2 - 4(h + 2)(9) = 0$	3	3
6.	(a) $p = 3$ (b) $q = 47$ (c) $x = 5$	1 1 1	3
7.	$-2 \le x \le \frac{2}{3}$ B2: $(3x - 2)(x + 2) \le 0$ B1 : $3x^2 + 4x - 4 \le 0$	3	3
8.	$n = -2$ B1: $3^{2(2n+1)} = 3^{3n}$ or $4n + 2 = 3n$ or equivalent	2	2
9.	$x = 10$ or $x = -2$ B3: $x^2 - 8x - 20 = 0$ B2: $\frac{x^2}{2x+5} = 4$ B1: $\log_2 \frac{x^2}{2x+5} = 2$	3	3
10.	$y = \frac{x^2}{81}$ B2: $\log_3 y - 2\log_3 x = -4$ or equivalent B1: $\frac{\log_3 y}{\log_3 9} + 2 = \log_3 x$	3	3

11.	(a) 4 (b) 559 B2: $s_{18} - s_5 = 594 - 35$ B1: $s_{18} = \frac{18}{2}[2(-1) + (17)(4)]$ or $s_5 = \frac{5}{2}[2(-1) + (4)(4)]$	1 3	 4
12.	n = 8 B2 : $\frac{2[(-3)^n - 1]}{-3-1} = -3280$ B1: r = −3	3	 3
13.	$a = -\frac{3}{4}, b = \frac{27}{4}$ B3 : either one correct B2 : $xy = ax^2 + b$ B1 : gradient = $\frac{3-6}{5-1}$	4	 4
14.	$13\underline{i} - 2\underline{j}$ B1 : $6\underline{i} - 7\underline{j} + 7\underline{i} + 5\underline{j}$	2	 2
15.	(a) $p = 3$ B1 : $4\underline{i} + 6\underline{j} = \lambda(2\underline{i} + p\underline{j})$ (b) $\sqrt{13}$ B1 : $2\underline{i} + 3\underline{j}$	2 2	 4
16.	$18^o26', 45^o, 198^o26', 225^o$ B3 : $18^o26', 45^o$ B2 : $(3\tan x - 1)(\tan x - 1) = 0$ or $\tan x = \frac{1}{3}$ or $\tan x = 1$ B1 : $(4\tan x - 2\tan^2 x = 1 + \tan^2 x$	4	 4
17.	$m = \frac{8}{3n}$ B1 : $\left(\frac{-m}{4}\right)\left(\frac{3n}{2}\right) = -1$	2	 2
18.	(a) 6.5 B1 : 1.084 radians (b) 22.9 B1 : $\frac{1}{2}(6.5)(1.084)$	2 2	 4

19.	-44 B3 : $4x^2(2x-3)^2(2x+9)$ B2 : $4x^3\left[4(2x-3)^3(2)\right]-12x^2(2x-3)^4$ B1 : $4(2x-3)^3(2)$ or $12x^2$	4	4
20.	$\frac{1}{\pi}$ cms^{-1} B2 : Use of chain rule : $8 = 2\pi r \times \frac{dr}{dt}$ or equivalent B1 : $\frac{dA}{dr} = 2\pi r$ or $r = 4$cm	3	3
21.	6 B3 : $\frac{p(3)^3}{3} - \frac{p(1)^3}{3} = 52$ B2 : $8 + \left[\frac{px^3}{3}\right]_1^3 = 60$ B1 : $\frac{px^3}{3}$ is seen	4	4
22.	(a) 93 (b) 1296	1 1	2
23.	(a) 720 B1 : 6! (b) 240 B1 : 5!×2!	2 2	4
24.	(a) $\frac{1}{15}$ (b) $\frac{29}{60}$ B1 : $(\frac{2}{3}\times\frac{1}{5}\times\frac{1}{4})+(\frac{2}{3}\times\frac{4}{5}\times\frac{3}{4})+(\frac{1}{3}\times\frac{1}{5}\times\frac{3}{4})$	1 2	3
25.	(a) 0.6915 B1 : $P(z > \frac{17-18.5}{3})$ (b) 34 B1 : 50 × 0.6915	2 2	4

ANSWER TRIAL PAPER 2, 2012
SECTION A

1. $y = 1 + 3x$ *or* $x = \dfrac{y-1}{3}$ 1M

Substitute x or y into eqn. 2. 1M

$x(1+3x) + (1+3x) + 2x = 0$ **or**

$y\left(\dfrac{y-1}{3}\right) + y + 2\left(\dfrac{y-1}{3}\right) = 0$ or equivalent

$3x^2 + 6x + 1 = 0$ **or**

$y^2 + 4y - 2 = 0$

$x = \dfrac{-6 \pm \sqrt{6^2 - 4(3)(1)}}{2(3)}$ 1M

or

$y = \dfrac{-4 \pm \sqrt{4^2 - 4(1)(-2)}}{2(1)}$

x = −0.184 , – 1.816 1M

y = 0.448//0.449 , – 4.448// – 4.449 1M

2. (a) $\dfrac{dy}{dx} = 3x^2 - 3$, *and subt.* $x = 2$ 1M

(2,1) 1M

$y - 1 = 9(x - 2)$ 1M

$y = 9x - 17$ 1M

(b) $\int 1 - 2x\,dx = x - \dfrac{2x^2}{2} + c$ 1M

$6 = (-1) - (-1)^2 + c$ 1M

The equation, $y = x - x^2 + 8$ 1M

3. (a) $x + 11y = 120$ 1M

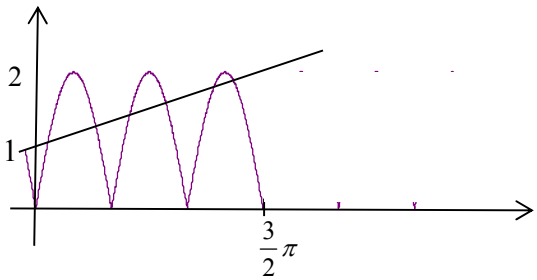
$\dfrac{6}{2}[2x + (6-1)y] = 210$ 1M

x = 10, y = 10 1M, 1M

(b) 10 + (n-1)(10) = 24+(n-1)(8) 1M

n = 8 1M

4. (a)



graph Sin 1M

Max 2 and min 0 1M

$1\frac{1}{2}$ cycle 1M

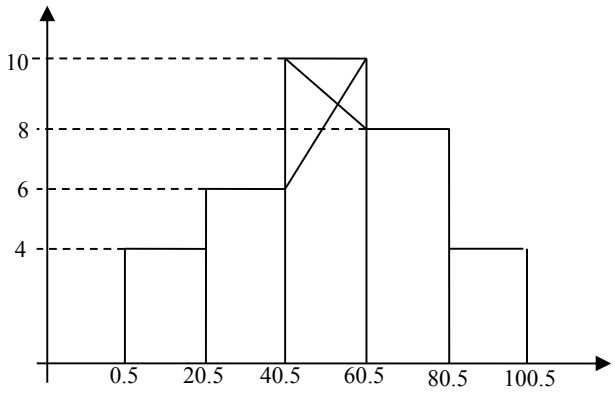
Graph modulus 1M

(b) $y = \dfrac{2x}{3\pi} + 1$ 1M

Draw straight line graph 1M

No. of solution = 6 1M

5. a)



Use correct interval 1M

Correct frequencies 1M

Draw intersecting lines for mode 1M

a) mode = 54.5 1M

b) $\sum fx^2 = 104048$ or

Mean = 1656/ 32 = 51.75 1M

Use formula 1M

Variance = $\dfrac{104048}{32} - 51.75^2$

= 573.44 1M

6. a) i. $\dfrac{14-p}{8-0} = \dfrac{2}{3}$ 1M

y-intercept = $\dfrac{26}{3}$ 1M

ii. mAC = $-\dfrac{3}{2}$

$y - 2 = -\dfrac{3}{2}(x - 6)$ 1M

$y = -\dfrac{3}{2}x + 11$ 1M

Solve $y = -\dfrac{3}{2}x + 11$ and $y = \dfrac{2}{3}x + \dfrac{26}{3}$ 1M

C $\left(\dfrac{14}{13}, \dfrac{122}{13}\right)$ 1M

b) $\sqrt{(y-14)^2 + (x-8)^2} = 2$ 1M, 1M

$y^2 + x^2 - 28y - 16x + 256 = 0$ 1M

7. a) $\sin \angle POT = \frac{6}{8}$ 1M

$\angle POQ = 1.696$ 1M

b) Arc QU = 8 x 0.848 1M

OT = $\sqrt{8^2 - 6^2}$ 1M

Perimeter
= arc QU + QR + RV + VU
= 6.784 + 7 + 6 + 4.292 1M
= 24.076 1M
Accept 24.08

8. a)

$\log_{10} x$	0.3010	0.4771	0.6021	0.6990	0.7782	0.8451
$\log_{10} y$	1.690	1.50	1.38	1.281	1.199	1.121

2M

b) $\log_{10} y = \log_{10} k - n \log_{10} x$ 1M
All 6 points plotted 2M
Line of best fit 1M

c) (i) $\log_{10} k = \log_{10} y$ – int *ercept* 1M
$k =$ 100 1M

(ii) $-n =$ *gradient* 1M
$n = -1.034$ 1M

9. a) Solve equations
$y = -x + 4$ *and* $y = (x-2)^2 - 2x$ 1M
$x = 5$ 1M
$B\ (5, -1)$ 1M

b)
$\int_0^1 (x^2 - 6x + 4)dx = \frac{x^3}{3} - \frac{6x^2}{2} + 4x$ 1M
use limit 0 to 1 1M
Area = $\frac{1}{2} \times 4 \times 4$ - 1.454 1M
= 6.546//6.55 1M

(c) $V = \pi \int_0^{0.76} (x^2 - 6x + 4)^2 dx$

$= \pi \left[\frac{x^5}{5} - \frac{12x^4}{4} + \frac{44x^3}{3} - \frac{48x^2}{2} + 16x \right]_0^{0.76}$

at least two terms correct 1M
use limit 1M
= 3.79π 1M

10. a) $\overrightarrow{BD} = \overrightarrow{BA} + \overrightarrow{AD}$ or $\overrightarrow{BC} = \overrightarrow{BA} + \overrightarrow{AD}$ 1M

$\overrightarrow{BD} = -4\underline{x} + 2\underline{y}$ 1M

$\overrightarrow{AE} = 6\underline{x} + 3\underline{y}$ 1M

b) $\overrightarrow{AF} = h(6\underline{x} + 3\underline{y})$

$\overrightarrow{AF} = 4\underline{x} + k(-4\underline{x} + 2\underline{y})$ 1M

$6h = 4 - 4k$ and
$3h = 2k$ 1M

Solve equations
$6(\frac{2k}{3}) = 4 - 4k$ 1M

$k = \frac{1}{2}$, $h = \frac{1}{3}$ 1M1M

c) $\left|\overrightarrow{BD}\right|^2 = [4(3)]^2 + [2(2)]^2$ 1M

$= \sqrt{160}$ 1M

11.
a) (i) ${}^{10}C_r \times (0.2)^r \times (0.8)^{8-r}$ 1M

P(X ≥ 2) = 1 – P (X=0) – P(X=1)
or
P (X=2) + P(X=3) +…….+P(X=10) 1M
= [1 – 0.1074 – 0.2684]
= 0.6242 1M
(ii) n (0.2)(0.8) = 130 1M
n = 812//813 1M

b) $z = \frac{x - 67.56}{6.5}$ 1M

(i) P(Z < – 0.8554)
= 0.1962//0.1963 1M

(ii) P(-0.8554< z < 0.222) = 0.3916 1M

$\frac{120}{n(S)} = 0.3916$ 1M
306// 307 1M

12. (a) *Use of* $I = \frac{Q_1}{Q_0} \times 100$ 1M

$x = 120$ 1M

$y = 8$ 1M

(b) $160(10) + 120(25) + 140(19) + 135(28)$ 1M

$\frac{160(10) + 120(25) + 140(19) + 135(28)}{10 + 25 + 19 + 28}$ 1M

134.63 1M

(c) (i)

$\frac{134.63 \times 155}{100}$ 1M

= 208.68 1M

(ii) $\frac{Q_{12}}{30} \times 100 = 208.68$ 1M

$Q_{12} = 62.60$ 1M

14. (a) Area ΔABD = 43

$\frac{1}{2}(15)(8)\sin \angle ABD = 43$ 1M

45.78^{O} or $45^{o}47'$ 1M

$\angle ABD = 134.22^{O}$ // $134^{O}13'$ 1M

(b) $CD^2 = 15^2 + 8^2 - 2(15)(8)\cos 134.22$ 1M

CD = 21.36 cm 1M

c) $\frac{8}{Sin\,110^{o}} = \frac{6}{Sin \angle CDB}$ 1M

44.81^{o} // $44^{O}49'$ 1M

$\angle CBD = 25.19^{o}$ // $25^{O}11'$ 1M

d)

Area $= 43 + \frac{1}{2}(6)(8)\sin 25.19$ 1M

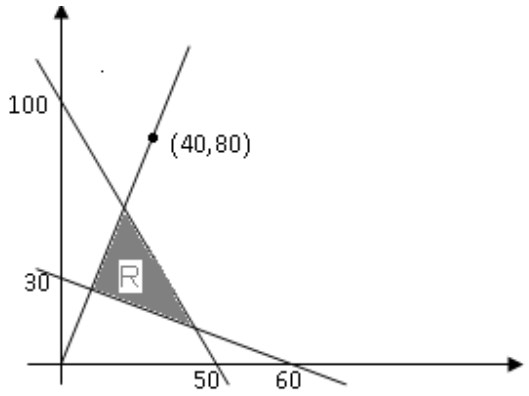
= 53.21 1M

15. (a) I : $3x + 7y \le 210$ 1M

II : $10x + 6y \le 600$ 1M

III : $y \le 2x$ 1M

(b)



One straight line drawn 1M

The other two straight lines drawn 1M

Region R 1M

(c)(i) 36 1M

(ii) Minimum point (13, 25) 1M

minimum cost= 0.8 (13) + 0.5 (25) 1M

= 22.90 1M

. 15. (a) 12 1M

(b) $2t^2 - 11t + 12 = 0$ 1M

$(2t - 3)(t - 4) = 0$ 1M

$t = \frac{3}{2}$, $t = 4$ 1M

(c) $s = \int_{\frac{3}{2}}^{4} 2t^2 - 11t + 12\,dt = \frac{2t^3}{3} - \frac{11t^2}{2} + 12t$

1M

Total distance , $= \left| \frac{2t^3}{3} - \frac{11t^2}{2} + 12t \right|_{\frac{3}{2}}^{4}$

1M

$= 80\frac{5}{6}$ // 80.83 1M

(d) $4t - 11$ 1M

$4t - 11 = 9$ 1M

$t = 5$ 1M