Name : ………………..……………

Form : …………………………..……

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM 2013
ADDITIONAL MATHEMATICS
Kertas 1
Sept 2013
2 jam   **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 Diperolehi
1	2	
2	3	
3	3	
4	3	
5	3	
6	4	
7	4	
8	3	
9	3	
10	2	
11	4	
12	4	
13	3	
14	3	
15	3	
16	3	
17	4	
18	2	
19	4	
20	4	
21	3	
22	4	
23	3	
24	3	
25	3	
TOTAL	**80**	

Kertas soalan ini mengandungi **22** halaman bercetak dan **2** halaman tidak bercetak.

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

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

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

   $= \displaystyle\int_a^b y \ dx$ or

   $= \displaystyle\int_a^b x \ dy$

5   Volume generated

   $= \displaystyle\int_a^b \pi y^2 \ dx$ or

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

GEOMETRY

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

2   Midpoint

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

3   $|\underset{\sim}{r}| = \sqrt{x^2 + y^2}$

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

5   A point dividing a segment of a line

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

6   Area of triangle

   $= \dfrac{1}{2}\left|(x_1y_2 + x_2y_3 + x_3y_{1_1}) - (x_2y_1 + x_3y_2 + x_1y_3)\right|$

STATISTICS

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

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 $\mu = np$

13   $\sigma = \sqrt{npq}$

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

TRIGONOMETRY

1   Arc length, $s = r\theta$

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

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

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

5   $\csc^2 A = 1 + \cot^2 A$

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

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

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

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

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

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

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

1

Diagram 1 shows the relation between *x* and *f*(*x*).
Rajah 1 *menunjukkan hubungan antara x dan f(x).*
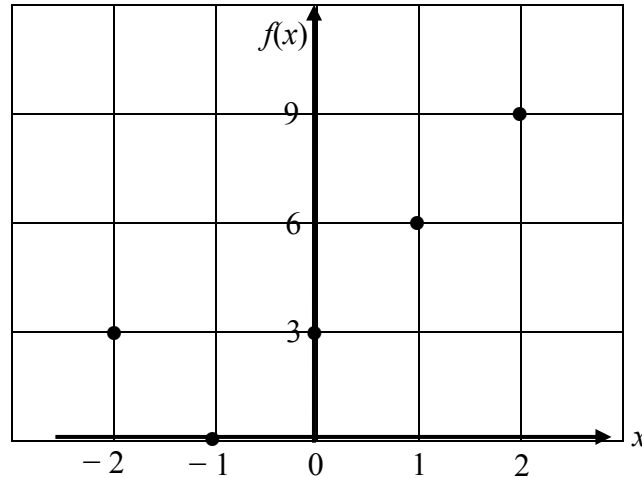

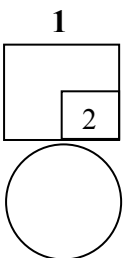Diagram 1
Rajah 1

State
Nyatakan

(*a*) the object of 9 ,
   objek bagi 9 ,

(*b*) the type of relation between *x* and *f*(*x*).
   jenis hubungan antara x dan f(x).

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

Answer/*Jawapan*:

(*a*)

(*b*)

1

2

2   The functions f^{-1} and fg are defined as $f^{-1} : x \rightarrow 4 - 3x$ and $fg : x \rightarrow x - 3$. Find

Fungsi-fungsi f^{-1} dan fg ditakrifkan sebagai $f^{-1}: x \rightarrow 4 - 3x$ dan fg : $x \rightarrow x - 3$.
Cari

(a) $f^{-1}(3)$.

(b) $g(x)$

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

Answer/*Jawapan*:

(a)

(b)

2

3

3   Given that function $f(x) = 2x + 3$ and $g(x) = k\,x$. Find the value of

Diberi fungsi $f(x) = 2x + 3$ dan $g(x) = k\,x$. Cari nilai bagi

(a) $f(2)$,

(b) k if $fg(1) = 11$.

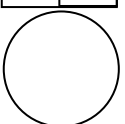   *k jika $fg(1) = 11$.*

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

Answer/*Jawapan*:

(a)

(b)

3

3

4   The quadratic equation $(1+2q)x^2 - x - 1 = 0$, where q is a constant, has two different roots. Find the range of values of q.
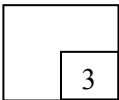
[3 *marks*]

Persamaan kuadratik $(1+2q)x^2 - x - 1 = 0$, dengan keadaan q ialah pemalar, mempunyai dua punca yang berbeza. Cari julat nilai q.

[3 *markah*]

Answer/*Jawapan*:

4
3

5   Find the range of values of x for $(x+3)(x-3) \ge \dfrac{5x}{2}$.

[3 *marks*]

Cari julat nilai x bagi $(x+3)(x-3) \ge \dfrac{5x}{2}$.

[3 *markah*]

Answer/*Jawapan*:

5
3
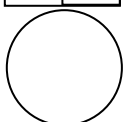
6   Diagram 6 shows the graph of a quadratic function $f(x) = p(x-q)^2 + r$, where p, q and r are constants, has a maximum point at $(1,-3)$.

Rajah 6 menunjukkan graf fungsi kuadratik $f(x) = p(x-q)^2 + r$, dengan keadaan p, q dan r ialah pemalar, mempunyai titik maksimum di $(1,-3)$.
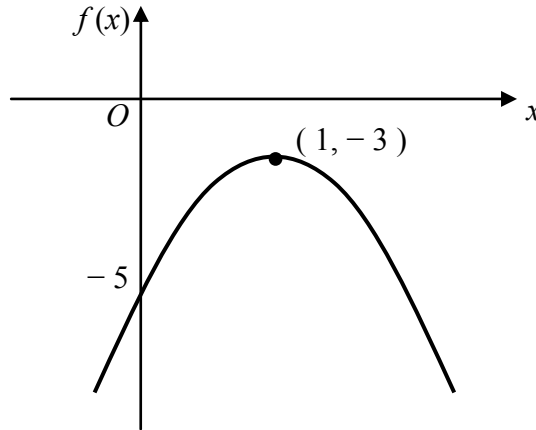

Diagram 6
Rajah 6

(*a*)   Find the value of p and of r .
     Cari nilai p dan nilai r .

(*b*)   State the equation of the axis of symmetry of the curve.
     Nyatakan persamaan paksi simetri bagi lengkung itu.

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

Answer/*Jawapan*:
(*a*)

(*b*)

6

4

7 Solve the equation :
Selesaikan persamaan :

$$16\left(2^{3x}\right) - 2^{3x+2} = 48$$

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

Answer/*Jawapan*:

8 It is given that $-55, -48, -41, ...,$ is an arithmetic progression. The nth term of this progression is greater than 100. Find the least value of n.
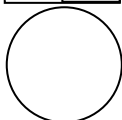
[3 *marks*]

Diberi $-55, -48, -41, ...,$ *ialah satu janjang aritmetik. Sebutan ke-n janjang ini adalah lebih besar daripada* 100. *Cari nilai n yang terkecil.*

[3 *markah*]

Answer/*Jawapan*:

9 It is given that the first term of arithmetic progression is −3. If the sum of the first five terms is equal to eighth term, find the common difference of the progression.

[3 *marks*]

Diberi bahawa sebutan pertama bagi janjang arithmetic ialah −3. Jika hasil tambah lima sebutan pertama adalah bersamaan dengan sebutan kelapan, cari beza sepunya bagi janjang tersebut.

[3 *markah*]

Answer/*Jawapan*:

10 Given that the first term of a geometric progression is 2 and the sum to infinity of the progression is $\dfrac{3}{2}$. Find the common ratio of the progression.

[2 *marks*]

Diberi sebutan pertama bagi suatu janjang geometri ialah 2 dan hasil tambah hingga ketakterhinggaan bagi janjang tersebut ialah $\dfrac{3}{2}$. Cari nisbah sepunya bagi janjang tersebut.

[2 *markah*]

Answer/*Jawapan*:
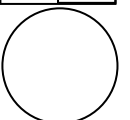
11 A straight line graph is obtained by plotting $\log_2 y$ against x, as shown in Diagram 11.

Graf garis lurus diperoleh dengan memplot $\log_2 y$ *melawan* x, *seperti ditunjukkan pada rajah* 11.
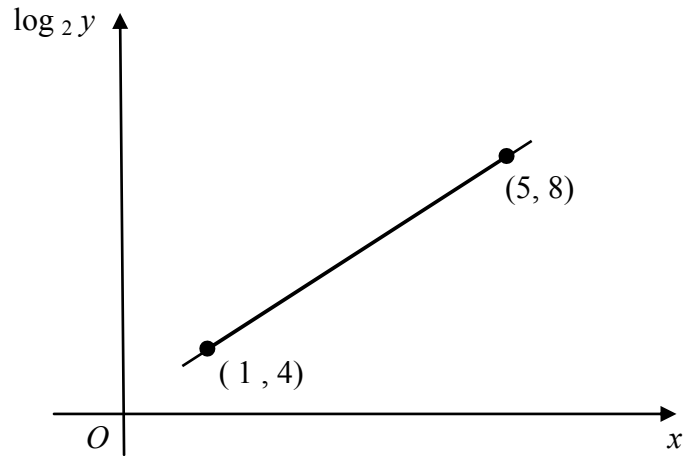
Diagram 11
Rajah 11

Express y in terms of x
Ungkapkan y dalam sebutan x

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

Answer/*Jawapan*:

11

4

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly
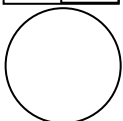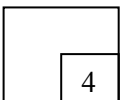
12 In Diagram 12, *PQR* is a straight line with a gradient of −2. The *x*-coordinate of
point *R* is 6 .
Dalam Rajah 12*, PQR ialah garis lurus dengan kecerunan −2. Koordinat-x bagi
titik R ialah* 6 .
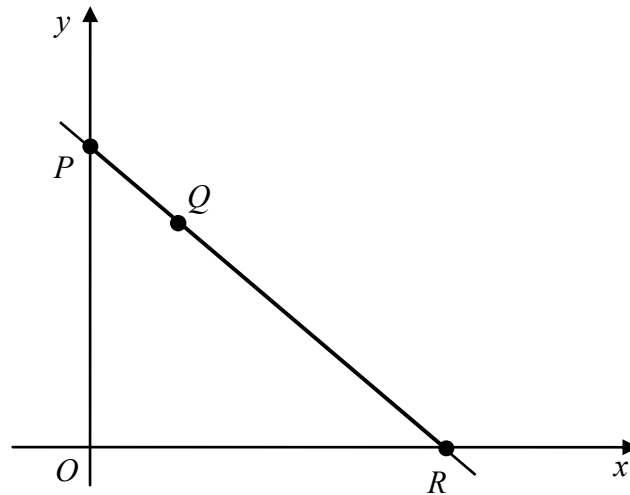
Diagram 12
Rajah 12

(*a*) Find the equation of the straight line *PR*.
     Cari persamaan garis lurus PR.

(*b*) Point *Q* divides the straight line *PR* internally in the ratio *PQ* : *QR* = 1 : 5. Find the
     coordinates of *Q* .
     Titik Q membahagi dalam garis lurus PR dengan nisbah PQ : *QR* = 1 : 5. *Cari
     koordinat titik Q* .

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

Answer/*Jawapan*:

(*a*)

(*b*)

12

4

13 Solve the equation $\log_2 p + \log_4 p = 9$.

Selesaikan persamaan $\log_2 p + \log_4 p = 9$.

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

Answer/*Jawapan*:

13
3

14 The point $P(2, 3)$, $Q(5, 0)$, $R(1, -2)$ and $S(-3, -1)$ are the vertices of a quadrilateral.
Find the area of the quadrilateral *PQRS*.

[3 *marks*]

Titik-titik $P(2, 3)$, $Q(5, 0)$, $R(1, -2)$ dan $S(-3, -1)$ ialah bucu-bucu sebuah sisiempat.
Cari luas bagi sisiempat PQRS itu.

[3 *markah*]

Answer/*Jawapan*:

14
3
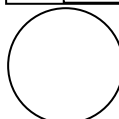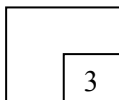
15   Diagram 15 shows two vectors, $\overrightarrow{OA}$ and $\overrightarrow{OB}$.

Rajah 15 *menunjukkan dua vektor* $\overrightarrow{OA}$ *dan* $\overrightarrow{OB}$.
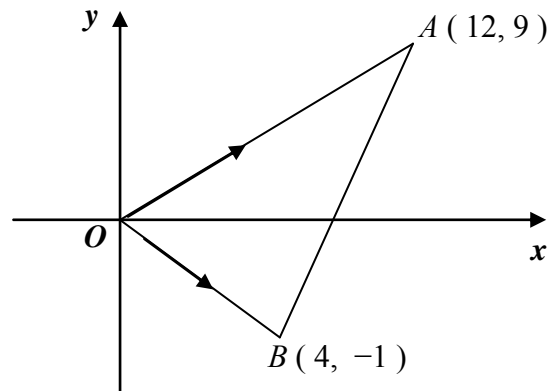
Diagram 15
*Rajah*15

Express
Ungkapkan

(*a*) $\overrightarrow{OA}$ in the form $\begin{pmatrix} x \\ y \end{pmatrix}$

     $\overrightarrow{OA}$ *dalam bentuk* $\begin{pmatrix} x \\ y \end{pmatrix}$

(*b*) $\overrightarrow{AB}$ in the form $x\underset{\sim}{i} + y\underset{\sim}{j}$

     $\overrightarrow{AB}$ *dalam bentuk* $x\underset{\sim}{i} + y\underset{\sim}{j}$

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

Answer/*Jawapan*:

(*a*)

(*b*)

15

3
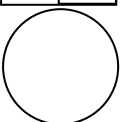
http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

16 Diagram 16 shows a triangle *OPQ* such that $\overrightarrow{OP} = \underline{a}$, $\overrightarrow{OQ} = 2\underline{b}$ and *R* is midpoint of *PQ*.

Rajah 16 *menunjukkan sebuah segi tiga OPQ di mana* $\overrightarrow{OP} = \underline{a}$, $\overrightarrow{OQ} = 2\underline{b}$ *dan R ialah titik tengah bagi PQ.*
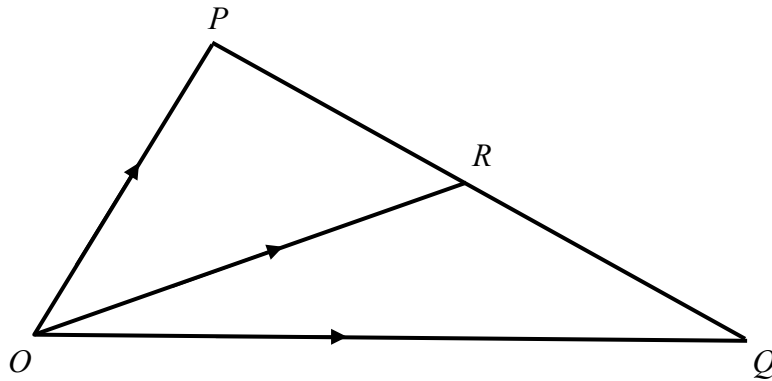
Diagram 16
Rajah 16

Find $\overrightarrow{OR}$ in terms of $\underline{a}$ and $\underline{b}$.
Cari $\overrightarrow{OR}$ *dalam sebutan* $\underline{a}$ *and* $\underline{b}$.

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

Answer/*Jawapan*:

16

3
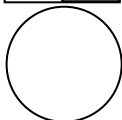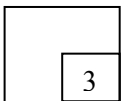
17 Given that the set of numbers $3, 5, 8, m, n, 25, 27, 28$ which are arranged in order, has a mean of 16. Find

Diberi bahawa satu kumpulan nombor $3, 5, 8, m, n, 25, 27, 28$ disusun ikut urutan, kumpulan nombor itu mempunyai min 16. Cari

(*a*) the range of the set of numbers,
    julat bagi kumpulan nombor itu,

(*b*) the value of $m + n$,
    nilai bagi $m + n$,

(*c*) the median of the set of numbers.   [4 *marks*]
    median bagi kumpulan nombor itu.   [4 *markah*]

Answer/*Jawapan*:

(*a*)

(*b*)

(*c*)

17

4

18 Find the value of
Cari nilai bagi

$$\lim_{x \to -3} \left(\frac{x^2 - 9}{x + 3} \right)$$

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

Answer/*Jawapan*:

18

2
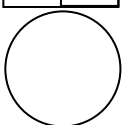
19 Diagram 19 shows a rhombus *OPST* and a sector *POT* of a circle with centre *O*.

Rajah 19 *menunjukkan sebuah rombus OPST dan sebuah sektor POT bagi sebuah bulatan berpusat O.*
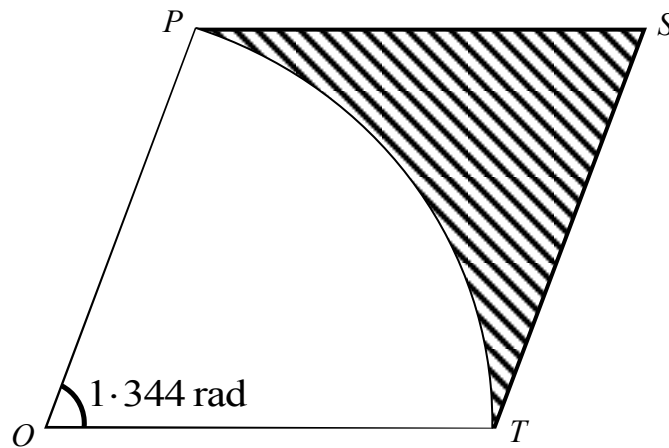
Diagram 19
Rajah 19

It is given $\angle POT = 1 \cdot 344$ rad and arc $PT = 6 \cdot 72$ cm. Find
(*a*)   the length, in cm, of *OP*,
(*b*)   the perimeter, in cm, of the shaded region.

Diberi bahawa $\angle POT = 1 \cdot 344$ rad *dan lengkok* $PT = 6 \cdot 72$ cm. *Cari*
(*a*)   *panjang, dalam* cm, *OP,*
(*b*)   *perimeter, dalam* cm, *kawasan berlorek.*

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

Answer/*Jawapan*:

(*a*)

(*b*)

19

4
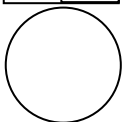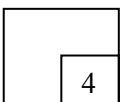
20   It is given that $\sin\theta = \dfrac{12}{13}$, where $90° \le \theta \le 180°$. Find the value of

Diberi bahawa $\sin\theta = \dfrac{12}{13}$, *dengan keadaan* $90° \le \theta \le 180°$. *Cari nilai bagi*

(*a*) $\cot\theta$

    kot θ

(*b*) $\sin 2\theta$.   [4 *marks*]

                                         [4 *markah*]

Answer/*Jawapan*:

(*a*)

(*b*)

20

4

---

21   Given that $y = 2x^2 - \dfrac{3}{x}$ and $h(x) = \dfrac{dy}{dx}$, find the value of $\displaystyle\int_1^2 h(x)\,dx$.

Diberi bahawa $y = 2x^2 - \dfrac{3}{x}$ *dan* $h(x) = \dfrac{dy}{dx}$, *cari nilai bagi* $\displaystyle\int_1^2 h(x)\,dx$.

                                             [3 *marks*]

                                             [3 *markah*]

Answer/*Jawapan*:

21

3
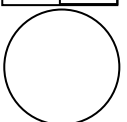
22 Diagram 22 shows seven letter cards.
Rajah 22 menunjukkan tujuh keping kad huruf.

S	U	B	J	E	C	T

Diagram 22
Rajah 22

A six-letter code is to be formed using six of these cards.
Suatu kod enam huruf hendak dibentuk dengan menggunakan enam daripada kad-kad itu.

Find
Cari

(*a*) the number of different six-letter codes that can be formed,
   bilangan kod enam huruf yang berlainan yang dapat dibentuk,

(*b*) the number of different six-letter codes which the letters **U** and **E** are side by side.
   *bilangan kod enam huruf yang berlainan dengan keadaan huruf **U** dan huruf **E** adalah bersebelahan.*

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

Answer/*Jawapan*:

(*a*)

(*b*)

22

4
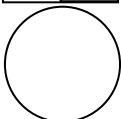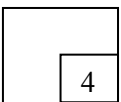
23 Given that $y = 2x^2 - 10x + 5$ and the rate of change of x is 4 units per second.
Find the rate of change of y at point $(2, -7)$.

Diberi $y = 2x^2 - 10x + 5$ dan kadar perubahan x ialah 4 unit per saat.
Cari kadar perubahan y pada titik $(2, -7)$.

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

Answer/*Jawapan*:

24 A box contains some blue pens and red pens. Given the probability of chosen a blue pen is $\dfrac{2}{5}$ while the probability of chosen a red pen is $\dfrac{3}{5}$. Three pens are chosen at random from the box. Find the probability of getting at least one blue pen.

[3 *marks*]

Sebuah kotak mengandungi beberapa batang pen biru dan pen merah. Diberi bahawa kebarangkalian memilih sebatang pen biru ialah $\dfrac{2}{5}$ manakala kebangkalian memilih sebatang pen merah ialah $\dfrac{3}{5}$. Tiga batang pen dipilih secara rawak daripada kotak itu . Cari kebarangkalian bahawa sekurang-kurangnya mendapat sebatang pen biru.

[3 *markah*]

Answer/*Jawapan*:

For examiner's use only
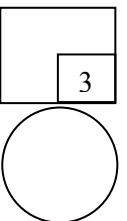
25 The masses of watermelons in a fruit stall have a normal distribution with a mean of μ kg and a variance of 0.36 kg. If a watermelon is chosen at random from the fruit stall, the probability that its mass is more than 6.5 kg is 0.21. Find the value of μ.

[3 *marks*]

Jisim tembikai dalam sebuah gerai buah-buahan mempunyai taburan normal dengan min μ kg dan varians 0.36 kg. Jika sebiji tembikai dipilih secara rawak daripada gerai buah-buahan itu, kebarangkalian bahawa jisimnya melebihi 6.5 kg ialah 0.21. Cari nilai bagi μ.

[3 *markah*]

Answer/*Jawapan*:

25

3

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

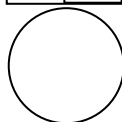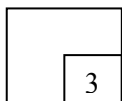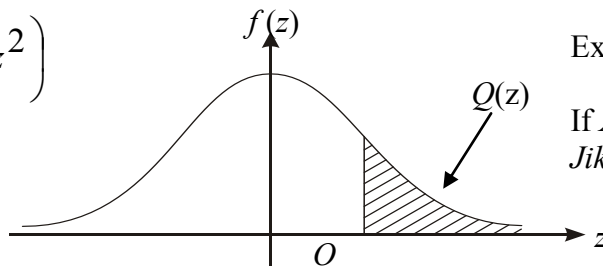| z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
														Minus / *Tolak*					
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	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 $P(X > k) = Q(k)$
Jika $X \sim N(0, 1)$, *maka* $P(X > k) = Q(k)$

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

BLANK PAGE
HALAMAN KOSONG

BLANK PAGE
HALAMAN KOSONG

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

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

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

3. Write your answers in the spaces provided in 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 pages 2 and 3.
   Satu senarai rumus disediakan di halaman 2 dan 3.

9. A booklet of four-figure mathematical tables is provided.
   Sebuah buku sifir matematik empat angka 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.

3472/2
Additional Mathematics
Kertas 2
September 2013
2 jam 30 minit

PROGRAM PENINGKATAN PRESTASI AKADEMIK
SPM 2013

MATA PELAJARAN

ADDITIONAL
MATHEMATICS

Kertas 2
Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

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

2. *Answer* **all** *questions in* **Section A, four** *questions from* **Section B** *and* **two** *questions from* **Section C**.

3. *Give only* **one** *answer/solution to each question.*

4. *Show your working. It may help you to get your marks.*

5. *The diagrams provided are not drawn according to scale unless stated.*

6. *The marks allocated for each question and sub - part of a question are shown in brackets.*

7. *You may use a* **non-programmable** *scientific calculator.*

8. *A list of formulae is provided in page* 2 *and* 3.

This question paper consists of **19** printed pages.

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

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

$= \int_a^b y\, dx \quad$ or

$= \int_a^b x\, dy$

5. Volume of revolution

$= \int_a^b \pi y^2\, dx \quad$ or

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

GEOMETRY

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

2. Mid point

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

3. Division of line segment by a point

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

4. Area of triangle

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

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

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

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

STATISTICS

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. $^n P_r = \dfrac{n!}{(n - r)!}$

9. $^n C_r = \dfrac{n!}{(n - r)!r!}$

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

11. $P(X = r) = {}^n C_r \, p^r \, q^{n-r}, \; p + q = 1$

12. Mean, $\mu = np$

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

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

TRIGONOMETRY

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

2. Area of sector, $A = \dfrac{1}{2}r^2\theta$

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

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

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

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

1. Solve the simultaneous equations $x - 2y = 5$ and $x^2 + 2y = 7$.

[5 *marks*]

Selesaikan persamaan serentak $x - 2y = 5$ dan $x^2 + 2y = 7$.

[5 *markah*]

2. The quadratic equation $3x^2 + 7x - 6 = 0$ has roots h and k, where $h > k$.

Find

(*a*) the value of h and of k,

(*b*) the range of x if $3x^2 + 7x - 6$ always positive.

[5 *marks*]

Persamaan kuadratik $3x^2 + 7x - 6 = 0$ mempunyai punca-punca h dan k, dengan keadaan h > k.

Cari

(*a*) *nilai h dan nilai k,*

(*b*) *julat nilai x jika $3x^2 + 7x - 6$ sentiasa positif.*

[5 *markah*]

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

[4 *marks*]

(*b*) Hence, using the same axes, sketch a suitable straight line to find the number of solutions to

the equation $\dfrac{x}{4\pi} - \sin 2x = 0$ for $0 \le x \le 2\pi$.

State the number of solutions.

[3 *marks*]

(*a*) *Lakar graf bagi $y = 4\sin 2x$ untuk $0 \le x \le 2\pi$.*

[4 *markah*]

(*b*) *Seterusnya, dengan menggunakan paksi yang sama, lakar satu garis lurus yang sesuai untuk*

mencari bilangan penyelesaian bagi persamaan $\dfrac{x}{4\pi} - \sin 2x = 0$ untuk $0 \le x \le 2\pi$.

Nyatakan bilangan penyelesaian itu.

[3 *markah*]

4.
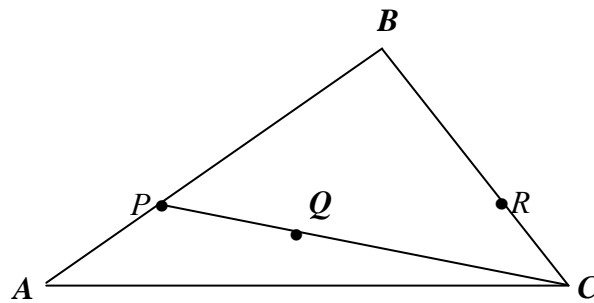
Diagram 4 / *Rajah* 4

Diagram 4 shows a triangle *ABC*. Point *P* lies on the straight line *AB* such that *AP* : *PB* = 1 : 3. Point *R* lies on the straight line *BC* such that $\dfrac{BR}{BC} = \dfrac{2}{3}$. Point *Q* lies on the straight line *PC* such that $\overrightarrow{PC} = 3\overrightarrow{PQ}$. It is given that $\overrightarrow{AB} = 4\underset{\sim}{x}$ and $\overrightarrow{AC} = \underset{\sim}{y}$.

(*a*) Express in terms of $\underset{\sim}{x}$ and $\underset{\sim}{y}$

    (i) $\overrightarrow{BC}$,

    (ii) $\overrightarrow{PC}$,

    (iii) $\overrightarrow{AQ}$.   [5 *marks*]

(*b*) Hence, shows that the points *A*, *Q* and *R* are collinear.   [3 *marks*]

Rajah 4 *menunjukkan suatu segi tiga ABC. Titik P terletak pada garis AB dengan keadaan*   *AP : PB = 1 : 3. Titik R terletak pada garis BC dengan keadaan* $\dfrac{BR}{BC} = \dfrac{2}{3}$. *Titik Q terletak pada garis PC dengan keadaan* $\overrightarrow{PC} = 3\overrightarrow{PQ}$. *Diberi bahawa* $\overrightarrow{AB} = 4\underset{\sim}{x}$ *dan* $\overrightarrow{AC} = \underset{\sim}{y}$

(*a*) *Ungkapan dalam sebutan* $\underset{\sim}{x}$ *dan* $\underset{\sim}{y}$,

    (i) $\overrightarrow{BC}$,

    (ii) $\overrightarrow{PC}$,

    (iii) $\overrightarrow{AQ}$.   [5 *markah*]

(*b*) *Seterusnya, tunjukkan titik A, Q dan C adalah segaris.*   [3 *markah*]

5. (*a*) Table 5 shows the marks obtained by a group of students in a test.

Marks *Markah*	Number of students *Bilangan murid*
$5-9$	4
$10-14$	2
$15-19$	6
$20-24$	11
$25-29$	15
$30-34$	7
$35-39$	3

Table 5 / *Rajah* 5

Without drawing an ogive, calculate the median mark.

[3 *marks*]

(*b*) A set of marks $x_1, x_2, x_3, x_4, x_5, x_6$ has a mean of 8 and standard deviation of 4. Find the new mean and new standard deviation if each mark is multiplied by 2 and then 5 is added to it.

[4 *marks*]

(*a*) *Jadual* 5 *menunjukkan markah yang diperoleh sekumpulan murid dalam satu ujian. Tanpa melukis ogif, hitungkan markah median.*

[3 *markah*]

(*b*) *Min dan sisihan piawai bagi satu senarai markah* $x_1, x_2, x_3, x_4, x_5, x_6$ *ialah* 8 *dan* 4 *masing-masing. Cari nilai min dan sisihan piawai baru jika setiap markah tersebut didarab dengan* 2 *dan* 5 *ditambah kepadanya.*

[4 *markah*]

6.
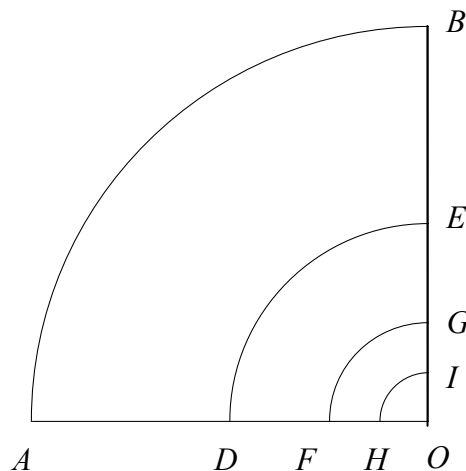
Diagram 6 / *Rajah* 6

Diagran 6 shows part of the arrangement of an infinite series of quadrants. The radius of the quadrant *AOB* is *p* cm. *D* is the midpoint of *AO*, *F* is the midpoint of *DO*, *H* is the midpoint of *FO* and so on.

(*a*) Show that the areas of the quadrant *AOB*, *DOE*, *FOG*, ... form a geometric progression and hence, state the common ratio of the progression.

[3 *marks*]

(*b*) Given *AO* = 60 cm,

(i) determine which quadrant has an area of $\dfrac{225}{256}\pi$ cm^2 ,

(ii) find the sum to infinity of the areas, in terms of π cm^2, of the quadrants.

[5 *marks*]

Rajah 6 *menunjukkan sebahagian daripada susunan tak terhingga bagi siri sukuan . Jejari bagi sukuan AOB ialah p* cm. *D ialah titik tengah bagi AO, F ialah titik tengah bagi DO, H ialah titik tengah bagi FO dan seterusnya.*

(*a*) *Tunjukkan luas bagi sukuan AOB, DOE, FOG, ...bentuk satu janjang geometri dan seterusnya, nyatakan nisbah sepunya bagi janjang ini.*

[3 *markah*]

(*b*) *Diberi AO* = 60 cm,

(i) *tentukan sukuan yang keberapa mempunyai luas* $\dfrac{225}{256}\pi$ cm^2 ,

(ii) *cari hasil tambah hingga tak terhinggaan, dalam sebutan* π cm^2 , *bagi sukuan-sukuan.*

[5 *markah*]

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

Section B
Bahagian B

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

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

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

x	1	2	3	4	5	6
y	0·71	1·00	1·38	1·99	2·88	3·97

Table 7 / *Rajah* 7

Table 7 shows the values of two variables, x and y, obtained from an experiment. Variables x
and y are related by the equation $y = \dfrac{10^{kx}}{h}$, where h and k are constants.

(*a*) Plot $\log_{10} y$ against x, using a scale of 2 cm to 1 unit on the x-axis and 2 cm to 0. 1
unit on the $\log_{10} y$-axis. Hence, draw the line of best fit.

[4 *marks*]

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

(i) h,

(ii) k,

(iii) y when $x = 3·5$.

[6 *marks*]

Jadual 7 menunjukkan nilai-nilai bagi dua pembolehubah, x dan y, yang diperoleh daripada

satu eksperimen. Pembolehubah x dan y dihubungkan oleh persamaan $y = \dfrac{10^{kx}}{h}$, dengan

keadaan h dan k ialah pemalar.

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

dan 2 cm kepada 0.1 unit pada paksi -$\log_{10} y$. Seterusnya, lukis garis lurus penyuaian

terbaik.   [4 *markah*]

(*b*) *Gunakan graf di **7**(*a*) untuk mencari nilai*

(i)   *h*,

(ii)   *k*,

(iii)   *y apabila x = 3·5*.   [6 *markah*]

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

8.
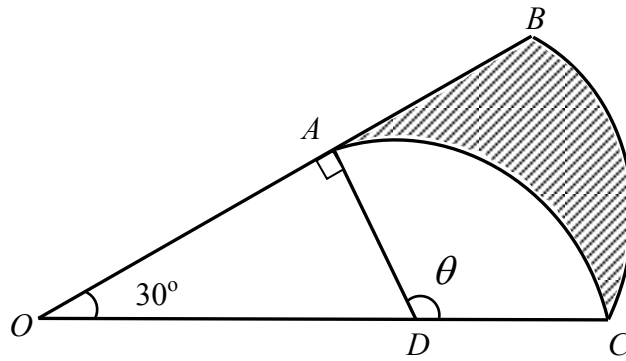
Diagram 8 / *Rajah* 8

Diagram 8 shows a sector O*BC* with centre *O* and a sector *ADC* with centre *D*. *AD* is perpendicular to *OB* and the length of *OB* is 12 cm. It is given *DC* = 4 cm.

[Use $\pi = 3.142$]

Calculate

(*a*) the value of θ, in radians,

[2 *marks*]

(*b*) the perimeter, in cm, of the shaded region,

[4 *marks*]

(*c*) the area , in cm^2 of shaded region.

[4 *marks*]

Rajah 8 *menunjukkan sebuah sektor OBC dengan pusat O dan sektor ADC dengan pusat D. AD berserenjang dengan OB dan panjang OB ialah* 12 cm. *Diberi DC* = 4 cm. [*Guna* $\pi = 3.142$]

Hitung

(*a*) *nilai* θ, *dalam radian*,

[2 *markah*]

(*b*) *perimeter, dalam* cm, *kawasan berlorek*,

[4 *markah*]

(*c*) *luas, dalam* cm^2, *kawasan berlorek*.

[4 *markah*]

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

9.   Solution by scale drawing is not accepted.
             Penyelesaian secara lukisan berskala tidak diterima.
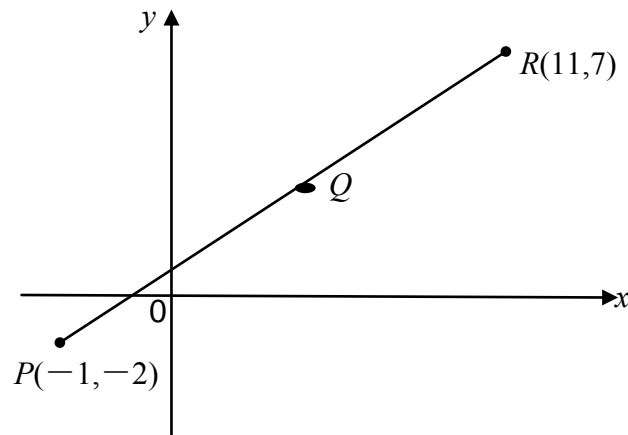
Diagram 9 / *Rajah* 9

Diagram 9 above shows a straight line *PR*. Point *Q* divides the straight line *PR* internally in the ratio *PQ* : *QR* = 1 : 2

(*a*) Find the coordinates of *Q* ,

[2 *marks*]

(b) Calculate the area of triangle *POR*,

[2 *marks*]

(*c*) Find the equation of the straight line that passes through *Q* and perpendicular to *PR*,

[3 *marks*]

(*d*) Point *T* moves such that its distance from *P* is always twice its distance from *R*.

Find the equation of the locus of *T* .   [3 *marks*]

Rajah 9 menunjukkan suatu garis lurus PR. Titik Q membahagi dalam garis lurus PR dengan nisbah PQ : QR = 1 : 2

(a)   *Cari koordinat titik Q,*

[2 *markah*]

(b)   *Hitung luas segi tiga POR,*

[2 *markah*]

(c) *Cari persamaan garis lurus yang melalui Q dan berserenjang dengan PR,*

[3 *markah*]

(d) *Titik T bergerak dengan keadaan jaraknya dari P adalah sentiasa dua kali dari R. Cari persamaan lokus bagi T .*

[3 *markah*]

10.
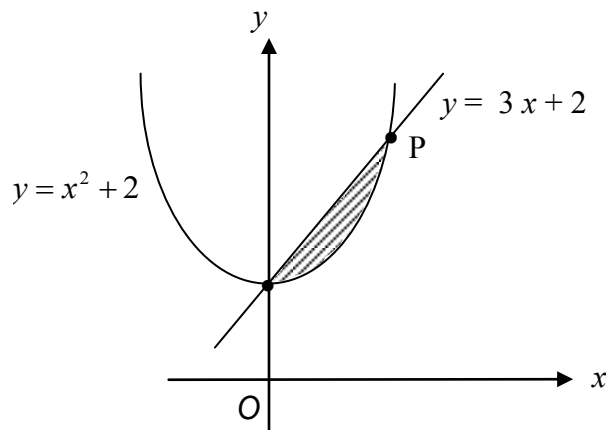
Diagram 10 / *Rajah* 10

Diagram 10 above shows a shaded region bounded by the curve $y = x^2 + 2$ and the straight line $y = 3x + 2$.

Find

(*a*) the coordinates of *P*,

[3 *marks*]

(*b*) the area of the shaded region,

[4 *marks*]

(*c*) the volume of revolution, in terms of π, when the region bounded by the curve, and the straight line is rotated through 360° about the *y*-axis.

[3 *marks*]

Rajah 10 *menunjukkan kawasan berlorek yang dibatasi oleh lengkung* $y = x^2 + 2$ *dan garis lurus* $y = 3x + 2$.

Cari

(*a*) *koordinat P*, [3 *markah*]

(*b*) *luas rantau yang berlorek*, [4 *markah*]

(*c*) *isipadu kisaran, dalam sebutan* π, *apabila rantau yang dibatasi oleh lengkung dan garis lurus, dikisarkan melalui* 360° *pada paksi-y.*

[3 *markah*]

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

11(*a*)   In a survey carried out in a school, it is found that 60% of the students have their breakfast in the school canteen. If 10 students from the school are selected at random, find the probability that

(i)   exactly three students have their breakfast in the school canteen,

(ii)   at least two students have their breakfast in the school canteen.

[*5 marks*]

(*b*)   The masses of a group of boys have a normal distribution with a mean of 45kg and a standard deviation of 5 kg. If a boy is selected randomly from this group, find

(i)   the probability that his mass less than 40 kg.

(ii)   the value o f *m* if 30 % of the boys have mass more than *m* kg.

[*5 marks*]

(*a*)   *Dalam satu kajian yang dijalankan di sebuah sekolah ,didapati* 60% *daripada   murid-murid mengambil sarapan pagi di kantin sekolah. Jika* 10 *murid daripada sekolah itu dipilih secara rawak, hitung kebarangkalian bahawa*

(i)   *tepat tiga orang murid mengambil sarapan pagi di kantin sekolah*

(ii)   *sekurang-kurangnya dua orang murid mengambil sarapan pagi di kantin sekolah.*

[*5 markah*]

(*b*)   *Jisim sekumpulan budak lelaki adalah mengikut taburan normal dengan min* 45kg *dan sisihan piawai* 5kg. *Jika seorang budak lelaki dipilih secara rawak daripada kumpulan ini, cari*

(i)   *kebarangkalian jisimnya kurang daripada* 40 kg.

(ii)   *nilai m jika* 30% *dari budak lelaki itu mempunyai jisim melebihi m* kg.

[*5 markah*]

Section C
Bahagian C

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

12.   A particle moves in a straight line and passes through a fixed point O with a velocity of 12 ms^{-1}. Its acceleration, a m s^{-2}, t s after passing through O is given by $a = 4 - 2t$. The particle stops when $t = p$ s.

[Assume motion to the right is positive]

Find

(*a*) the initial acceleration, in ms^{-2}, of the particle,

[1 *marks*]

(*b*) the maximum velocity of the particle,

[3 *marks*]

(*c*) the value of p,

[2 *marks*]

(*d*) the total distance travelled by the particle in the first 8 seconds.

[4 *marks*]

Satu zarah bergerak di sepanjang suatu garis lurus dan melalui satu titik tetap O dengan halaju 12 m s^{-1}. Pecutannya a m s^{-2}, t s selepas melalui O diberi oleh a = 4 − 2t . Zarah itu berhenti pada masa t = p s.

[Anggapkan gerakan ke arah kanan sebagai positif]

Cari

(*a*) *pecutan awal, dalam* ms^{-2} *, zarah itu,*

[1 *markah*]

(*b*) *halaju maksimum bagi zarah itu,*

[3 *markah*]

(*c*) *nilai untuk p,*

[2 *markah*]

(*d*) *jumlah jarak yang dilalui oleh zarah dalam 8 saat pertama.*

[4 *markah*]

13.   Diagram 13 shows a quadrilateral *PQRS*. The area of triangle *QRS* is 18 cm^2 and ∠*QRS* is an acute angle.
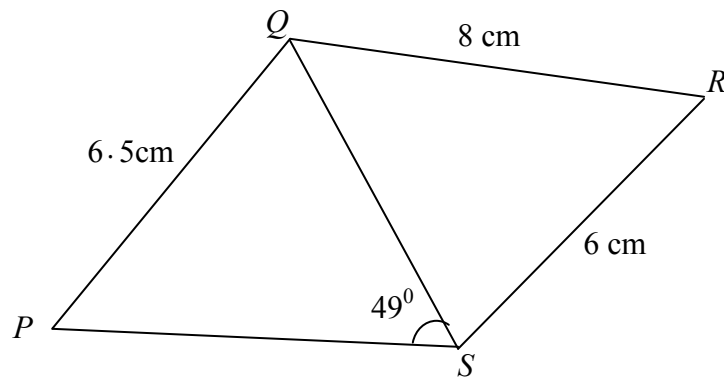
Diagram 13 *Rajah 13*

Calculate

(*a*) ∠*QRS*,   [2 *marks*]

(*b*) the length, in cm, of *QS*,   [2 *marks*]

(*c*) ∠*PQS*.   [3 *marks*]

(*d*) the area, in cm^2, of quadrilateral *PQRS*.   [3 *marks*]

Rajah 13 *menunjukkan sebuah segiempat PQRS. Luas segitiga QRS ialah* 18 cm^2 *dan* ∠*QRS ialah sudut tirus.*

Hitungkan

(*a*) ∠*QRS*,   [2 *markah*]

(*b*) panjang, dalam cm, QS,   [2 *markah*]

(*c*)   ∠*PQS*.   [3 *markah*]

(*d*) luas, dalam cm^2, bagi sisi empat *PQRS*.   [3 *markah*]

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

14.   Use graph paper to answer this question.

A travel company offers a package of special missions to Kuala Lumpur. The delegation consist

of *x* children and *y* adults. The management has set the following constraints for the delegation.

   I)   A delegation is limited to 60 members only.

   II)   The price for an adult is RM120 and RM60 for a child under the age of 12 years. The

         collection payment of all travelers at least RM 3600.

   III) The ratio of the number of children to the number of adults is 1 : 2 .

(*a*) Write three inequalities, other than x $\geq$ 0 and y $\geq$ 0 which satisfies all the above constrains.

[3 *marks*]

(*b*) Using a scale of 2 cm to 10 people on both axes construct and shade the region R that satisfies

all the above constrains.   [3 *marks*]

(*c*) Using the graph constructed in 14(b), find

   (i)   the minimum number of child who can follow the trip.

   (ii) the minimum profit obtained if the profit for one adult

         and one child is RM 90   and RM 30 respectively.

[4 *marks*]

Sebuah syarikat pelancongan menawarkan satu pakej rombongan khas ke Kuala Lumpur. Rombongan ini terdiri daripada x orang kanak-kanak dan y orang dewasa. Pihak pengurusan telah menetapkan kekangan seperti berikut bagi rombongan itu.

I: *Rombongan itu dihadkan kepada* 60 *ahli sahaja.*

II: *Harga bagi seorang dewasa ialah* RM120 *dan* RM60 *untuk seorang kanak- kanak berumur 12 tahun ke bawah. Kutipan bayaran kesemua pelancong sekurang kurangnya* RM 3600.

III: *Nisbah bilangan kanak-kanak kepada bilangan orang dewasa ialah* 1 : 2

(a) *Tulis tiga ketaksamaan, selain x ≥ 0 dan y ≥ 0 yang memenuhi semua kekangan di atas.*

[3 *markah*]

(b) *Dengan menggunakan skala* 2 cm *kepada* 10 *orang pada kedua-dua paksi, bina dan lorek rantau R yang memenuhi semua kekangan di atas.*   [3 *markah*]

(c) *Berdasarkan graf anda, cari*

  (i) *bilangan minimum kanak-kanak yang boleh mengikuti rombongan itu.*

  (ii) *keuntungan maksimum yang diterima jika keuntungan bagi seorang dewasa ialah* RM 90 *dan seorang kanak-kanak ialah* RM 30   [4 *markah*]

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

15.   Table 15 shows the prices and the price indices of four ingredients T, U, V, and W, used to make bread. Diagram 15 shows the relative quantity of the ingredients used.

Ingredient *Bahan*	Price (RM) *Harga (RM)*		Price index in the year 2011 based on year 2010 *Indeks harga pada tahun 2011 berasaskan tahun 2010*
	2010	**2011**	
T	5	6·50	130
U	6	9	p
V	q	3·50	140
W	4	5·40	135

Table 15 / *Jadual* 15
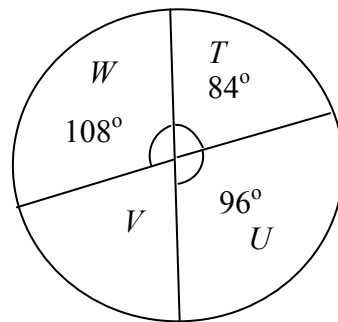
Diagram 15 / *Rajah* 15

(*a*) Find the values of p and q.

[3 *marks*]

(*b*) Calculate the composite index of the cost of making bread in the year 2011 based on year 2010.   [3 *marks*]

(*c*) The cost of making bread increased by 15% from year 2011 to year 2012. Calculate

(i)   the composite index in the year 2012 using the year 2010 as the base year.

(ii)   the cost of making the bread in the year 2011 if the cost in year 2010   is RM50.

[4 *marks*]

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

Jadual 15 *menunjukkan harga dan indeks harga bagi empat bahan T, U, V, dan W yang digunakan untuk membuat roti. Rajah* 15 *menunjukkan kuantiti relatif bagi penggunaan bahan-bahan itu.*

(*a*)   *Cari nilai bagi p dan q.*

[3 *markah*]

(*b*)   *Hitung nombor indeks gubahan bagi kos pembuatan roti itu pada tahun 2011 berasaskan tahun* 2010.

[3 *markah*]

(*c*)   *Harga untuk membuat roti telah meningkat sebanyak* 15% *dari tahun* 2011 *hingga* 2012. *Hitungkan*

(i) *nombor indeks gubahan pada tahun* 2012 *dengan menggunakan tahun* 2010 *sebagai tahun asas.*

(ii) *kos untuk membuat roti pada tahun* 2011 *jika kosnya pada tahun* 2010 *ialah* RM50.

[4 *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)

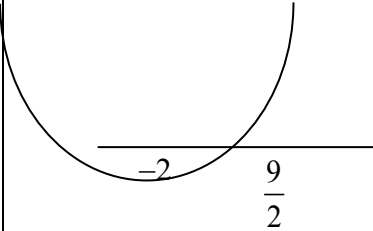| z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
														Minus / Tolak					
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	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 $P(X > k) = Q(k)$
Jika $X \sim$ N(0, 1), *maka* $P(X > k) = Q(k)$

http://edu.joshuatly.com/
http://fb.me/edu.joshuatly

PROGRAM PENINGKATAN PRESTASI AKADEMIK SPM 2013
Marking Scheme
Additional Mathematics Paper 1

Question	Solution/ Marking Scheme	Answer	Marks
1		(a) 2	1
		(b) many-to-one	1
2	(b) B1: $4-3(x-3)$ or $\dfrac{4-g}{3}=x-3$	(a) -5	1
		(b) $13-3x$	2
3		(a) 7	1
	(b) $f(k)=11$ **or** $2k+3=11$	(b) 4	2
4	B2: $5+8q>0$ B1: $(-1)^2-4(1+2q)(-1)>0$	$q>-\dfrac{5}{8}$	3
5	B2 : $(2x-9)(x+2)\geq 0$ **or** $x=\dfrac{9}{2}$, $x=-2$ $x^2-9\geq \dfrac{5x}{2}$ B1: *or* $2x^2-5x-18\geq 0$	$x\leq -2$ $x\geq \dfrac{9}{2}$	3
6	B1: $-5=p(0-1)^2-3$	(a) $p=-2$ $r=-3$	2 1
		(b) $x=1$	1

Question	Solution/ Marking Scheme	Answer	Marks
7	B3: $3x = 2$ B2: $2^{3x}(16-4) = 48$ B1: 2^2 or 4	$\dfrac{2}{3}$	4
8	B2: $-55 + (n-1)7 > 100$ B1: $a = -55$ and $d = 7$	$n = 24$	3
9	B2: $\dfrac{5}{2}(2a+4d) = a+7d$ or $\dfrac{5}{2}(2(-3)+4d) = -3+7d$ B1: $S_5 = \dfrac{5}{2}(2a+4d)\; or\; T_8 = a+7d$	6	3
10	B1 : $\dfrac{2}{1-r} = \dfrac{3}{2}$	$r = -\dfrac{1}{3}$	2
11	B3: $y = 2^{x+3}$ B2: $\log_2 y = x + 3$ B1: Gradient = 1 or c = 3	$8(2^x)$	4
12	(*a*) B1 : $0 = -2(6) + c$ or $c = 12$ (*b*) B1 : $\dfrac{5(0)+1(6)}{1+5}$ or $\dfrac{5(12)+1(0)}{1+5}$	(*a*) $y = -6x + 12$ (*b*) $Q\,(\,1,\,10\,)$	2 2
13	B2: $\log_2 P = 6$ B1: $\dfrac{\log_2 P}{\log_2 4}$ or $\dfrac{\log_2 p}{2}$ or $3\log_3 p$	64	3
14	B2 : $\dfrac{1}{2}\left|(0-10-1-9)-(15+0+6-2)\right|$ B1 : $(0-10-1-9)$ or $(15+0+6-2)$	$\dfrac{39}{2}$	3

Question	Solution/ Marking Scheme	Answer	Marks
15	B1: $\overrightarrow{AB}=\overrightarrow{AO}+\overrightarrow{OB}$	(a) $\begin{pmatrix}12\\9\end{pmatrix}$ (b) $-8\underline{i}-10\underline{j}$	1 2
16	B2: $\overrightarrow{OR}=\underline{a}+\underline{b}-\dfrac{1}{2}\underline{a}$ B1: $\overrightarrow{PQ}=\overrightarrow{PO}+\overrightarrow{OQ}$ or $\overrightarrow{PQ}=2\underline{b}-\underline{a}$ or $\overrightarrow{OR}=\overrightarrow{OP}+\dfrac{1}{2}\overrightarrow{OQ}$	$\dfrac{1}{2}\underline{a}+\underline{b}$	3
17	(b) B1: $\dfrac{3+5+8+m+n+25+27+28}{8}=16$	(a) 25 (b) 32 (c) 16	1 2 1
18	B1: $\displaystyle\lim_{x\to-3}\left(\dfrac{(x+3)(x-3)}{x+3}\right)$	-6	2
19	(a) B1: $OP\times 1.344=6.72$ (b) B1: $^*5+^*5+6.72$	(a) $r=5$ (b) 16.72	2 2
20	(b) B2: $\sin 2\theta=2\left(\dfrac{12}{13}\right)\left(-\dfrac{5}{13}\right)$ B1: $-\dfrac{5}{13}$	(a) $\cot\theta=-\dfrac{5}{12}$ $-\dfrac{120}{169}$	1 3

Question	Solution/ Marking Scheme	Answer	Marks
21	B2: $[2(2)^2 - \dfrac{3}{2}] - [2(1)^2 - 3]$ B1: $\left(2x^2 - \dfrac{3}{x}\right)$	8.5 or $8\dfrac{1}{2}$ or $\dfrac{17}{2}$	3
22	(a) B1: $^7P_6$ or $7 \times 6 \times 5 \times 4 \times 3 \times 2$ (b) B1: $2\,2 \times {}^6P_5$ or $2 \times 6 \times 5 \times 4 \times 3 \times 2$	(a) 5040 (b) 1440	2 2
23	B2 : $[\,4(2) - 10\,] \times 4$ B1 : $\dfrac{dy}{dx} = 4x - 10$	-8	3
24	B2: $1 - \left(\dfrac{3}{5}\right)^3$ or $1 - \left(\dfrac{3}{5} \times \dfrac{3}{5} \times \dfrac{3}{5}\right)$ B1: $\left(\dfrac{2}{5} \times \dfrac{3}{5} \times \dfrac{3}{5}\right)$ or $\left(\dfrac{2}{5} \times \dfrac{2}{5} \times \dfrac{3}{5}\right)$ or $\left(\dfrac{2}{5} \times \dfrac{2}{5} \times \dfrac{2}{5}\right)$	$\dfrac{98}{125}$	3
25	B2 : $\dfrac{6 \cdot 5 - \mu}{0 \cdot 6} = 0 \cdot 807$ B1 : $P\left(z > \dfrac{6 \cdot 5 - \mu}{\sqrt{0 \cdot 36}}\right) = 0 \cdot 21$	$\mu = 6 \cdot 02$	3

END OF MARKING SCHEME

PROGRAM   PENINGKATAN PRESTASI AKADEMIK SPM 2013

ADDITIONAL MATHEMATICS

Paper 2

(SET A)

.

MARKING SCHEME

N0.	SOLUTION	MARKS
1	$x = 2y + 5$ or $2y = x - 5$ $(2y+5)^2 + 2y = 7$ $x^2 + x - 5 = 7$ $2y^2 + 11y + 9 = 0$ $x^2 + x - 12 = 0$ $(2y+9)(y+1) = 0$ $(x+4)(x-3) = 0$ $x = -4$ and $x = 3$ (both) $y = -\frac{9}{2}$ and $y = -1$ (both)	**P1** **K1 Eliminate y** **K1 Solve quadratic equation** **N1** **N1**
		5
2 **(a)**	$3x^2 + 7x - 6 = 0$ $(3x-2)(x+3) = 0$ $x = \frac{2}{3}$ or $x = -3$ $h = \frac{2}{3}, \quad k = -3$	 **K1** **N1** **N1**
(b)	$3x^2 + 7x - 6 > 0$ $x < -3$ and $x > \frac{2}{3}$	**K1** **N1**
		5
3 **(a)** **(b)**	 $y = \dfrac{x}{\pi}$ draw the straight line y = $\dfrac{x}{\pi}$ Number of solutions = 4	**P1 sin shape correct.** **P1 Amplitude = 4** **P1 2 full cycle in $0 \le x \le 2\pi$** **P1 [Maximum = 4 and** **Minimum = -4]** **N1 For equation** **K1 Sketch the straight line** **N1**
		7

4			
(a)	(i)		
	$\overrightarrow{BC} = \overrightarrow{BA} + \overrightarrow{AC}$		**K1**
	$\overrightarrow{BC} = -4\underset{\sim}{x} + \underset{\sim}{y}$		**N1**
	(ii)		
	$\overrightarrow{PC} = \overrightarrow{PA} + \overrightarrow{AC}$		**N1**
	$\overrightarrow{PC} = -\underset{\sim}{x} + \underset{\sim}{y}$		
	(iii)		
	$\overrightarrow{AQ} = \overrightarrow{AP} + \overrightarrow{PQ}$		**K1**
	$\overrightarrow{AQ} = \dfrac{2}{3}\underset{\sim}{x} + \dfrac{1}{3}\underset{\sim}{y}$		**N1**
(b)	$\overrightarrow{AQ} = h\overrightarrow{QR}$		**K1** find h
	$h = 1$		
	A, Q, R are collinear.		**N1**
			N1
			8
5			**P1** for L=24.5 or F=23 or f_m=15
(a)			
	median $= 25 \cdot 5 + \left[\dfrac{\dfrac{1}{2}(48) - 23}{15} \right](5)$		**K1** use correct formula
	$= 25 \cdot 8333$		**N1**
(b)	new mean=2(8)+5= 21		**K1 N1**
	new standard devition=2(4)=8		**K1 N1**
			7

6 (a)	$\frac{1}{4}\pi p^2, \frac{1}{16}\pi p^2, \frac{1}{64}\pi p^2, \dots$	K1
	$\dfrac{\frac{1}{16}\pi p^2}{\frac{1}{4}\pi p^2} = \dfrac{\frac{1}{64}\pi p^2}{\frac{1}{16}\pi p^2},$	K1
	$r = \dfrac{1}{4}$	N1
(b)	(i)	
	$900\pi\left(\dfrac{1}{4}\right)^{n-1} = \dfrac{225}{256}\pi$	K1K1
	$n = 6$	N1
	(ii)	
	$S_\infty = \dfrac{900\pi}{1 - \frac{1}{4}}$	K1
	1200π	N1
		8

7 (a)	x	1	2	3	4	5	6		N1 6 correct values of log y
	$\log_{10} y$	- 0.15	0	0.14	0.30	0.46	0.60		

(b)

K1 Plot $\log_{10} y$ vs x.
Correct axes & uniform scale

N1 6 points plotted correctly

N1 Line of best-fit

(c)

$$\log y = kx - \log_{10} h$$

P1

(i)

$-\log_{10} h$ = *y-intercept

$h = 2.00$

K1
N1

(ii)

k = *gradient
   = 0.15

K1
N1

(iii)

$y = 1.70$

N1

	10

N0.	SOLUTION	MARKS
8 **(a)**	2.095 rad	**N1**
(b)	$AB = 5.07$ cm	**K1**
	$S_{BC} = 12(30 \times \dfrac{\pi}{180})$ or $S_{AC} = 4(2.095)$	**K1 Use** $s = r\theta$
	$= 6.28$ $= 8.38$	**N1**
	Perimeter = 5.07 + 6.28 + 8.38 = 19.73	**K1** **N1**
(c)	Area of $OBC = \dfrac{1}{2}(12)^2 (30 \times \dfrac{\pi}{180})$ or Area of $OBC = \dfrac{1}{2}(4)^2 (2.095)$	**K1 Use formula** $A = \dfrac{1}{2}r^2\theta$
	$=$ 37.70 cm^2 $= 16.76$ cm^2	**N1**
	Area of the shaded region = 37.70 – 16.76 – 13.86	**K1**
	$= 7.08$ cm^2	**N1**
		10
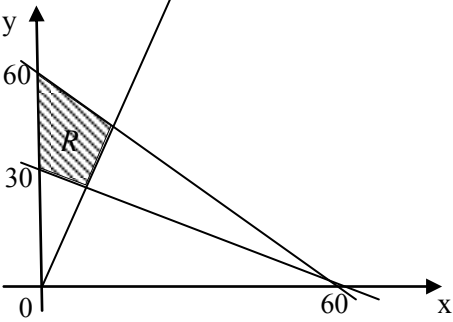
N0.	SOLUTION	MARKS
9 **(a)**	Area of POR = $\dfrac{1}{2} \begin{vmatrix} 0 & 11 & -1 & 0 \\ 0 & 7 & -2 & 0 \end{vmatrix}$	**K1**
	$= \frac{1}{2}\left|-15\right| \qquad = \quad 7.5$	**N1**
(b)	Let Q (x,y)	
	$x = \dfrac{1(11)+2(-1)}{3}$, $y = \dfrac{1(7)+2(-2)}{3}$	**K1 for either x or y**
	Q (3 , 1)	**N1**
(c)	$M_{PR} = \dfrac{7-(-2)}{11-(-1)} = \dfrac{9}{12} = \dfrac{3}{4}$, $m \perp M_{PR} = -\dfrac{4}{3}$	**K1 use gradient correctly**
	$y - 1 = -\dfrac{4}{3}(x -3)$	**K1 use forming quadratic equation**
	$3y = -4x + 15$	**N1**
(d)	Let T as (x,y)	
	TP = 2 TR	**P1**
	$(x+1)^2 +(y+2)^2 = 4\!\left[(x-11)^2 +(y-7)^2\right)$	**K1 (use distance formula)**
	$3x^2 +3y^2 - 90x - 60y + 675 = 0$	
	$x^2 + y^2 - 30x - 20y + 225 = 0$	**N1**
		10

N0.	SOLUTION	MARKS
10. (a)	$y = 3x + 2$, $y = x^2 + 2$ $3x = x^2$ $x(x-3) = 0$ $x = 0, 3$ When $x = 3$, $y = 3(3) + 2 = 11$ $P(3, 11)$	**K1** **K1 for solving quad.equation** **N1**
(b)	$A = \int_{0}^{3} ([3x+2] - (x^2+2))dx$ $= \left(\dfrac{3x^2}{2} - \dfrac{x^3}{3} \right) \Big|_{0}^{3}$ $= \dfrac{27}{2} - \dfrac{27}{3} = 4\dfrac{1}{2}$ *Note : If use area of right angle triangle and* $\int x\,dy$*, give marks accordingly.*	**K1 use** $\int (y_2 - y_1)\,dx$ **K1 integrate correctly** **K1 Subtitute the limit correctly** **N1**
(c)	$V = \pi \int_{2}^{11} x^2 dy - \dfrac{1}{3}\pi r^2 h$ $= \pi \int_{2}^{11} (y-2)dy - \dfrac{1}{3}\pi(3)^2(9)$ $= \pi \left[\dfrac{y^2}{2} - 2y \right]_{2}^{11} - 27\pi$ $= \left(40\dfrac{1}{2} \right)\pi - 27\pi = 13\dfrac{1}{2}\pi$	**K1 correct limit or use volume of cone** **K1 integrate correctly** **N1**
		10

N0.	SOLUTION	MARKS
11 **(a)** **(i)**	X= Students have their breakfast p = 0.6 , q = 1- 0.6 = 0.4 ,n = 10 $P(X = 3) = {}^{10}c_3 \, 0.6^3 0.4^7$ =0.0425	**K1 Use P (X=r) =** $${}^{n}C_r \; p^{\,r} \, q^{n-r}$$ **N1**
(ii)	$P (X \geq 2) = 1 - P(X=0) - P(X = 1)$ Or $= P(X = 2) + P(X = 3) + ... + P(X = 10)$ $= 1 - {}^{10}c_0 \, 0.6^0 0.4^{10} \; - \; {}^{10}c_1 \, 0.6^1 0.4^9$ =0.9983	**K1** **K1 Use P (X=r) =** $${}^{n}C_r \; p^{\,r} \, q^{n-r}$$ **N1**
(b) **(i)**	X= masses of a group of boys, X $\approx$ N (45,5) μ= 45 , σ =5 $P(X < 40) = P (Z < \dfrac{40 - 45}{5})$ $= P(Z < -1) = P (Z > 1)$ = 0.1587	**K1 Use Z =** $\dfrac{X - \mu}{\sigma}$ **N1**
(ii)	P (X > m) = 0.3 $P(Z > \dfrac{m - 45}{5}) = 0.3$ From table , $\dfrac{m - 45}{5} = 0.524$ m- 45 = 2.62 m = 47.62 kg	**K1 use $\dfrac{x - \mu}{\sigma}$** **K1 equate with z score** **N1**
		10

N0.	SOLUTION	MARKS
12 (a)	$a_{initial} = 4 \ ms^{-2}$	N1
(b)	$v = \int (4-2t)dt$ $\quad = 4t - t^2 + c$ $t = 0, v = 12, c = 12$ $\quad v = 4t - t^2 + 12$ $\quad a = 0, t = 2$ $V_{max} = 4(2) - (2)^2 + 12$ $\quad\quad = 16 \ m \ s^{-1}$	K1 for integrating v K1 N1
(c)	$v = 0 \quad , \ (t+2)(-t+6) = 0$ $\quad\quad t = 6 = p$	K1 N1
(d)	Total distance $= \left[\int_0^6 (4t^2 - t^2 + 12)dt \right] + \left[\left| \int_6^8 (4t^2 - t^2 + 12)dt \right|\right]$ $= \left[2t^2 - \dfrac{t^3}{3} + 12t \right]_0^6 + \left[\left| 2t^2 - \dfrac{t^3}{3} + 12t \bigg|_6^8 \right|\right]$ $= \left[2(6)^2 + \dfrac{(6)^3}{3} + 12(6) \right] - 0 + \left[\left| 2(8)^2 - \dfrac{(8)^3}{3} + 12(8) \right| - 2(6)^2 + \dfrac{(6)^3}{3} + 12(6)\right]$ $= 90\dfrac{2}{3}$	K1 for $\int_0^6 \ or \int_6^8$ K1 (for Integration; either one) K1 (for use and summation) N1
		10

N0.	SOLUTION	MARKS
13 (a)	$18 = \dfrac{1}{2}(8)(7)\sin \angle QRS$	**K1**
	$Sin \angle QRS = 0.75$	
	$\angle QRS = 48.59^o$	**N1**
(b)	$QS^2 = 8^2 + 6^2 - 2(8)(6)\cos 48.59^o$	**K1**
	$QS = 6.042$ cm	**N1**
(c)	$\dfrac{6.5}{\sin 49^o} = \dfrac{6.042}{\sin \angle QPS}$	**K1**
	$Sin \angle QPS = 0.7015$	
	$\angle QPS = 44.55^O$	**K1**
	$\angle PQS = 180 - 49^o - 44.55^o$	
	$= 86.45^o$	**N1**
(d)	Area of $PQRS$ = Area of triangle $QRS + \dfrac{1}{2}(6.042)(6.5)\sin 86.45^o$	**K1**
	$= 18 + 19.598$	**K1**
	$= 37.598$	**N1**
		10

N0.	SOLUTION	MARKS
14 **(a)**	$x + y \leq 60$	
	$60x + 120y \geq 3600$ or $x + 2y \geq 60$	**N1**
	$y \geq 2x$	**N1**
		N1
(b)		
	• At least one straight line is drawn correctly from inequalities involving x and y.	**K1**
	• All the three straight lines are drawn correctly.	**N1**
	• Region is correctly shaded.	**N1**
(c)(i)	12	**N1**
(ii)	Minimum point **(**12, 24**)**	**N1**
	30x + 90y = k	
	Minimum profit = 30(12) + 90(24)	
	= RM 2520	**K1** **N1**
		10

N0.	SOLUTION	MARKS
15 (a)	$p = \dfrac{9}{6}x100$ **atau** $140 = \dfrac{3.5}{q}x100$	K1
	$p = 150$	N1
	$q = RM\,2.50$	N1
(b)	72^0(can be seen)	N1
	$\overline{I} = \dfrac{130x84 + 150x96 + 140x72 + 135x108}{84 + 96 + 72 + 108}$	K1
	$\overline{I}^{11}/_{10} = 138.83$	N1
(c) (i)	$\overline{I}^{12}/_{10} = 138.83x\dfrac{115}{100}$	K1
	$= 159.65$	N1
(ii)	Cost of making bread in the year 2011	
	$138.83 = \dfrac{p_{11}}{50}x100$	K1
	$p_{11} = RM\,69.42$	N1
		10

END OF MARKING SCHEME