NAMA : _____

KELAS : _____

JABATAN PELAJARAN NEGERI SABAH

SIJIL PELAJARAN MALAYSIA 2010 **3472/1**
EXCEL 2
ADDITIONAL MATHEMATICS
PAPER 1
OGOS 2010

2 Jam Dua jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan angka giliran dan nombor kad pengenalan anda pada ruang yang disediakan.*

2. *Calon dikehendaki membaca arahan di halaman* 2.

Question	Full Marks	Marks Obtained
1	2	
2	2	
3	3	
4	4	
5	3	
6	3	
7	3	
8	3	
9	2	
10	3	
11	3	
12	4	
13	3	
14	2	
15	3	
16	4	
17	4	
18	3	
19	3	
20	4	
21	4	
22	4	
23	4	
24	3	
25	4	
Total	80	

This paper consists of 18 printed pages.

INFORMATION FOR CANDIDATES

1. *This question paper consists of* 25 *questions.*

2. *Answer* **all** *questions.*

3. *Give only* **one** *answer for each question.*

4. *Write your answers clearly in the space provided in the question paper.*

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

6. *If you wish to change your answer, cross out the work that you have done. Then write down the new answer.*

7. *The diagrams in the questions provided are not drawn to scale unless stated.*

8. *The marks allocated for each question are shown in brackets.*

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

10. *A booklet of four-figure mathematical tables is provided.*

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

12. *This question paper must be handed in at the end of the examination.*

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

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

   $=\int_a^b x\,dy$

5. Volume generated

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

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

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. $I = \dfrac{Q_1}{Q_o} \times 100$

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

GEOMETRY

1. Distance

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

2. Midpoint

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

3. A point dividing a segment of a line

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

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

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

TRIGONOMETRY

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

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

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

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

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

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

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

For Examiner's Use

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

1 The relation between $P=\{4,6,15,17\}$ and $Q=\{2,3,5,7\}$ is defined by the ordered pairs of $\{(4,2),(6,2),(6,3),(15,3),(15,5)\}$.

Hubungan di antara $P=\{4,6,15,17\}$ *dan* $Q=\{2,3,5,7\}$ *ditakrif oleh pasangan bertertib* $\{(4,2),(6,2),(6,3),(15,3),(15,5)\}$.

State

Nyatakan

(*a*) the object of 5,

objek bagi 5,

(*b*) the range of the relation.

julat bagi hubungan tersebut.

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

1

2

Answer / *Jawapan* : (*a*).....……

(*b*)…….

---

2 Given that $f:x\to x^2$ and $gf:x\to x^2+2,$ find the function *g*. [2 *marks*]

Diberi bahawa $f:x\to x^2$ *dan* $gf:x\to x^2+2,$ *carikan fungsi g.* [2 *markah*]

2

2

Answer / *Jawapan* : …....……

For Examiner's Use

3. Given that $f : x \to 6x + 5$ and $g : x \to 2x + 3$, find the function fg^{-1}.

Diberi bahawa $f : x \to 6x + 5$ *dan* $g : x \to 2x + 3$, *cari fungsi* fg^{-1} .

[3 *marks*]

[3 *markah*]

3

3

Answer / *Jawapan* : ……..……..……

---

4 Given one of the roots of the quadratic equation $x^2 - px - 27 = 0$ is the square of the other root.

Diberi salah satu daripada punca persamaan kuadratik $x^2 - px - 27 = 0$ *ialah kuasa dua punca satu lagi.*

(*a*) Find the value of *p*.

Cari nilai p.

(*b*) State the roots of the quadratic equation.

Nyatakan punca persamaan kuadratik itu.

[4 *marks*]

[4 *markah*]

4

4

Answer / *Jawapan* : (*a*) ……..……

(*b*) ……..……..

For Examiner's Use

5 Find the range of values of x for which $5x > 2x^2 - 3$. [3 *marks*]

Cari julat nilai x bagi $5x > 2x^2 - 3$. [3 *markah*]

5

3

Answer / *Jawapan* : ……..…….....

---

6 Solve the equation $2^x \square 3^{2x-3} = 12$. [3 *marks*]

Selesaikan persamaan $2^x \square 3^{2x-3} = 12$. [3 *markah*]

6

3

Answer / *Jawapan* : ……..…….

---

7 Solve the equation $\log_4(x+6) - \log_4 x = 1$. [3 *marks*]

Selesaikan persamaan $\log_4(x+6) - \log_4 x = 1$ [3 *markah*]

7

3

Answer / *Jawapan* : ……..…….

For Examiner's Use

8 Diagram 8 shows the graph of quadratic function $f(x) = a(x-1)^2 + k$, where a and k are constants. The graph has a minimum point $(1, -8)$.

Rajah 8 *menunjukkan graf fungsi kuadratik* $f(x) = a(x-1)^2 + k$, *dengan keadaan* a *dan* k *adalah pemalar. Graf itu mempunyai titik minimum* $(1, -8)$.

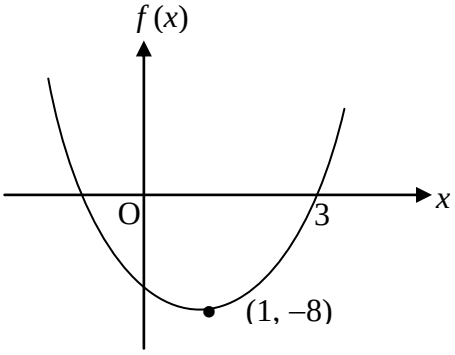

Diagram 8
Rajah 8

State
Nyatakan

(*a*) the value of *k*,
nilai bagi k,

(*b*) the value of *a*,
nilai bagi a,

(*c*) the equation of axis of symmetry.
persamaan bagi paksi simetri.

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

Answer / *Jawapan* : (*a*) *k* = ...

(*b*) *a* = ...

(*c*) .....

8

3

For Examiner's Use

9 Find the number of terms in the arithmetic progression, −18, −13, −8, …, 57.

Cari bilangan sebutan dalam janjang aritmetik, −18, −13, −8, …, 57.

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

9

2

Answer / *Jawapan* : ……..

---

10 The first three terms of a geometric progression are $h + 3$, h, $h - 2$.

Tiga sebutan pertama suatu janjang geometri ialah $h + 3$, h, $h - 2$.

Find

Cari

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

(*b*) the common ratio of the progression.
nisbah sepunya janjang itu.

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

10

3

Answer / *Jawapan* : (*a*) *h* = ……

(*b*) ……

For Examiner's Use

11 In a geometric progression, the first term is 4 and the sum of the first two terms is 7. Find the sum to infinity of the progression. [3 *marks*]

Dalam suatu janjang geometri, sebutan pertama ialah 4 *dan hasil tambah dua sebutan pertama ialah* 7. *Cari hasil tambah hingga sebutan ketakterhinggaan bagi janjang itu.* [3 *markah*]

11

Answer / *Jawapan* : 3

---

12 A straight line graph is obtained by plotting $\log_{10} y$ against $\log_{10} x$, as shown in Diagram 12. Given that the equation of graph is $\log_{10} y = 3 \log_{10} x + 4$.

Graf garis lurus diperoleh dengan memplotkan $\log_{10} y$ *melawan* $\log_{10} x$, *seperti yang ditunjukkan di Rajah 12. Diberi bahawa persamaan graf itu ialah* $\log_{10} y = 3 \log_{10} x + 4$.

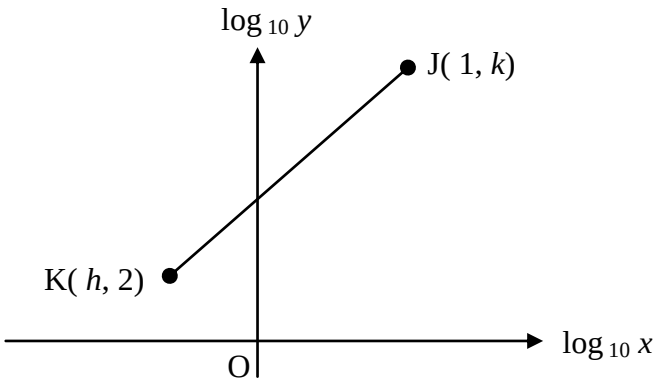

Diagram 12
Rajah 12

Find the value of *h* and of *k*. [4 *marks*]
Cari nilai h dan nilai k. [4 *markah*]

12

Answer / *Jawapan* : *h* =.....

k =..... 4

For Examiner's Use

13 The vertices of a triangle are $A(4,7)$, $B(h,3)$ and $C(10,-1)$. Given that triangle ABC is right-angled at B, calculate the possible values of h.

Bucu-bucu sebuah segitiga ialah $A(4,7)$, $B(h,3)$ and $C(10,-1)$. *Diberi bahawa segitiga ABC bersudut tepat pada B, hitungkan nilai-nilai yang mungkin untuk h.*

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

13

3

Answer / *Jawapan* : ……..

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

Rajah 14 *menunjukkan dua vektor,* $\overrightarrow{OP}$ *dan* $\overrightarrow{QO}$.

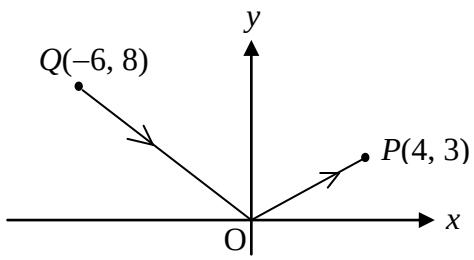


Diagram 14
Rajah 14

Express $\overrightarrow{PQ}$ in the form $\begin{pmatrix} x \\ y \end{pmatrix}$. [2 *marks*]

Ungkapkan $\overrightarrow{PQ}$ *dalam bentuk* $\begin{pmatrix} x \\ y \end{pmatrix}$. [2 *markah*]

14

2

Answer / *Jawapan* : ……..……...

For Examiner's Use

15 Given that $\overrightarrow{AB} = \begin{pmatrix} m \\ 3 \end{pmatrix}$ and $\overrightarrow{AC} = \begin{pmatrix} -3 \\ n \end{pmatrix}$, find the value of *m* and of *n* if $\overrightarrow{BC} = \begin{pmatrix} 6 \\ -5 \end{pmatrix}$.

Diberi $\overrightarrow{AB} = \begin{pmatrix} m \\ 3 \end{pmatrix}$ *dan* $\overrightarrow{AC} = \begin{pmatrix} -3 \\ n \end{pmatrix}$, *cari nilai m dan nilai n jika* $\overrightarrow{BC} = \begin{pmatrix} 6 \\ -5 \end{pmatrix}$.

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

Answer / *Jawapan* : *m*=……..

n = ……

15 3

---

16 Diagram 16 shows a triangle *ABC.*

Rajah 16 *menunjukkan sebuah segitiga ABC*

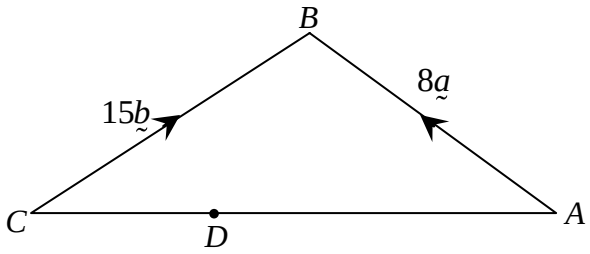


Diagram 16
Rajah 16

The point *D* lies on *AC* such that *AD: DC* = 2 : 1.

Titik D terletak pada AC dengan keadaan AD: *DC* = 2 : 1.

Express in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$
Ungkapkan dalam sebutan $\underset{\sim}{a}$ *dan* $\underset{\sim}{b}$

(*a*) $\overrightarrow{AC}$,

(*b*) $\overrightarrow{BD}$.

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

Answer / *Jawapan* : (*a*)…….……...…..…..

(*b*)…….……

16 4

For Examiner's Use

17 Solve the equation $3\cos^2 x - 10\sin x + 5 = 0$ for $0^o \leq x \leq 360^o$.

Selesaikan persamaan $3\,\text{kos}^2 x - 10\sin x + 5 = 0$ untuk $0^o \leq x \leq 360^o$.

[4 *marks*]

[4 *markah*]

17

4

Answer / *Jawapan* : …….……..

---

18 It is given that $y = \frac{1}{3}u^5$, where $u = 6x + 1$. Find $\frac{dy}{dx}$ in terms of x.

Diberi bahawa $y = \frac{1}{3}u^5$, *dengan keadaan* $u = 6x + 1$. *Cari* $\frac{dy}{dx}$ *dalam sebutan x.*

[3 *marks*]

[3 *markah*]

18

3

Answer / *Jawapan* : ……..

For Examiner's Use

19

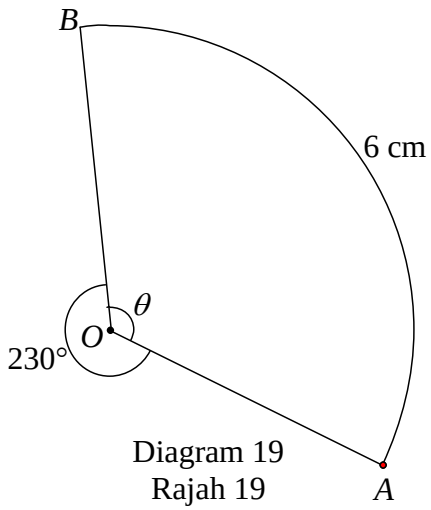


Diagram 19
Rajah 19

Diagram 19 shows the sector *OAB* with centre *O*. The reflex angle of *AOB* is 230° and the length of the arc *AB* is 6 cm. Using π = 3.142, find

Rajah 19 *menunjukkan sektor OAB dengan pusat O. Sudut reflex AOB ialah* 230° *dan panjang lengkok AB ialah* 6 cm. *Dengan menggunakan* π = 3.142, *cari*

(*a*) the value of θ, in radians,
nilai bagi θ, *dalam radian*,

(*b*) the area, in cm^2, of sector *OAB*.
luas, dalam cm^2, *bagi sektor OAB*.

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

19

Answer / *Jawapan* : (*a*) θ = ……..……

(*b*) ……..…..……

3

For Examiner's Use

20 The volume of water, V m^3, in a tank is given by $V = \frac{3h}{2}(2 + h)^2$, where h is the height of the water, in m, in the tank. Water leaked from the tank at the rate of 12 m^3 s^{-1}. Find the rate of change of the height of the water in m s^{-1}, at the instant when its height is 2 m.

[4 *marks*]

Isipadu air, V m^3, *dalam sebuah tangki diberi oleh* $V = \frac{3h}{2}(2 + h)^2$, *dengan keadaan* h *ialah tinggi air, dalam* m, *dalam bekas itu. Air bocor dari tangki itu dengan kadar* 12 m^3 s^{-1}. *Cari kadar perubahan tinggi air dalam* m s^{-1}, *pada ketika tingginya ialah* 2 m.

[4 *markah*]

20

4

Answer / *Jawapan* : …..……

---

21 Given that $\int_0^4 g(x)\,dx = 2$, find

Diberi bahawa $\int_0^4 g(x)\,dx = 2$, *cari*

(*a*) $\int_4^0 2g(x)\,dx$,

(*b*) $\int_0^4 [x - g(x)]dx$.

[4 *marks*]
[4 m*arkah*]

21

4

Answer / *Jawapan* : (*a*) …..…….

(*b*)……....

For Examiner's Use

22(*a*) How many five-digit odd numbers can be formed from the digits 5, 6, 7, 8, 9 if no repetition is allowed?

Berapakah bilangan nombor ganjil lima digit yang boleh dibentuk daripada digit 5, 6, 7, 8, 9 tanpa ulangan?

(*b*) A karate team of 5 members is chosen from 4 girls and 6 boys. Calculate the number of different ways the team can be formed if there is no restriction.

Satu pasukan karate yang terdiri daripada 5 orang ahli dipilih daripada 4 orang perempuan dan 6 orang lelaki. Hitungkan bilangan cara yang berlainan pasukan itu boleh dibentuk jika tiada syarat dikenakan.

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

Answer / *Jawapan* : (*a*) ……..

(*b*)……..…….

22 4

---

23 A marble is drawn at random from a bag containing 2 white marbles, 3 red marbles and 5 blue marbles.

Sebiji guli dikeluarkan secara rawak dari sebuah beg yang mengandungi 2 biji guli putih, 3 biji guli merah dan 5 biji guli biru.

Find the probability of
Cari kebarangkalian untuk

(*a*) getting a red or blue marble,
mendapat sebiji guli merah atau biru,

(*b*) not getting a red marble.
tidak mendapat guli merah.

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

Answer / *Jawapan* : (*a*)…..…….

(*b*)……

23 4

For Examiner's Use

24 A set of data consists of five numbers. The sum of the numbers is 30 and the sum of the squares of the numbers is 225.

Satu set data mengandungi lima nombor. Hasil tambah bagi nombor-nombor itu ialah 30 *dan hasil tambah bagi kuasa dua nombor-nombor itu ialah* 225*.*

(*a*) Find the mean for the five numbers.

Cari min bagi lima nombor itu.

(b) When a number *p* is added to this set, the mean is unchanged. Hence, find the variance.

Apabila satu nombor p ditambah ke set nombor ini, minnya tidak berubah. Seterusnya, cari varians.

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

24

3

Answer / *Jawapan* : (*a*) …..……

(*b*) ……...……...

25

For Examiner's Use

Diagram 25 shows a standard normal distribution graph.

Rajah 25 menunjukkan satu graf taburan normal piawai.

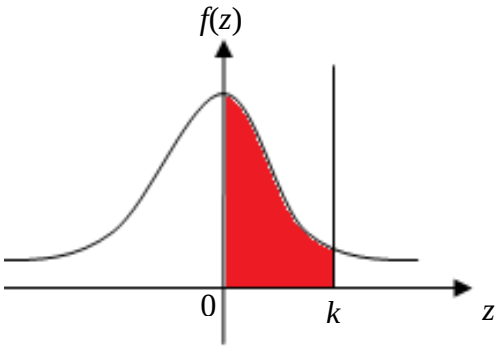


Diagram 25
Rajah 25

Given $P(0 \le z \le k)$ is 0.4115.
Diberi $P(0 \le z \le k)$ *ialah* 0.4115.

(*a*) Find $P(z \ge k)$.
Cari $P(z \ge k)$.

(*b*) X is a continuous random variable which is normally distributed with a mean of 48 and a variance of 144.

X ialah pembolehubah rawak selanjar bertaburan secara normal dengan min 48 *dan varians* 144.

Find the value of X when the z-score is k.
Cari nilai X apabila skor-z ialah k

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

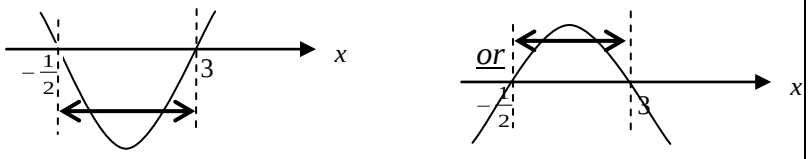
25

4

Answer / *Jawapan* : (*a*) ……..

(*b*) ……..

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

No.	Suggested solution and mark scheme	Sub Marks	Total Marks
1.	(a) 15 (b) $\{2,3,5\}$	1 1	2
2.	$g(x) = x + 2$ B1: $g(y) = (\sqrt{y})^2 + 2$ *or* $g(x^2) = (x^2) + 2$ *or* $f^{-1}(x) = \sqrt{x}$	2	2
3.	$fg^{-1} = 3x - 4$ B2: $fg^{-1} = 6\left(\frac{x-3}{2}\right) + 5$ B1: $g^{-1} = \frac{x-3}{2}$	3	3
4.	(*a*) $p = 6$ B2: $\alpha = -3$ B1: $\alpha + \alpha^2 = p$ or $\alpha(\alpha^2) = -27$ (b) -3, 9	3 1	4
5.	$-\frac{1}{2} < x < 3$ *or* $3 > x > -\frac{1}{2}$ B2:  B1: $(2x+1)(x-3) < 0$ *or* $(-2x-1)(x-3) > 0$	3	3
6	$x = 2$ B2: $2^x \cdot (3^2)^x = 12 \times 27$ *or* $2^x \cdot (9)^x = 324$ *or* $18^x = 324$ *or* *equivalent.* B1: $\frac{2^x \cdot 3^{2x}}{3^3} = 12$ *or* *equivalent.* *OR* *using logarithms method:* $x = 2$ (accept 1.9999) B2: $0.3010x + (2x - 3)(0.4771) = 1.079$ *or* $1.2552x = 2.5103$ B1: $\log_{10} 2^x + \log_{10} 3^{2x-3} = \log_{10} 12$ (accept any base)	3	3

7.	$x = 2$ B2: $\frac{x+6}{x} = 4$ <u>or</u> $x + 6 = 4x$ <u>or</u> *equivalent* B1: $\log_4 \frac{x+6}{x} = 1$	3	3
8.	(*a*) $k = -8$ (*b*) $a = 2$ (*c*) $x = 1$	1 1 1	3
9.	16 <u>or</u> 16 terms <u>or</u> $n = 16$ B1: $-18 + (n - 1)(5) = 57$ <u>or</u> *by listing method:* –18, –13, –8, –3, 2, 7, 12, 17, 22, 27, 32, 37, 42, 47, 52, 57.	2	2
10.	(*a*) $h = 6$ B1 : $\frac{h}{h+3} = \frac{h-2}{h}$ <u>or</u> $h^2 = (h-2)(h+3)$ (*b*) $r = \frac{2}{3}$	2 1	3
11.	$S_\infty = 16$ B2: $S_\infty = \frac{4}{1-\frac{3}{4}}$ B1: $r = \frac{3}{4}$	3	3
12.	$h = -\frac{2}{3}$, $k = 7$*(both)* B3: $h = -\frac{2}{3}$ <u>or</u> $k = 7$ B2: $2 = 3h + 4$ <u>or</u> $k = 3(1) + 4$ B1: $Y = 3X + 4$	4	3
13.	2, 12 B2: $h^2 - 14h + 24 = 0$ B1: $\frac{3-7}{h-4} \times \frac{3-(-1)}{h-10} = -1$	3	3
14.	$\begin{pmatrix} -10 \\ 8 \end{pmatrix}$ B1: $\vec{PQ} = \vec{PO} + \vec{OQ}$ <u>or</u> $\begin{pmatrix} -4 \\ -3 \end{pmatrix} + \begin{pmatrix} -6 \\ 8 \end{pmatrix}$	2	2
15.	$m = -9$, $n = -2$ (both) B2: $-m + (-3) = 6$ <u>or</u> $-3 + n = -5$ B1: $\vec{BC} = \vec{BA} + \vec{AC}$ <u>or</u> $\begin{pmatrix} 6 \\ -5 \end{pmatrix} = \begin{pmatrix} -m \\ -3 \end{pmatrix} + \begin{pmatrix} -3 \\ n \end{pmatrix}$ *or equivalent*	3	3
16.	(*a*) $8\underset{\sim}{a} - 15\underset{\sim}{b}$	1	

	(*b*) $-\frac{8}{3}\underset{\sim}{a}-10\underset{\sim}{b}$ B2: $\overrightarrow{BD}=-8\underset{\sim}{a}+\frac{2}{3}(8\underset{\sim}{a}-15\underset{\sim}{b})$ <u>or</u> $\overrightarrow{BD}=-15\underset{\sim}{b}+\frac{1}{3}(-8\underset{\sim}{a}+15\underset{\sim}{b})$ B1: $\overrightarrow{AD}=\frac{2}{3}(8\underset{\sim}{a}-15\underset{\sim}{b})$ <u>or</u> $\overrightarrow{BD}=-8\underset{\sim}{a}+\frac{2}{3}\overrightarrow{AC}$ OR $\overrightarrow{CD}=\frac{1}{3}(-8\underset{\sim}{a}+15\underset{\sim}{b})$ <u>or</u> $\overrightarrow{BD}=-15\underset{\sim}{b}+\frac{1}{3}\overrightarrow{CA}$	3	
17.	41.81^{o} , 138.19^{o} or 41° 49', 138° 11' B3 : $\sin x = \frac{2}{3}$, $\sin x = -4$ (both) B2 : $(3\sin x - 2)(\sin x + 4) = 0$ B1 : $3(1-\sin^2 x) - 10\sin x + 5 = 0$	4	4
18.	$10(6x+1)^4$ B2: $\frac{dy}{dx}=\frac{5}{3}u^4\times 6$ B1: $\frac{dy}{du}=\frac{5}{3}u^4$ <u>or</u> $\frac{du}{dx}=6$	3	3
19.	(*a*) 2.269 (*b*) 7.933 B1: $\frac{1}{2}\left(\frac{6}{2.269}\right)(6)$ <u>or</u> $\frac{1}{2}\left(\frac{6}{2.269}\right)^2(2.269)$ <u>or</u> $r = 2.644$	1 2	3
20.	$\frac{dh}{dt}=-\frac{1}{4}$ B3: $-12=48\times\frac{dh}{dt}$ B2: $\frac{dV}{dh}=6+12(2)+\frac{9}{2}(2)^2=48$ B1: $\frac{dV}{dh}=\frac{3}{2}(2+h)^2+2\left(\frac{3}{2}h\right)(2+h)$ <u>or</u> $\frac{dV}{dh}=6+12h+\frac{9}{2}h^2$	4	4
21.	(*a*) −4 (*b*) 6 B2 : $\left[\frac{x^2}{2}\right]_0^4 - 2$ B1 : $\int_0^4 x\,dx - \int_0^4 g(x)\,dx$	1 3	4
22.	(*a*) 72 B1 : 3 x 4! (*b*) 252 B1 : $^{10}C_5$	2 2	4

23	(*a*) $\frac{4}{5}$ B1 : $\frac{3}{10}+\frac{5}{10}$ (*b*) $\frac{7}{10}$ B1 : 1 - $\frac{3}{10}$ or $\frac{5}{10}$ + $\frac{2}{10}$	2 2	4
24	(*a*) 6 (*b*) $7\frac{1}{2}$ B1 : $\frac{225+6^2}{6}-6^2$	1 2	3
25	(*a*) 0.0885 (*b*) 64.2 B2 : $\frac{x-48}{12}=1.35$ B1 : k = 1.35	1 3	4

SULIT

NAMA : _____

KELAS : _____

JABATAN PELAJARAN NEGERI SABAH

SIJIL PELAJARAN MALAYSIA 2010 **3472/2**
EXCEL 2
ADDITIONAL MATHEMATICS
Paper 2
SEPTEMBER 2010

$2\frac{1}{2}$ *jam* 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 for each question.*
4. *Show your working. It may help you to get marks.*
5. *The diagrams in the questions provided are not drawn to scale unless stated.*
6. *The marks allocated for each question and sub-part of a question are shown in brackets.*
7. *A list of formulae is provided on pages 2 to 4.*
8. *A booklet of four-figure mathematical tables is provided.*
9. *You may use a non-programmable scientific calculator.*

This paper consists of 16 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
   $=\int_a^b y\,dx$ or
   $=\int_a^b x\,dy$
5. Volume generated
   $=\int_a^b \pi y^2\,dx$ or
   $=\int_a^b \pi x^2\,dy$

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. $\sigma=\sqrt{\dfrac{\sum f(x-\bar{x})^2}{\sum f}}=\sqrt{\dfrac{\sum fx^2}{\sum f}-\bar{x}^2}$
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. $P(X=r)={}^nC_r p^r q^{n-r},\ p+q=1$

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

6. $I = \dfrac{Q_1}{Q_o} \times 100$

12. Mean, $\mu = np$

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

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

GEOMETRY

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

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

3. A point dividing a segment of a line
   $(x, y) = \left(\dfrac{nx_1 + mx_2}{m+n}, \dfrac{ny_1 + my_2}{m+n} \right)$

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

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

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. $\text{cosec}^2 A = 1 + \cot^2 A$
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 $= \dfrac{1}{2}ab\sin C$

Section A
Bahagian A

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

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

1 Solve the following simultaneous equations :

Selesaikan persamaan serentak berikut :

$y - 2x + 3 = 0$ [5 *marks*]

$x^2 + y^2 + xy - 10 = 0$ [*5 markah*]

2 Given that $f(x) = 5x + 3$ and $g(x) = \frac{3}{2}x - 2$. Find

Diberi bahawa $f(x) = 5x + 3$ *dan* $g(x) = \frac{3}{2}x - 2$. Cari

(*a*) $f^{-1}(x)$ [1 *mark*]

$f^{-1}(x)$ [1 *markah*]

(*b*) $gf^{-1}(x)$ [2*marks*]

$gf^{-1}(x)$ [2*markah*]

(*c*) $h(x)$ such that $hf(x) = 3 + 10x$ [3 *marks*]

h(x) supaya $h\,f(x) = 3 + 10x$ [3 *markah*]

3 (a) Sketch the graph of $y = 2\cos 2x + 1$ for $0 \le x \le 2\pi$. [4 marks]

Lakar graf $y = 2\cos 2x + 1$ *untuk* $0 \le x \le 2\pi$. [4 *markah*]

(b) Hence using the same axes, sketch a suitable straight line to find the number of solutions for the equation $\pi\cos 2x - x = 0$ for $0 \le x \le 2\pi$.
State the number of solutions. [3 marks]

Seterusnya, dengan menggunakan paksi yang sama , lakar satu garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $\pi\cos 2x - x = 0$ *untuk* $0 \le x \le 2\pi$. *Nyatakan bilangan penyelesaian itu.* [*3 markah*]

4.

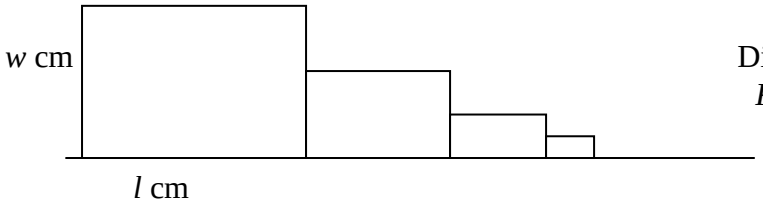


Diagram 1
Rajah 1

Diagram 1 shows the arrangement of the first four of an infinite series of similar rectangles . The length and width of the first rectangle is l cm and w cm respectively. The measurements of the length and width of each subsequent rectangle are half that of the previous one.
Rajah 1 menunjukkan empat buah segi empat tepat yang pertama bagi suatu siri infinit segi empat tepat yang serupa . Panjang dan lebar segi empat tepat yang pertama ialah l cm dan w cm masing-masing. Panjang dan lebar untuk segi empat tepat yang seterusnya adalah separuh ukuran segi empat tepat sebelumnya.

(a) Show that the areas of the rectangle form a geometric progression and state the common ratio . [3 marks]
Tunjukkan bahawa luas- luas segi empat tepat itu membentuk suatu janjang geometri. Nyatakan nisbah sepunyanya. [*3 markah*]

(b) Given that l = 352 cm and w = 128 cm,
Diberi bahawa l = 352 cm dan w = 128 cm,

(i) determine the number of rectangles with area greater than 11 cm^2 , [3 marks]
tentukan bilangan segi empat tepat yang luasnya lebih daripada 11 cm^2, [*3 markah*]

(ii) find the sum to infinity of the areas , in cm^2 of the rectangles . [2 marks]
cari hasil tambah hingga infiniti, luas segi empat tepat itu dalam cm^2. [2 *markah*]

5. Number of pupils
Bilangan Murid

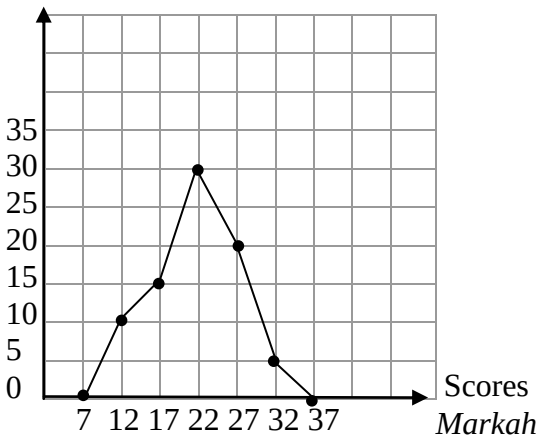


Diagram 2
Rajah 2

Diagram 2 shows a frequency polygon which represents the distribution of the scores obtained by 80 pupils in a test.
Rajah 2 menunjukkan suatu poligon kekerapan yang mewakili taburan markah yang di perolehi oleh 80 orang pelajar dalam satu ujian.

(a) Complete the frequency distribution table below. [1 mark]
Lengkapkan jadual taburan kekerapan di bawah. [*1 markah*]

Score Markah	10-14	15-19	20-24	25-29	30-34
Cumulative Frequency *Kekerapan Longgokan*					

(b) Calculate the median score [3 *marks*]
Hitung nilai markah median [*3 markah*]

(c) Calculate the variance of the distribution. [3 *marks*]
Hitung varians bagi taburan tersebut [*3 markah*]

6. Diagram 3 shows triangles OAB and OAC. The straight lines OB and AC intersect at point K such that AK : AC = 1 : 3. Given that $\vec{OA}$ = 3$\underline{a}$ and $\vec{OC}$ = h$\underline{b}$ where h is a constant.
Rajah 3 menunjukkan segitiga-segitiga OAB dan OAC. Garis lurus OB dan AC bertemu di titik K di mana AK : AC = 1 : 3. Diberi bahawa $\vec{OA}$ *= 3*$\underline{a}$ *and* $\vec{OC}$ *= h*$\underline{b}$*, dengan keadaan h ialah pemalar.*

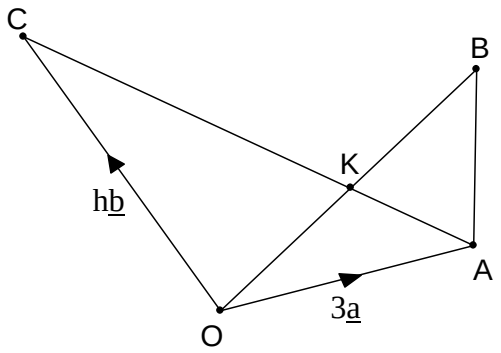


Diagram 3
Rajah 3

`

Find
Cari

(a) $\vec{AK}$ in terms of h, $\underline{a}$ and $\underline{b}$
$\vec{AK}$ *dalam sebutan h,* $\underline{a}$ *and* $\underline{b}$

(b) $\vec{OK}$ in terms of h, $\underline{a}$ and $\underline{b}$
$\vec{OK}$ *dalam sebutan h,* $\underline{a}$ *and* $\underline{b}$

[4 marks]
[*4 markah*]

Hence, if $\vec{KB}$ = 10$\underline{a}$ + 5$\underline{b}$, find the value of h. [3 marks]
Oleh itu, jika $\vec{KB}$ = 10$\underline{a}$ + 5$\underline{b}$, cari nilai h. [*3 markah*]

Section B
Bahagian B

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

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

7. Given that $\int_0^2 f(x)dx = 17$, where *f(x)* is a linear function.

Diberi $\int_0^2 f(x)dx = 17$ *, yang mana f(x) ialah suatu fungsi linear.*

(a) Find the value of *k* when $\int_2^0 [f(x)+k]\,dx = 1$. [2marks]

Cari nilai k apabila $\int_2^0 [f(x)+k]\,dx = 1$. [2*markah*]

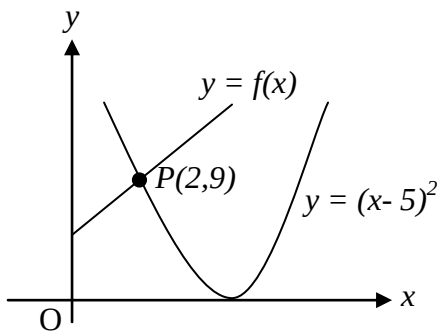


Diagram 4
Rajah 4

Diagram 4 shows the graph of the straight line $y = f(x)$ which intersects the curve $y = (x - 5)^2$ at point P(2, 9) .

Rajah 4 menunjukkan graf garis lurus $y = f(x)$ *yang bersilang dengan lengkung* $y = (x- 5)^2$ *pada titik P(2, 9) .*

(b) Find the area bounded by the straight line $y = f(x)$, the curve $y = (x - 5)^2$, the *x-axis* and the *y-axis* . [4marks]
Cari luas yang dibatasi oleh garis lurus $y = f(x)$ *, lengkung* $y = (x - 5)^2$*, paksi-x dan paksi-y.* [4 *markah*]

(c) Calculate the volume generated in terms of π , when the area bounded by the line OP, the curve $y = (x - 5)^2$ and the x-axis is revolved through 360° about the *x-axis*. [4 marks]
Hitung isipadu yang dijanakan dalam sebutan π *, apabila rantau yang dibatasi oleh garis lurus OP, lengkung* $y = (x - 5)^2$ *dan paksi-x dikisarkan melalui 360° pada paksi-x.* [*4 markah*]

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

x	3	4	5	6	7	8
y	12.1	6.46	3.47	1.89	0.95	0.52

Table 5
Jadual 5

Table 5 shows the values of the variables x and y obtained from an experiment. Variables x and y are related by the equation $y = pq^{x-1}$, where p and q are constants.

Jadual 5 menunjukkan nilai-nilai pembolehubah x dan y, yang didapati daripada suatu ujikaji. Pembolehubah x dan y dikaitkan oleh persamaan $y = pq^{x-1}$, dengan keadaan p dan q adalah pemalar.

(a) Using a scale of 2 cm to 1 unit on the $(x - 1)$-axis and 2 cm to 0.2 unit on the log y-axis, plot log y against $(x - 1)$. Hence, draw the line of best fit. [5 marks]

Dengan menggunakan skala 2cm kepada 1 unit pada paksi-$(x - 1)$ dan 2cm kepada 0.2 unit pada paksi- log y , plotkan log y melawan $(x - 1)$. Seterusnya, lukis satu garis lurus penyuaian terbaik. [*5 markah*]

(b) From your graph in *8*(a) , find the value of
Daripada graf anda di 8(a), cari nilai

(i) p and of q
p dan nilai q

(ii) x when $y = 5.0$. [5 marks]
x apabila y = 5.0 [*5 markah*]

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

Diagram 6 shows a rectangle *PQRS*.
Rajah 6 menunjukkan sebuah segi empat tepat PQRS.

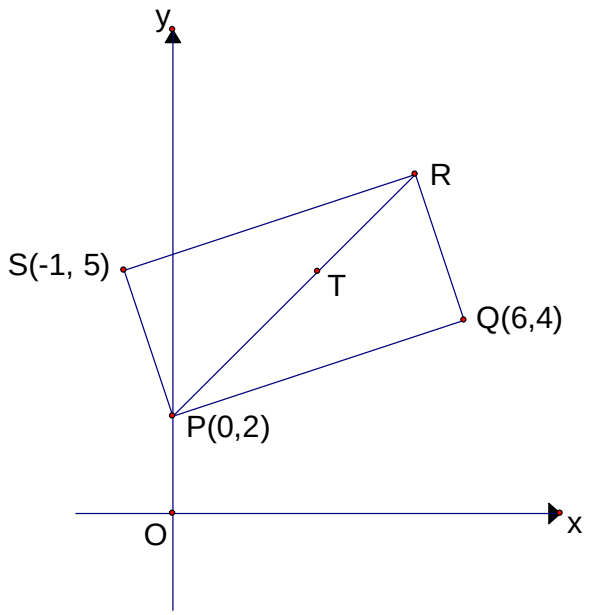


Diagram 6
Rajah 6

Given that the equation of the straight line *PR* is $y = 2 + x$. Point T lies on the straight line PR such that PT : TR = 2 : 1

Diberi persamaan garis lurus PR ialah $y = 2 + x$. *Titik T terletak pada garis lurus PR dengan keadaan PT : TR = 2 : 1*

(a) Find
Cari,

(i) the equation of the straight line SR [2 marks]
persamaan garis lurus SR [*2 markah*]

(ii) the coordinates of T [4 marks]
koordinat titik T, [4 *markah*]

(iii) the area of triangle PST [2 marks]
luas segitiga PST [*2 markah*]

(b) A point M moves such that its distance from point S is always 5 units. Find the equation of the locus of M. [2 *marks*]
Suatu titik M bergerak dengan dengan keadaan jaraknya dari titik S ialah sentiasa 6 unit. Cari persamaan lokus titik M. [*2 markah*]

10.

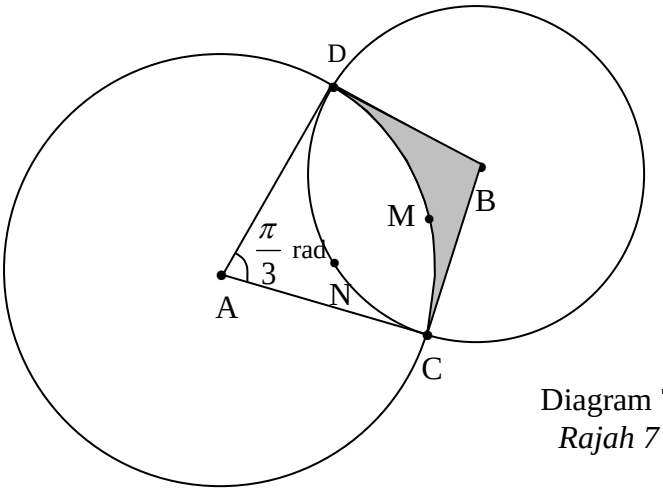


Diagram 7
Rajah 7

Diagram 7 shows two circles with centres at A and B which intersect each other at points C and D. AC and AD are tangents to the circle with centre B.

Given that AB is 6 cm and $\angle CAD = \frac{\pi}{3}$ radian.

Rajah 7 menunjukkan dua buah bulatan yang berpusat A dan B dan bersilang satu sama lain di C dan D. AC dan AD adalah garis tangen kepada bulatan berpusat B. Diberi AB ialah 6 cm dan $\angle CAD$ *ialah* $\frac{\pi}{3}$ *radian.*

[Use π = 3.142. Give your answers correct to three decimal places]
[Guna π = 3.142. Beri jawapan anda betul kepada tiga tempat perpuluhan]

Calculate
Hitung

(a) the length of AC, in cm [2 marks]
panjang AC, dalam cm [*2 markah*]

(b) length of arc DNC, in cm [3 marks]
panjang lengkok DNC, dalam cm [*3 markah*]

(c) the area of sector ADMC, in terms of π [2 marks]
luas sektor ADMC, dalam sebutan π [*2 markah*]

(d) the area of the shaded region , in terms of π [3 marks]
luas kawasan berlorek, dalam sebutan π [*3 markah*]

11 (*a*) Given that 65% of the candidates who sat for a particular examination passed. If 9 candidates are chosen at random from the candidates who sat for the examination, find the probability that
Diberi bahawa, 65% *daripada calon yang menduduki suatu peperiksaan tertentu telah lulus. Jika* 9 *calon dipilih secara rawak daripada calon yang menduduki peperiksaan itu, cari kebarangkalian bahawa*

(i) exactly 6 candidates passed,
tepat 6 *orang calon lulus,*

(ii) at least 2 candidates failed.
sekurang-kurangnya 2 *orang calon gagal.*

[5 marks]
[5 *markah*]

(*b*) The time taken to produce a souvenir are normally distributed with a mean of 30 minutes and a standard deviation of 5 minutes. Find the probability of producing a souvenir
Masa yang diambil untuk menghasilkan satu cenderamata adalah mengikut taburan normal dengan min 30 *minit dan sisihan piawai* 5 *minit. Cari kebarangkalian menghasilkan satu cenderamata dalam tempoh*

(i) in not more than 35 minutes,
tidak melebihi 35 *minit,*

(ii) between 15 and 25 minutes.
antara 15 *dan* 25 *minit.*

[5 marks]
[5 *markah*]

Section C
Bahagian C

[20 *marks*]
[20 *markah*]

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

12. Table 2 shows the prices and the prices indices of five commodities A, B, C, D and E.

Jadual 2 menunjukkan harga dan indeks harga bagi lima komoditi A, B, C, D dan E .

Commodity *Komoditi*	Price (RM) for year *Harga (RM) bagi tahun*		Price index for year 2010 based on year 2005 *Indeks harga pada tahun 2010 berasaskan tahun 2005*
	2005	2010	
A	2.00	2.50	125
B	4.50	5.25	y
C	x	2.50	175
D	5.00	7.50	150
E	4.00	z	95

Table 8
Jadual 8

Diagram 9 shows a bar chart indicating the monthly expenditure (in hundreds RM) of a family for the *commodities above for the year 2005.*

Rajah 9 ialah carta bar yang menunjukkan perbelanjaan bulanan (dalam ratus RM) sebuah keluarga bagi komoditi-komoditi di atas dalam tahun 2005.

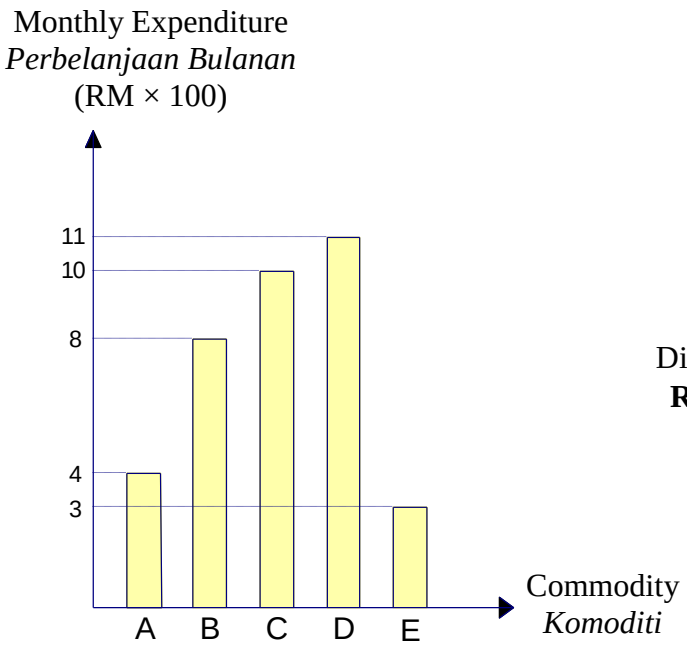


Diagram 9
Rajah 9

(a) Find the values of x, y and z. [3 marks]
Cari nilai x, y dan z. [*3 markah*]

(b) Calculate the composite index for the expenditure of the commodities in the year 2010 based on the year 2005. [2 marks]
Hitung indeks gubahan bagi perbelanjaan komoditi-komoditi tersebut pada tahun 2010 berasaskan tahun 2005. [*2 markah*]

(c) Calculate the total monthly expenditure for the commodities in the year 2010. [3 marks]
Hitung jumlah perbelanjaan bagi komoditi-komoditi tersebut pada tahun 2010. [*3 markah*]

(d) If the indices of the commodities is expected to increase by 30% from the year 2010 to the year 2015, calculate the composite index for the year 2015 based *on* the year 2005. [2 marks]

Jika indeks komoditi-komoditi tersebut dijangka meningkat 30% dari tahun 2010 ke tahun 2015, hitung indek gubahan tahun 2015 berasaskan tahun 2005. [*2 markah*]

13 Diagram 10 shows a quadrilateral *PQRS*.
Rajah 10 menunjukkan sebuah sisi empat PQRS.

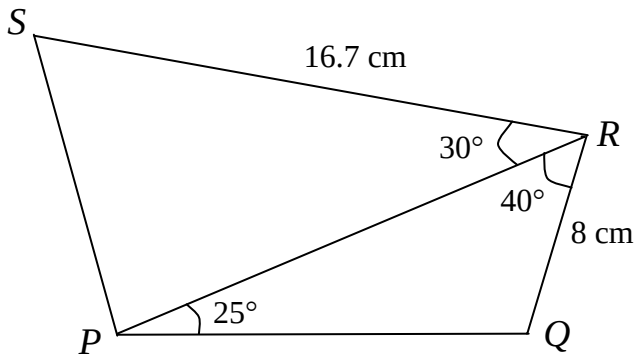


Diagram 10
Rajah 10

(*a*) Calculate the length, in cm, of
Hitung panjang, dalam cm, *bagi*

(i) *PR*,
(ii) *PS*. [5 marks]
[5 *markah*]

(*b*) Point P' lies on *PR* such that $PS = P'S$. Calculate
Titik P' *terletak pada PR dengan keadaan* $PS = P'S$. *Hitung*

(i) $\angle RPS$,
(ii) the area, in cm^2, of $\Delta PP'S$.
luas, dalam cm^2, *bagi* $\Delta PP'S$. [5 marks]
[5 *markah*]

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

A furniture workshop has 2 workers, *A* and *B*, doing the job of assembling and then painting desks. The time taken by these workers is as tabulated in Table 11.
Suatu kilang perabot menggaji 2 orang pekerja, A dan B, untuk memasang dan mengecat meja. Masa yang diambil oleh pekerja adalah dijadualkan di Jadual 11.

Worker *Pekerja*	Time taken (minutes) *Masa diambil (minit)*	
	Assemble *Memasang*	Paint *Mengecat*
A	105	60
B	120	30

Table 11
Jadual 11

In a week, worker *A* can complete *x* desks, while worker *B* complete *y* desks. These two workers work under the following constraints:
Dalam suatu minggu, pekerja A dapat menyiapkan x buah meja, manakala pekerja B menyiapkan y buah meja. Kedua-dua orang pekerja itu bekerja berdasarkan kekangan berikut:

I The total time taken by the two workers does not exceed 110 hours.
Jumlah masa yang diambil oleh dua orang pekerja itu tidak melebihi 110 jam.

II The minimum total time by the two workers for assembling the desks is 14 hours.
Jumlah masa minimum yang diambil oleh dua pekerja untuk memasang meja ialah 14 jam.

III The number of desks completed by *A* must not exceed by 20 that completed by B.
Bilangan buah meja yang disiapkan oleh A tidak melebihi 20 buah bilangan yang disiapkan oleh B.

(*a*) Write three inequalities, other than $x \geq 0$ and $y \geq 0$, which satisfy all the above constraints. [3 marks]
Tuliskan tiga ketaksamaan, selain $x \geq 0$ *dan* $y \geq 0$, *yang memenuhi semua kekangan di atas.* [3 *markah*]

(*b*) Using a scale of 2 cm to 5 desks on the both axes, construct and shade the region *R* which satisfies all the above constraints. [3 marks]
Dengan menggunakan skala 2 cm kepada 5 meja pada kedua-dua paksi, bina dan lorekkan rantau R yang memenuhi semua kekangan di atas. [3 *markah*]

(*c*) Use your graph from (*b*) to answer the following questions:.
Guna graf anda dari (b) untuk menjawab soalan berikut:

(i) Find the range of the number of desks which completed by worker *B* if worker *A* completed 6 desks for that particular week.
Cari julat bagi bilangan meja yang disiapkan oleh pekerja B jika pekerja A menyiapkan 6 buah meja pada minggu yang tertentu.

(ii) The profit for each desk sold is RM 12. Assuming that all the desks made by *A* and *B* for that particular week are sold, find the maximum total profit netted.
Keuntungan bagi sebuah meja ialah RM 12. Anggapan bahawa semua meja yang disiapkan oleh A dan B bagi hari yang tertentu telah dijual, cari jumlah keuntungan maximum.

[4 marks]
[4 *markah*]

15. A particle moves along a straight line and passes through a fixed point O. Its velocity, v ms^{-1}, is given by $v = 6 + 3t - 3t^2$, where t is the time, in seconds, after passing through O. The particle stops instantaneously at a point R.
[Assume motion to the right is positive]

Suatu zarah bergerak di sepanjang suatu garis lurus dan melalui satu titik tetap O. Halajunya v ms^{-1} diberi oleh $v = 6 + 3t - 3t^2$ di mana t ialah masa dalam saat. selepas melalui O. Zarah itu berhenti seketika di suatu titik R.
(Anggapkan gerakan ke arah kanan sebagai positif)

Find
Cari

(a) the initial velocity [1 mark]
halaju awalnya [*1 markah*]

(b) the acceleration, in ms^{-2}, of the particle at R, [3 mark]
pecutan dalam ms^{-2} bagi zarah itu di R [*3 markah*]

(c) the maximum velocity, in ms^{-1}, of the particle, [2 marks]
halaju maksimum, dalam ms^{-1} bagi zarah itu [*2 markah*]

(d) the total distance, in m, travelled by the particle in the first 4 seconds, after passing through O. [4 marks]
jumlah jarak dalam m, yang dilalui oleh zarah itu dalam 4 saat pertama selepas melalui O. [*4 markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

NO. KAD PENGENALAN

ANGKA GILIRAN

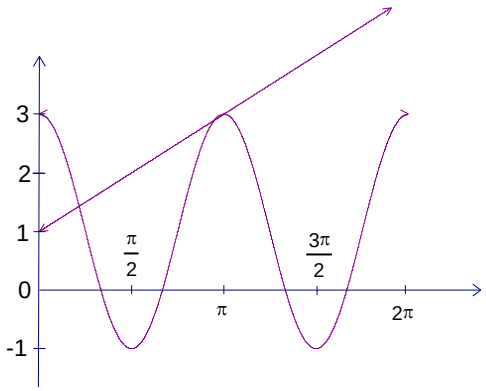
Arahan Kepada Calon

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

2 Tandakan (√) untuk soalan yang dijawab.

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

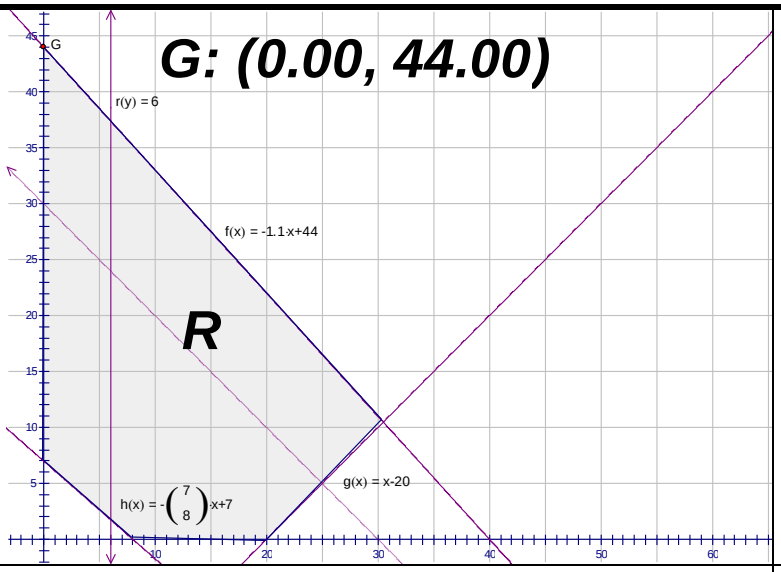
Kod Pemeriksa				
Bahagian	Soalan	Soalan Dijawab	Markah Penuh	Markah Diperoleh (*Untuk Kegunaan Pemeriksa*)
A	1		5	
	2		6	
	3		7	
	4		8	
	5		7	
	6		7	
B	7		10	
	8		10	
	9		10	
	10		10	
	11		10	
C	12		10	
	13		10	
	14		10	
	15		10	
Jumlah				

ADDITIONAL MATHS - PAPER 2				
1		$y = 2x - 3$ or $x = \frac{y=3}{2}$	P1	5
		Substitute x or y into $x^2 + y^2 + xy - 10 = 0$	K1	
		$x = \frac{-(-15) \pm \sqrt{(-15)^2 - 4(7)(-1)}}{2(7)}$ or $y = \frac{-12 \pm \sqrt{12^2 - 4(7)(-31)}}{2(7)}$	K1	
		x =2.208 and -0.06471	N1	
		y= 1.415 and -3.129	N1	
2	2a	$\frac{x-3}{5}$	P1	6
	2b	$\frac{3}{2}(\frac{x-3}{2}) - 2$	K1	
		$\frac{3x-29}{10}$	N1	
	2c	$3 + 10(\frac{y-3}{5})$ | $2(5x+3) - 3$	K1	
		2y - 3	K1	
		h(x) = 2x - 3	N1	
3	3a	 Cosine graph shape Amplitude = 4 2 cycles Translated 1 unit and passing through (0,3),(2π ,3)	P1 P1 P1 P1	4
	3b	$y = \frac{2x}{\pi} + 1$	N1	3
		Draw the line $y = \frac{2x}{\pi} + 1$	L1	
		No of solutions = 3	N1	
4	4a	lw, $\frac{1}{2}l\left(\frac{1}{2}w\right)$, $\frac{1}{2}\left(\frac{1}{2}l\right)\left(\frac{1}{2}\right)\left(\frac{1}{2}w\right)$, ...	P1	3
		lw, $\frac{1}{4}lw$, $\frac{1}{16}lw$, ... r = $\frac{1}{4}$	K1	
		A GP with r = $\frac{1}{4}$	N1	

4	4b(i)	a = 352(128) or equivalent	P1	5
		$352(128)\left(\frac{1}{4}\right)^{n-1} > 11$	K1	
		No. of rectangles = 6	N1	
	4b(ii)	$S_\infty = \frac{352(128)}{1-\frac{1}{4}}$	K1	
		$60074\frac{2}{3}$	N1	
5	5a	10 - 14 | 15 - 19 | 20 - 24 | 25 - 29 | 30 - 34 10 | 25 | 55 | 75 | 80	P1	7
	5b	L = 19.5 or F = 25 or f_m = 30	P1	
		$19.5 + (\frac{40-25}{30})\times 5$	K1	
		22	N1	
	5c	Mean = 21.688	P1	
		$\frac{39995}{80} - 21.688^2$	K1	
		29.568	N1	
6	6a	$\vec{AC}$ = -3$\underline{a}$ + h$\underline{b}$	K1	7
		$\frac{1}{3}$(-3$\underline{a}$ + h$\underline{b}$) or -$\underline{a}$ + $\frac{h}{3}\underline{b}$	N1	
	6b	3$\underline{a}$ + $\frac{1}{3}$(-3$\underline{a}$ + h$\underline{b}$)	K1	
		2a + $\frac{h}{3}\underline{b}$	N1	
		10$\underline{a}$ + 5$\underline{b}$ = m(2a + $\frac{h}{3}\underline{b}$) where m is a constant	K1	
		m = 5	N1	
		h = 3	N1	
7	7a	$-17 + [kx]_2^0 = 1$	K1	10
		k = -9	N1	
	7b	$\frac{(x-5)^3}{3}$	P1	
		$\int_0^2 f(x)dx + \int_2^5 (x-5)^2 dx$	K1	
		$17 + (\frac{0^3}{3} - \frac{(-3)^3}{3})$	K1	
		26	N1	
	7c	$\frac{1}{3}\pi(9^2)2$ or $\pi\int_0^2 (\frac{9}{2}x)^2 dx$	P1	

		$\pi\int_0^2 (\frac{9}{2}x)^2\,dx + \pi\int_2^5 (x-5)^4\,dx$ or equivalent	K1	
7	7c	$\pi\left[\frac{81}{4}\times\frac{x^3}{3}\right]_0^2 + \pi\left[\frac{(x-5)^5}{5}\right]_2^5$	K1	
		$102\frac{3}{5}\pi$	N1	
8	8a (refer a diagram)	*log y* 1.08 0.81 0.54 0.28 -0.02 -0.28	P1	10
		Using the correct , uniform scale and axes	P1	
		All points plotted correctly	P1	
		Line of best fit	P1	
		log y = (x – 1)log q + log p	P1	
	8b(i)	Use *log q = * m* or *log p = * c*	K1	
		q = 0.53	N1	
		p = 43.65	N1	
	8b(ii)	Use *log y = 0.70* to find *x-1* from the graph	K1	
		x = 4.40	N1	
9	9a(i)	y – 5 = $\frac{1}{3}$(x + !) or 5 = $\frac{1}{3}$(-1) + c	K1	10
		3y = x + 16 or equivalent	N1	
	9a(ii)	$(\frac{5}{2},\frac{9}{2})$	P1	
		R(5,7)	P1	
		$\left(\frac{2\times5+1\times0}{3},\frac{2\times7+1\times2}{3}\right)$	K1	
		$\left(\frac{10}{3},\frac{16}{3}\right)$	N1	
	9a(iii)	$\frac{1}{2}\left\|0-\frac{16}{3}+\frac{20}{3}-\left(-2+\frac{50}{3}+0\right)\right\|$ or equivalent	K1	
		$\frac{20}{3}$	N1	
	9b	$\sqrt{(x+1)^2+(y-5)^2}$ = 5	K1	
		$x^2 + y^2 + 2x - 10y + 1 = 0$	N1	
10	10a	6 cos $\frac{\pi}{6}$ or equivalent	K1	10
		5.196 or $3\sqrt{3}$	N1	
	10b	BC = 3	P1	
		$3\times\frac{2\pi}{3}$	K1	
		6.284	N1	
	10c	$\frac{1}{2}(5.196)^2\times\frac{\pi}{3}$	K1	
		14.138	N1	
	10d	$2\times\frac{1}{2}\times5.196\times3$	K1	

		$2\times\frac{1}{2}\times 5.196\times 3$ - 14.138	K1	
		1.450	N1	
11	11a(i)	${}^9C_6(0.65)^6(0.35)^3$	K1	10
		0.2716	N1	
	11a(ii)	${}^9C_1(0.65)^8(0.35)^1$ or ${}^9C_0(0.65)^9(0.35)^0$	P1	
		1 – 0.10037 – 0.02071	K1	
		0.8789	N1	
	11b(i)	$P(Z \le \frac{35-30}{5})$	K1	
		0.8413	N1	
	11b(ii)	$P(\frac{15-30}{5} < Z < \frac{25-30}{5})$	K1	
		0.15866 – 0.00135	K1	
		0.1573	N1	
12	12a	y = 116.67	P1	10
		x = 1.43	P1	
		z = 3.80	P1	
	12b	$\frac{125\times 4+116.67\times 8+175\times 10+150\times 11+95\times 3}{4+8+10+11+3}$	K1	
		142.18	N1	
	12c	$\frac{142.18\times 3600}{100}$	K1	
		51118.48	N1	
	12d	$\frac{142.18\times 130}{100}$	K1	
		184.83	N1	
13	13a(i)	$\angle PQR = 115°$	P1	10
		$\frac{8\sin 115^0}{\sin 25^0}$	K1	
		17.16	N1	
	13a(ii)	$PS^2 = 16.7^2 + 17.16^2 - 2(16.7)(17.16)\cos 30^0$	K1	
		8.775	N1	
	13b(i)	$\frac{16.7\times\sin 30^0}{8.775}$	K1	
		$\angle RPS = 72.09^0$	N1	
	13b(ii)	$\angle PSP' = 35.82^0$	P1	
		$\frac{1}{2}(8.775)^2\sin 35.82^0$	K1	
		22.53	N1	

14	14a			
		11x + 10y ≤ 440 or equivalent	N1	10
		7x + 8y > 56 or equivalent	N1	
		x – y ≤ 20 or equivalent	N1	
	14b	Draw correctly at least straight line from *the inaqualities which involves x and y	K1	
		Draw all correctly all three *straight lines	N1	
		Shade the correct region R	N1	
	14c(i)	2 ≤ y ≤ 37	N1	
	14c(ii)	Maximum point (0, 44)	K1	
		12(0) + 12(44) or 12(0 + 44) or 12(44)	K1	
		RM528	N1	
15	15a	6 cms^{-1}	N1	10
	15b	Acceleratation = 3 – 6t	K1	
		(t - 2)(t + 1) = 0	K1	
		-9	N1	
	15c	$t = \frac{1}{2}$	K1	
		$6\frac{3}{4}$ or equivalent	N1	
	15d	$s = 6t + \frac{3t^3}{2} - t^3$	K1	
		$6(2) + \frac{3(2)^3}{2} - (2)^3$ or $6(4) + \frac{3(4)^3}{2} - (4)^3$	K1	
		10 + | -26 | or 10 + 10 + |-16 |	K1	
		36	N1	