Name : .....

Form : .....

SMKA NAIM LILBANAT 15150 KOTA BHARU KELANTAN.

"SEKOLAH BERPRESTASI TINGGI"

PEPERIKSAAN PERCUBAAN SPM 2013

3472/1

ADDITIONAL MATHEMATICS

Kertas 1

2 Jam

2 Jam

***Arahan*:**

1. Kertas soalan ini mengandungi 25 Soalan.
2. Jawab semua soalan.
3. Tulis jawapan anda dalam ruang yang disediakan dalam kertas soalan.
4. Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.
5. Anda dibenarkan menggunakan kakkulator saintifik.

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

*Kertas soalan ini mengandungi **11** halaman bercetak.*

3472/1

(Answer **all** questions)
*Jawab **semua** soalan*

1. Diagram 1 shows the graph of function $f(x)=|2x-4|$ for domain $0\le x\le 5$
Rajah 1 menunjukkan graf bagi fungsi $f(x)=|2x-4|$, *untuk domain* $0\le x\le 5$.

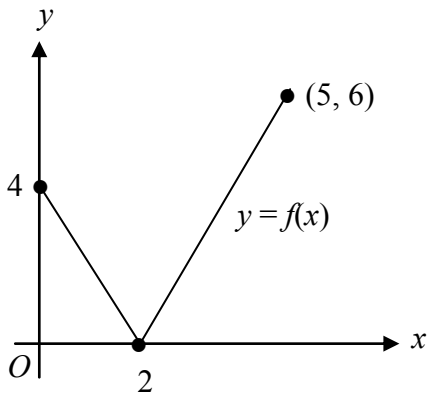


Diagram 1 / *Rajah 1*

State
Nyatakan
(*a*) $f(0)$,
(*b*) range of $f(x)$ corresponding to the given domain.
julat f(x) berdasarkan domain yang diberi.

[2 *markah*]

Answer / *Jawapan* :
(*a*)

1

(*b*)

2

---

2. Given the function $g(x)=3x-2$ and $gh(x)=12x+4$,
Diberi fungsi $g(x)=3x-2$ *dan* $gh(x)=12x+4$,
find / *cari*
(a) $h(x)$,
(b) value of x such that $h(x)$ maps onto itself.
nilai x dengan keadaan h(x) memeta kepada dirinya sendiri.

Answer / *Jawapan*:

(a) [3 *markah*]

2

(b)

3

3. Diagram 3 shows the function $f : x \to kx + 5$, where k is a constant.
Rajah 3 menunjukkan fungsi $f : x \to kx + 5$, *dengan keadaan k ialah pemalar.*

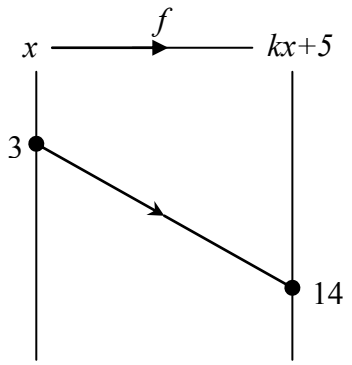


Diagram 3 / *Rajah 3*

Find the value of k
Cari nilai k.

[3 *markah*]

Answer / *Jawapan* :

3

---

4. Straight line $y = 2x + 1$ is tangent to the curve $y = x^2 + p$.
Garis lurus $y = 2x + 1$ *ialah tangen kepada lengkung* $y = x^2 + p$.

Find the value of p
Cari nilai p.

[3 *markah*]

Answer / *Jawapan* :

4

5. Sketch the graph of the function $f(x) = (x-3)^2 + 4$ on the given axes for $0 \le x \le 5$
Lakar pada paksi-paksi yang diberi, graf fungsi kuadratik $f(x) = (x-3)^2 + 4$,
untuk $0 \le x \le 5$.

Answer / *Jawapan* :

[2 *markah*]

5 | 2

6. Given that $f(x) = x(x-3) - 10$. Find the range of values of x when $f(x) \ge 0$.
Diberi $f(x) = x(x-3) - 10$. *Cari julat nilai x apabila* $f(x) \ge 0$.

[3 *markah*]

Answer / *Jawapan* :

6 | 3

7. Solve the equation
Selesaikan persamaan $4^{x+2} - 4^{x+1} = 6$.

[3 *markah*]

Answer / *Jawapan* :

7 | 3

8. Solve the equation $\log_3 6x - 2 = \log_3 (3x - 1)$
Selesaikan persamaan $\log_3 6x - 2 = \log_3 (3x - 1)$

[3 *markah*]

Answer / *Jawapan* :

8 | 3

9. Given that $\log_2 m = a$ and $\log_2 n = b$, express $\log_8\left(\frac{4m}{n}\right)$ in terms of a and b.

Diberi $\log_2 m = a$ *dan* $\log_2 n = b$, *ungkapkan* $\log_8\left(\frac{4m}{n}\right)$ *dalam sebutan a dan b.*

Answer / *Jawapan* :

[4 *markah*]

9

4

---

10. The first three terms of an arithmetic progression are x - 27, 12, y .
Tiga sebutan pertama bagi suatu janjang aritmetik ialah, x - 27, 12, y .

Find the value of $x + y$.
Cari nilai x +y

[2 *markah*]

Answer / *Jawapan :*

10

2

---

11. The sum of n first terms of arithmetic progression is given by $3(2n + 1)$.
Hasil tambah n sebutan pertama suatu janjang aritmetik diberi oleh 3(2n + 1).
Find / *Cari*

(a) first term
sebutan pertama,

(b) common different
beza sepunya.

[3 *markah*]

Answer / *Jawapan :*
(a)

(b)

11

3

12. The first term of geometric progression is 6 and the common ratio is 2. Find the sum from the forth term to the eight term of the progression.

Sebutan pertama bagi janjang geometri ialah 6 dan beza sepunya ialah 2. Cari hasil tambah dari sebutan keempat hingga sebutan kelapan janjang itu.

[3 *markah*]

Answer / *Jawapan* :

12

3

---

13. The variables x and y are related by the equation $y = 8h^{-x}$, where h is a constant. Diagram 13 shows the straight line obtained by plotting $\log_2 y$ against x

Pembolehubah x dan y dihubungkan oleh persamaan $y = 8h^{-x}$, *dengan keadaan h ialah pemalar.*

Rajah 13 menunjukkan graf garis lurus yang diperolehi dengan memplotkan $\log_2 y$ *melawan x.*

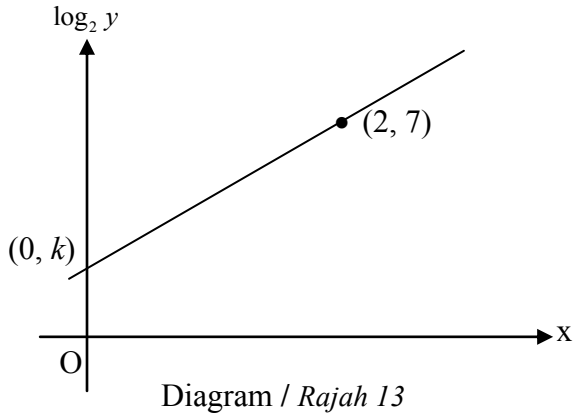


Diagram / *Rajah 13*

Find the value of
Cari nilai
(a) k
(b) h .

13

4

Answer / *Jawapan* :

[4 *markah*]

(*a*)

(*b*)

14. Diagram 14 shows the graphs of a straight line.
Rajah 14 menunjukkan graf bagi satu garis lurus.

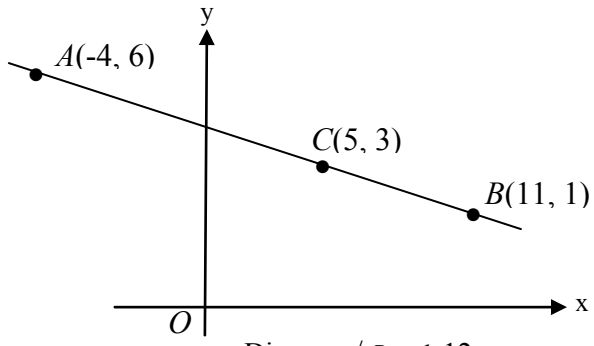


Diagram / *Rajah* 12

Given that point C divides the line segment AB such that $\frac{AC}{CB} = \frac{m}{n}$, find $m : n$.

Diberi titik C membahagi garis lurus AB dengan keadaan $\frac{AC}{CB} = \frac{m}{n}$, *cari* $m : n$.

Answer / *Jawapan* [3 *markah*]

14

3

15. Given that $\boldsymbol{u} = 2\mathbf{i} + 3\mathbf{j}$ and $\mathbf{v} = 2\mathbf{i} + k\mathbf{j}$, where k is a constant, find the values of k if $|2\mathbf{u} + \mathbf{v}| = 10$.

Diberi $\boldsymbol{u} = 2\boldsymbol{i} + 3\boldsymbol{j}$ *dan* $\boldsymbol{v} = 2\boldsymbol{i} + k\boldsymbol{j}$, *dengan keadaan k ialah pemalar, cari nilai-nilai k apabila* $|2\mathbf{u} + \mathbf{v}| = 10$.

[3 *markah*]

Answer / *Jawapan* :

15

3

16. Diagram 16 shows a triangle PQR.
Rajah 16 menunjukkan segitiga PQR.

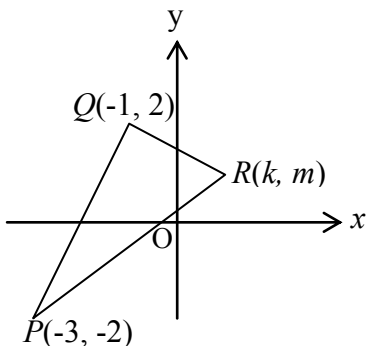


Diagram / *Rajah 16*

Given $\overrightarrow{PQ} + \overrightarrow{QR} = 5\underline{i} + 3\underline{j}$, find the value of k and of m.
Diberi $\overrightarrow{PQ} + \overrightarrow{QR} = 5\underline{i} + 3\underline{j}$, *cari nilai k dan nilai m.*

[4 *markah*]

Answer / *Jawapan* :

16

4

17. Solve the equation $4 \sin x \cos x = 1$, for $0° \leq x \leq 360°$.
Selesaikan persamaan $4 \sin x \kos x = 1$, *untuk* $0° \leq x \leq 360°$.

Answer / *Jawapan*

[4 *markah*]

17

4

18. Diagram 18 shows a sector OAB of a circle with centre O and radius is 10 cm
Rajah 18 menunjukkan suatu sektor OAB dengan pusat O dan berjejari 10 cm.

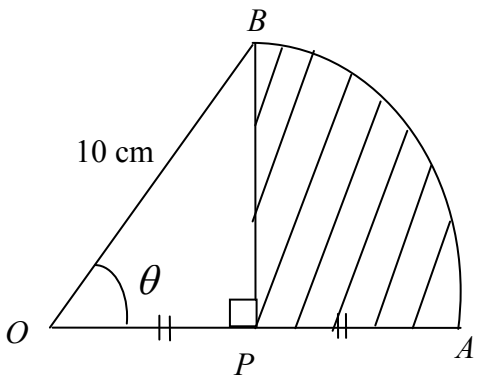


Diagram / *Rajah 18*

Given P, A and B are the points such that $OP = PA$ and $\angle OPB = 90^{o,}$ find,
Diberi P, A dan B adalah titik-titik dengan keadaan $OP = PA$ dan $\angle OPB = 90^{o}$, cari
[Use / *Guna* $\pi = 3.142$]

(a) $\angle AOB$, in radian
dalam radian,
(b) area, in cm^2, of the shaded region.
luas, in cm^2, kawasan berlorek.

[4 *markah*]

Answer / *Jawapan* :
(*a*)

(*b*)

18

4

---

19. The radius of a circle decreasing by 0.5 cm s^{-1}. Find the rate of area of circle when the radius is 4 cm.
Jejari suatu bulatan menyusut dengan kadar 0.5 cm s^{-1}. Cari kadar perubahan bagi luas bulatan apabila jejari bulatan itu ialah 4 cm.

[3 *markah*]

Answer / *Jawapan :*

19

3

20. Given $f(x) = 2x^3 + px^2 - 5x$, where p is a constant.
Diberi $f(x) = 2x^3 + px^2 - 5x$, *dengan keadaan p ialah pemalar.*

Find the value of p when $f''\left(\frac{1}{2}\right) = 4p$

Cari nilai p apabila $f''\left(\frac{1}{2}\right) = 4p$.

[3 *markah*]

Answer / *Jawapan :*

20

3

21. Given $\frac{d}{dx}(3-2x)^{-2} = \frac{4}{(3-2x)^3}$, find the value of $\int_{\frac{1}{2}}^{2} \frac{1}{(3-2x)^3} dx$

Diberi $\frac{d}{dx}(3-2x)^{-2} = \frac{4}{(3-2x)^3}$, *cari nilai* $\int_{\frac{1}{2}}^{2} \frac{1}{(3-2x)^3} dx$

[4 *markah*]

Answer / *Jawapan* :

21

4

22. A set of data 1, 3, 4, 5, 7, 8,10 and 11.
Suatu set data terdiri daripada 1, 3, 4, 5, 7, 8,10 dan 11.

Determine,
Tentukan

(a) median,/ *median*
(b) interquartile range
julat antara kuartil bagi data itu

Answer / J*awapan*
(*a*)

(*b*) [3 *markah*]

22
3

---

23. A group of students which consists of 3 boys and 5 girls to be arrange in a row. Calculate the number of possible ways if,

Sekumpulan murid yang terdiri daripada 3 orang murid lelaki dan 5 orang murid perempuan hendak disusun dalam satu baris. Hitungkan bilangan cara susunan berlainan yang mungkin jika.

(a) no condition is imposed
tiada syarat dikenakan

(b) all the boys sit next to each other.
semua murid lelaki duduk bersebelahan antara satu sama lain

[4 *markah*]

Answer / J*awapan* :

(*a*)

(*b*)

23
4

24. A bag contains four yellow marbles and six green marbles. Two marbles are drawn at random from the bag one after another without replacement. Find the probability that the two marbles drawn are of difference colour.

Sebuah bag menagndungi 4 biji guli kuning dan 6 biji guli hijau. Dua biji dipilih secara rawak daripada bag itu, satu demi satu tanpa pengembalian. Cari kebarangkalian dua biji yang dipilh adalah berlainan warna.

[3 *markah*]

Answer/ *Jawapan:*

24

3

25. In a Mathematics test, 30% of the students who sat the test failed to obtain 50 marks. If 8 students are selected from those who sat for the test, find the probability that

Dalam suatu ujian Matematik, 30% daripada pelajar gagal mencapai 50 markah. Jika 8 orang pelajar dipilih, hitung kebarangkalian bahawa

(a) half of them failed to obtain 50 marks.
separuh daripada pelajar itu gagal mencapai 50 markah.

(b) at least 7 of them failed to obtain 50 marks.
sekurang-kurannya 7 orang gagal mencapai 50 markah.

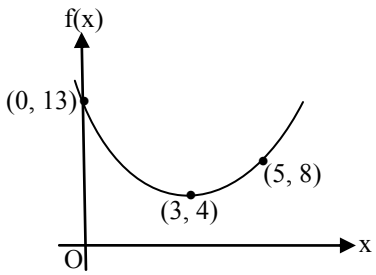
Answer / J*awapan* :

[4 *markah*]

25

4

SEK. MEN. KEB. AGAMA NAIM LILBANAT
PEPERIKSAAN PERCUBAAN SPM 2013
SKEMA PERMARKAHAN MATEMATIK TAMBAHAN KERTAS 1

No		Solution and Mark Scheme	Sub Marks	Total Marks
1	(a)	4	1	2
	(b)	$0 \le f(x) \le 6$	1	
2	(a)	$4x+2$	1	3
	(b)	$-\frac{2}{3}$ **B1** : $4x+2=x$	2	
3		3 **B2** : $3k+5=14$ **B1** : $f(3)=14$	3	3
4		2 **B2** : $(-2)^2-4(1)(p-1)=0$ **B1** : $x^2+p=2x+1$ or $x^2-2x+p-1=0$	3	3
5		**B1** : bentuk minimum. **B1** : melalui mana-mana dua titik  		2
6		$x \le -2, \quad x \ge 5$ **B2** : $(x+2)(x-5) \ge 0$ **B1** : $x^2-3x-10 \ge 0$	3	3

7		$-\frac{1}{2}$ **B2** : $4^x = \frac{1}{2}$ **B1** : $4^x(16) - 4^x(4) = 6$	3	**3**
8		$\frac{3}{7}$ **B2** : $\left(\frac{6x}{3x-1}\right) = 3^2$ **B1** : $\log_3\left(\frac{6x}{3x-1}\right) = 2$	3	**3**
9	(a)	$\frac{2+a-b}{3}$ **B3** : $\frac{2+\log_2 m - \log_2 n}{3}$ **B2** : $\frac{\log_2 4m - \log_2 n}{\log_2 8}$ **B1** : $\frac{\log_2\left(\frac{4m}{n}\right)}{\log_2 8}$	4	**4**
10		51 **B1** : $12-(x-27) = y-12$	2	**2**
11	(a)	9	1	**3**
	(b)	-3 **B1** : $d = T_2 - T_1$ or $T_2 = S_2 - S_1$	2	
12		**1488** **B2** : $S_8 - S_3 = 1530 - 42$ **B1** : $S_3 = \frac{6(2^3-1)}{2-1}$ or $S_8 = \frac{6(2^8-1)}{2-1}$	3	**3**

13	(a)	**3** **B1** : $\log_2 y = \log_2 8 - x\log_2 h$	2	**4**
	(b)	$\frac{1}{4}$ **B1** : $(2,7) : 7 = 3 - 2(\log_2 h)$ or gradient = $\frac{7-3}{2-0}$ =2	2	
14		**3 : 2** **B2** : $2m = 3n$ **B1** : $\frac{11m + (-4)n}{m+n} = 5$ or $\frac{1m+6n}{m+n} = 3$	3	**3**
15		2 and -14 **B2** : $2 \ or \ -14$ or $\sqrt{6^2 + (6+k)^2} = 10$ **B1** : $\lvert 6i + (6+k)j \rvert = 10$	3	**3**
16		$k = 2$ and $m = 1$ **B3** : $k = 2 \ or \ m = 1$ **B2** : $k + 3 = 5 \ or \ m + 2 = 3$ **B1** : $\vec{PQ} = 2i + 4j$ or $\vec{QR} = (k+1)i + (m-2)j$	4	**4**

17		$15^0, 75^0, 195^o, 255^o$ **B3** : betul mana-mana 3 nilai sudut **B2** : betul mana-mana 2 nilai sudut or $\sin(2x) = 0.5$ **B1** : betul salah satu nilai sudut or 30^o, 150^o or 390^o, 510^o	4	**4**
18	(a)	**1.047** *rad* **B1** : $\cos\theta = \frac{5}{10}$	2	**4**
	(b)	**30.699 or 30.70** **B1** : $\frac{1}{2}(10)^2(1.047)$ or $\frac{1}{2}(5)(10)\sin 60$	2	
19		-4π **B2** : $\frac{dA}{dt} = \frac{dA}{dr} x \frac{dr}{dt}$ $\frac{dA}{dt} = (8\pi)x(-0.5)$ **B1** : $\frac{dA}{dr} = 2\pi r$ **or** $\frac{dr}{dt} = -0.5$	3	**3**

20		**3** **B2** : $12(\frac{1}{2})+2p=4p$ **B1** : $f'(x)=6x^2+2px-5$ *or* $f''(x)=12x+2p$	3	**3**
21		$\frac{3}{16}$ **B3** : $\frac{1}{4}[(\frac{1}{(3-2(2))^2})-(\frac{1}{(3-2(0.5)})]$ **B2** : $\int\frac{1}{(3-2x)^3}dx=\frac{1}{4}[\frac{1}{(3-2x)^2}]$ **B1** : $\int\frac{4}{(3-2x)^3}dx=\frac{1}{(3-2x)^2}$	4	**4**
22	(a)	**6**	1	**3**
	(b)	**5.5** **B1** : $Q_1=3.5$ *or* $Q_3=9$	2	
23	(a)	**40 320** **B1** : $8!$ *or* $8P_8$	2	**4**
	(b)	4320 **B1** : $3!x5!x6$ *or* $3!x6!$	2	
24		$\frac{8}{15}$ **B2** : $1-(\frac{12}{90})-(\frac{30}{90})$ *or* $(\frac{12}{90})+(\frac{30}{90})$ **B1** : $\frac{4}{10}\text{x}\frac{3}{9}$ or $\frac{6}{10}\text{x}\frac{5}{9}$ or $\frac{4}{10}\text{x}\frac{6}{9}$ or $\frac{6}{10}\text{x}\frac{4}{9}$	3	**3**
25	(a)	**0.1361** **B1** : ${}^8C_4(0.3)^4(0.7)^4$	2	**4**
	(b)	**0.001290** **B1 :** ${}^8C_7(0.3)^7(0.7)^1$ *or* ${}^8C_8(0.3)^8(0.7)^0$	2	

Name : .....

Form : .....

SMKA NAIM LILBANAT 15150 KOTA BHARU KELANTAN.

"SEKOLAH BERPRESTASI TINGGI"

PEPERIKSAAN PERCUBAAN SPM 2013

3472/2

ADDITIONAL MATHEMATICS

Kertas 2

2 ½ Jam

2 ½ Jam

***Arahan*:**

1. This question paper consists of three sections: Section **A**, Section **B** and Section **C**.
2. Answer **all** questions in Section A, any **four** questions from Section B and any **two** questions from Section C.
3. Write your answers on the paper sheets provided.

	Untuk Kegunaan Pemeriksa		
	Soalan	**Markah Penuh**	**Markah Diperoleh**
A	1	5	
	2	7	
	3	6	
	4	8	
	5	8	
	6	6	
B	7	10	
	8	10	
	9	10	
	10	10	
	11	10	
C	12	10	
	13	10	
	14	10	
	15	10	
	JUMLAH	**100**	

*Kertas soalan ini mengandungi **7** halaman bercetak.*

Section A

[40 marks]

(Answer **all** questions)

1. Solve the simultaneous equations $y - 2x - 3 = 0$ and $x^2 - 2y^2 - xy + 27 = 0$

Give your answers correct to three decimal places.

[5 *marks*]

2. (a) Skatch the graph of $y = 2 - 3\sin x$ for $0 \le x \le 2\pi$

[4 *marks*]

(b) By using the same axes, sketch a suitable straight line to find the number of the solutions of the equation $3\sin x - \frac{1}{\pi}x = 0$.

[3 *marks*]

3. A curve has a gradient function $x^2 + kx + p$ with turning points (2, 0) and $(-1, \frac{9}{2})$, where k and p are constants.

Find

(a) the value of k and of p, [3 *marks*]

(b) equation of curve. [3 *marks*]

4. Diagram 4 shows of n siries of circle. The total of perimeter of all circle is 144π cm. Given the radius of smallest circle is 2cm and radius of the biggest circle is 16 cm. The arrangement of circles form a arithmetic progression.

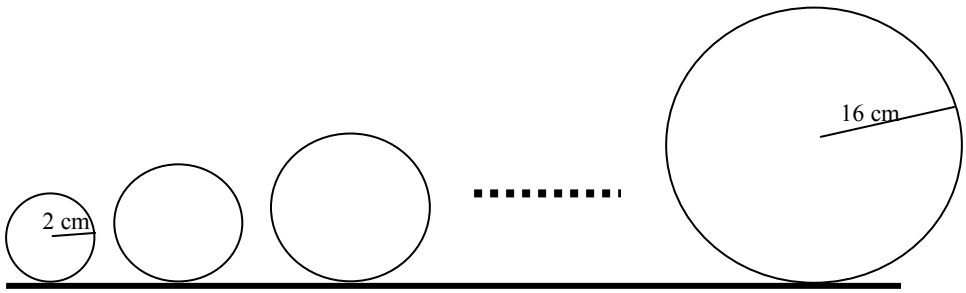


Diagram 4

Find

(a) the value of n,

[3 *marks*]

(b) perimeter of the sixth circle in term of π.

[3 *marks*]

(c) total perimeter for the first six circles in term of π

[2 *marks*]

5. Diagram 5 shows two triangles ABC and ABD. Point E lies on the straight line AD.

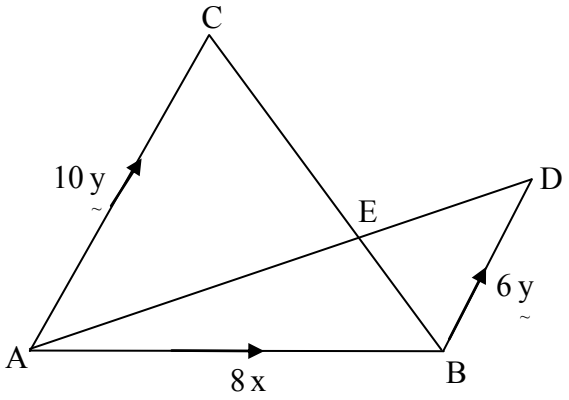


Diagram 5

It is given that $\vec{AC} = 10\underset{\sim}{y}$, $\vec{BD} = 6\underset{\sim}{y}$ and $\vec{AB} = 8\underset{\sim}{x}$

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

(i) $\vec{AD}$

(ii) $\vec{BC}$

[2 *marks*]

(b) It is given that $\vec{AE} = m\vec{AD}$ and $\vec{EC} = k\vec{BC}$, Express $\vec{AE}$ in terms of

(i) m, $\underset{\sim}{x}$ and $\underset{\sim}{y}$

(ii) k, $\underset{\sim}{x}$ and $\underset{\sim}{y}$

[3 *marks*]

(c) Hence, find the value of m and of k.

[3 *marks*]

6. The mean of set numbers k, $(k+1)$, $(2k-1)$, and $(2k+4)$ is 7.

(a) Find the value of k

[2 *marks*]

(b) Each number in the set is divided by 7 and then 1 added to it.
Find
(i) new mean
(ii) the new standard deviation.

[4 *marks*]

Section B

[40 *marks*]

(Answer any **four** questions from this section)

7. *Use graph paper to answer this question.*

Table 7 shows the values of two variables, *x* and *y*, obtained from an experiment. It is known that *x* and *y* are related by the equation $y = \frac{k}{x} + \frac{p}{x^2}$, where *p* and *k* are constants.

x	1.0	1.5	2.0	2.5	3.0	3.5
y	3.80	5.20	4.95	4.48	4.00	3.57

Table 7

(a) Plot *xy* against $\frac{1}{x}$ by using a scale to 2 cm to 0.2 units on $\frac{1}{x}$-axis and 2 cm to 2 unit on *xy* - axis.
Hence, draw the line of best fit.

[4 *marks*]

(b) Use the graph in 7(a) to find the value of
(i) *k* and *p*.
(ii) *y* when $x = 1.72$.

[6 *marks*]

8. Diagram 8 shows a part of curve $y = \frac{4}{(2x+1)^2}$ which passes through A (-1, 4)

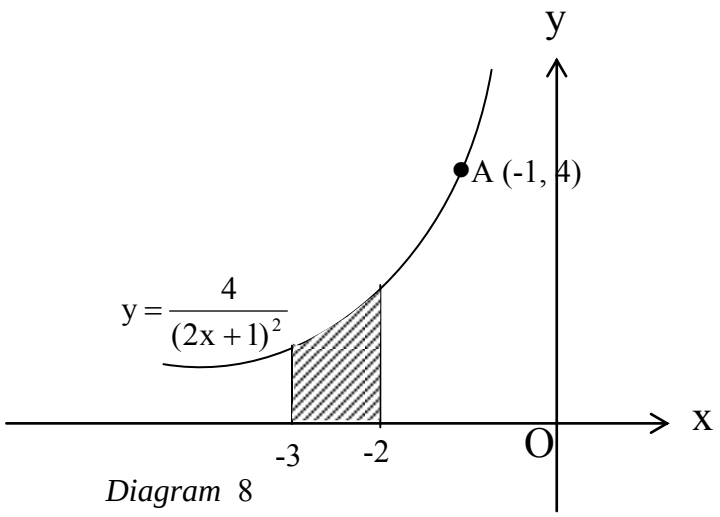


Diagram 8

(a) Find the equation of tangent at point A.

[4 *marks*]

(b) The shaded region is baounded by x-axis, straight line $x = -3$ and $x = -2$.
(i) Find the area of the shaded region..
(ii) Find the volume revolution, in term of π, when the shaded region is rotated through 360^o about the x - axis

[6 *marks*]

9. *Solution by scale drawing is **not** accepted.*

Diagram 9 shows a trapeziuem ABCD. Given the equation of straight line DC is $3y - 2x = 2$

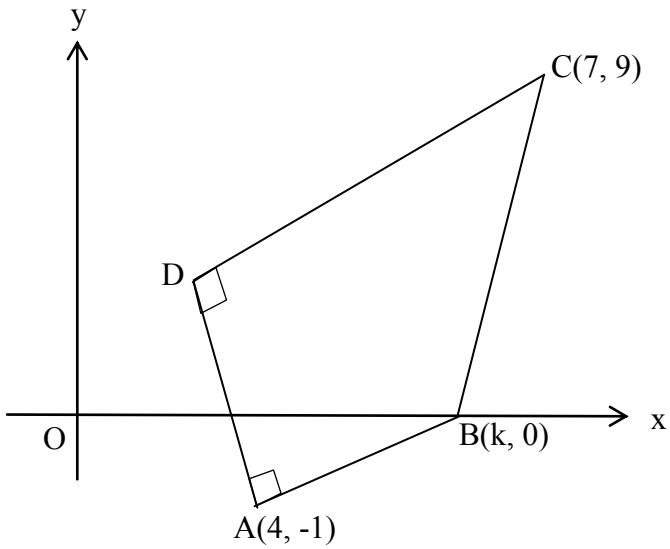


Diagram 9

Find,

(a) the value of k

[2 marks]

(b) the equation of straight line AD.

[2 *marks*]

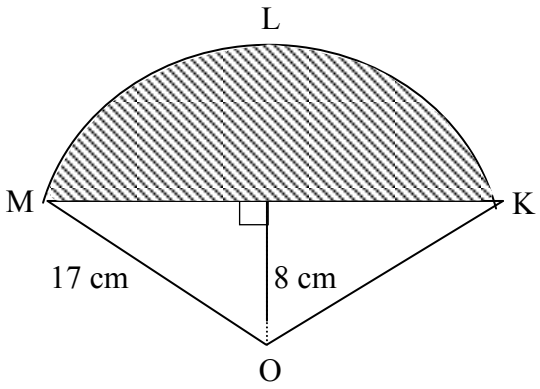
(c) coordinates of D

[3 *marks*]

(d) equation of the perpendicular bisector of AC.

[3 *marks*]

10. In diagram 10, OKLM is a sector of circle with centre O and radius 17 cm.



Rajah 10

Calculate

(a) $\angle$MOK, in radian

[3 *marks*]

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

[3 *marks*]

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

[4 *marks*]

11. (a) The result of a survey in an urban area shows the the probability of a student having a mobile phone is *k*. The mean and variance of *n* students chosen at random having a mobile phone are 360 and 72 recpectively.

Find the value of *n* and of *k*.

[5 *marks*]

(b) A group of worker are given medical check up. The blood pressure of the workers have a normal distribution with a mean of 140 mmHG.and a standard deviation of 10 mmHg. Blood pressure that is more than 150 mmHg is classified as ”high blood presure”

(i) A worker is chosen at random from the group. Calculate the probability that the worker has a blood pressure between 135 mmHg and 145 mmHg.

(ii) It is found that 80 workers have ”high blood pressure” . Find the total number of workers in the group.

[5 *marks*]

SECTION C

[20 *marks*]

(Answer any **two** questions from this section)

12. Diagram 12 shows a quadrilateral PQRS.

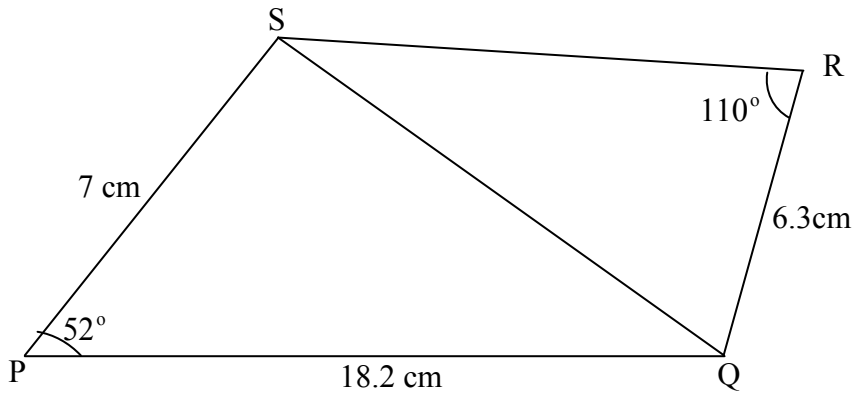


Diagram 12

(a) Calculate

(i) the length, in cm , of QS

(ii) $\angle PQS$

[4 *marks*]

(b) Point Q' lies on the QS such that $Q'R = QR$

(i) Sketch a triangle $Q'RS$

(ii) Calculate the area, in cm^2, of triangle $Q'RS$

[6 *marks*]

13. Table 13 shows the price of four items P, Q, R and S in the year 2002 and year 2005. Price index and weightage for the year 2005 based on the year 2002.

Items	Price on 2002 (RM)	Price on 2005 (RM)	Price index for the year 2005 based 2002	weightage
P	6.00	7.20	120	4
Q	5.50	7.70	*x*	2
R	5.60	*y*	125	3
S	8.00	8.80	110	1

Table 13

(a) Find the value of

(i) *x*

(ii) *y*

[2 *marks*]

(b) Calculate the composite index of the price of those items for the year 2005 based on the year 2002.

[3 *marks*]

(c) The total cost of all items in the year 2002 is RM 9600. Calculate the corresponding cost of items in the year 2005.

[2 *marks*]

(d) The price of items P and Q are increase by 10 % and the price of items R and S are increase by 5% fom the year 2005 to the year 2007. Find the composite index for the year 2007 based on the year 2002.

[3 *marks*]

14. *Use graph paper to answer this question.*

The member of a Naim's Teacher Club plan to organise a picnic. They agree to rent *x* bus and *y* van. The rental of a bus is RM 900 and the rental of a van is RM400. The rental of the vehicles for the trip is based on the following constrains.

I : The total number of vehicles to be rented is not more than 9.
II : The number of bus is at most twice the number of vans.
III : The minimum allocation for the rental of the vehicles are RM3 600

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

[3 *marks*]

(b) Using a scale of 2 cm to 1 vehicle on both axes, construck and shade the region R which satisfies all the above constrains.

[3 *marks*]

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

(i) the maximum number of van rented if 4 buses are rented.

(ii) the maximum number of members that can be accommodated into the rented vehicles if a bus can accommodate 45 passengers and a van can accommodate 20 passengers.

[4 *marks*]

15. A particle moves in a straight line and passes through a fixed point O. Its acceleration, $a\ ms^{-2}$, given by $a = 2t - 8$, where t is the time, in s, after passing through O. The initial velocity is $12\ ms^{-1}$.

Find

(a) the minimum velocity, in ms^{-1}, of the particle.

[4 *marks*]

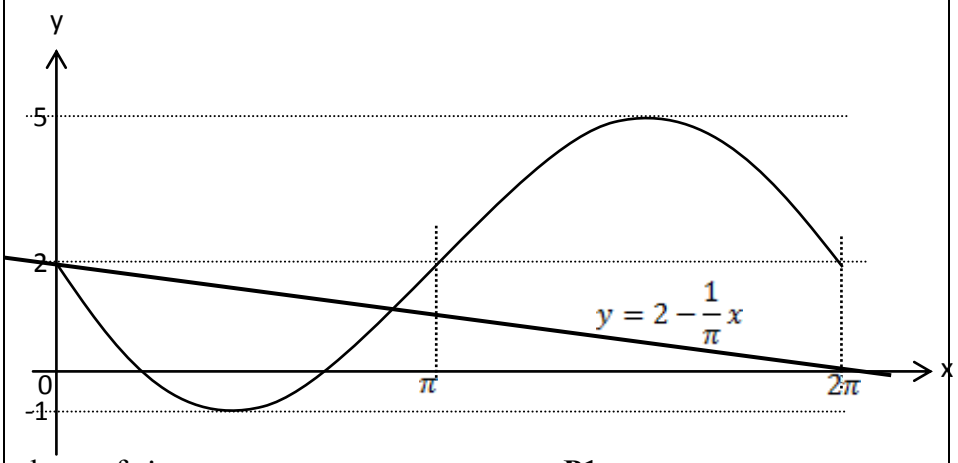
(b) the time, in *s*, at which the particle in instantaneously at rest.

[2 *marks*]

(c) the total distance, in *m*, travelled by the particle in the first 4 seconds.

[4 *marks*]

SEK. MEN. KEB. AGAMA NAIM LILBANAT
PEPERIKSAAN PERCUBAAN SPM 2013
SKEMA PERMARKAHAN MATEMATIK TAMBAHAN KERTAS 2

NO	SOLUTIONS	MARKS	TOTAL
1.	$y = 2x + 3$ *or* $x = \frac{y-3}{2}$ $x = \frac{y+4}{2}$	**P1**	**5**
	$x^2-2(2x+3)^2 - x(2x+3)+27= 0$ *or* $\left(\frac{y-3}{2}\right)^2 - 2y^2 - \left(\frac{y-3}{2}\right)y + 27 = 0$	**K1**	
	$x^2 + 3x - 1 = 0$ *or* $y^2 = 13$		
	$x = \frac{-3 \pm \sqrt{3^2 - 4(1)(-1)}}{2(1)}$	**K1**	
	or $y = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-28)}}{2(1)}$		
	$x = 0.303$, -3.303 (*both*)	**N1**	
	$y = 3.6060, -3.606$ (*both*)	**N1**	
2(a)			**7**
	shape of *sine* curve **P1**		
	1 cycle for $0 \le x \le 2\pi$ **P1**		
	maximum = 5 and minimum = -1 **P1**		
(b)	straight line $y = 2 - \frac{1}{\pi}x$	**N1** **K1 N1**	
	No. of solutions = 2	**N1**	
3(a)	$\frac{dy}{dx} = x^2 + kx + p$	**K1**	**6**

(b)	$(2,0): 4+2k+p=0$ $(-1,\frac{9}{2}): 1-k+p=0$ $k=-1$ *and* $p=-2$ $y=\int(x^2-x-2)\,dx$ $=\frac{x^3}{3}-\frac{x^2}{2}-2x+c$ *gantian* $(2,0)$ *or* $(-1,\frac{9}{2})$: $y=\frac{x^3}{3}-\frac{x^2}{2}-2x+\frac{10}{3}$	**K1** **N1** **K1** **K1** **N1**	
4(a) **(b)** **(c)**	$a=2\pi(2)=4\pi$ $l=2\pi(16)=32\pi$ or $S_n=\frac{n}{2}[4\pi+32\pi]=144\pi$ $n=8$ $T_8=4\pi+7d=32\pi$ $d=4\pi$ $T_6=4\pi+5(4\pi)$ $=24\pi$ $S_6=\frac{6}{2}[2(4\pi)+5(4\pi]$ $=84\pi$	**P1** **K1** **N1** **K1** **N1** **N1** **K1** **N1**	**8**
5(a)	(i) $\vec{AD}=\vec{AB}+\vec{BD}$ $=8\underset{\sim}{x}+6\underset{\sim}{y}$ (ii) $\vec{BC}=\vec{BA}+\vec{AC}$ $=-8\underset{\sim}{x}+10\underset{\sim}{y}$	**N1** **N1**	

5.(b)	(i) $\vec{AE} = m\vec{AD}$ $= 8m\underset{\sim}{x} + 6m\underset{\sim}{y}$	**P1**	**8**
	(ii) $\vec{EC} = k\vec{BC}$ $\vec{EA} + \vec{AC} = k\vec{BC}$ $\vec{EA} = -8k\underset{\sim}{x} + 10k\underset{\sim}{y} - 10\underset{\sim}{y}$	**K1**	
	$\vec{AE} = 8k\underset{\sim}{x} + (10 - 10k)\underset{\sim}{y}$	**N1**	
(c)	$8m = 8k$ $m = k$	**K1**	
	or $6m = 10 - 10k$ $m = \frac{5}{8}$	**N1**	
	$n = \frac{5}{8}$	**N1**	
6(a)	$\frac{k + k + 1 + 2k - 1 + 2k + 4}{4} = 7$ $k = 4$	**K1** **N1**	**6**
	(i) New mean $= \frac{7}{7} + 1 = 2$	**N1**	
	(ii) 4, 5, 7, 12		
	Standard deviation $= \sqrt{\frac{4^2 + 5^2 + 7^2 + 12^2}{4} - (7)^2}$ $= 3.08$	**K1** **N1**	
	New standard deviation $= \frac{3.08}{7} = 0.44$	**N1**	

7 (a)

xy	3.80	7.80	9.90	11.20	12.00	12.50
$\frac{1}{x}$	1.00	0.67	0.50	0.40	0.33	0.29

N1

N1

Both axes correct (at least plotting 1 point) **K1**
Plotting all 6 points – correct **K1**
line of the best fit - correct. **N1**

(b)

(i) $xy = k + \frac{p}{x}$ **P1**

$k = 16$ **N1**

$p = gradient = -\frac{16}{1.3} = -12.31$ **N1**

(ii) $x = 1.72$, $\frac{1}{x} = 0.58$ **K1**

$xy = 9$

$y = \frac{9}{1.72} = 5.23$ **N1**

10

8 (a)

$y = \frac{4}{(2x+1)^2}$

$\frac{dy}{dx} = -\frac{16}{(2x+1)^3}$ **K1**

$A(-1, 4)$; $\frac{dy}{dx} = 16$ **N1**

Equation of tangent :

$y - 4 = 16(x+1)$ **K1**

$y = 16x + 20$ **N1**

(b)

(i) Area of the shaded region:

Integrate $\int_0^1 4(2x+1)^{-2}\,dx$

$= \frac{4(2x+1)^{-1}}{2(-1)}$ **K1**

$= \frac{4(2x+1)^{-1}}{2(-1)}\Big|_{-3}^{-2} = \left|-\frac{4}{15}\right|$ **K1**

$= \frac{4}{15}\text{unit}^2 @ 0.267$ **N1**

10

(c)	**(ii) Volume**: Integrate = $\pi\int_{-3}^{-2}16(2x+1)^{-4}\,dx$ $= \left[-\frac{8}{3(2x+1)^3}\right]_{-3}^{-2}$ $= 0.077\pi$ or $\frac{784}{10125}\pi\,\text{unit}^3$ or 0.243	**K1** **N1** **N1**	
9 (a)	$3y-2x=2$ $y=\frac{2}{3}x+\frac{2}{3}$ $m_{DC}=\frac{2}{3}$ $\therefore m_{AB}=\frac{0+1}{k-4}=\frac{2}{3}$ $k=\frac{11}{2}$	**K1** **N1**	**10**
(b)	$m_{AD}=-\frac{3}{2}$ $\therefore$ *equation of* $AD: y+1=-\frac{3}{2}(x-4)$ $2y+3x=10$	**K1** **N1**	
(c)	$3y-2x=2$ ..... (1) $2y+3x=10$ .....(2) D(2, 2)	**K1 K1** **N1**	
(d)	Mid-point AC $=\left(\frac{4+7}{2},\frac{-1+9}{2}\right)$ $=\left(\frac{11}{2},\ 4\right)$ Equation bisector AC: $y-4=-\frac{3}{10}(x-\frac{11}{2})$ $20y+6x=113$	**P1** **K1** **N1**	

10 (*a*)	$\cos\left(\frac{1}{2}\angle MOK\right)=\frac{8}{17}$	**K1**	**10**
	$\frac{1}{2}\angle MOK = 61.9275^o$	**N1**	
	$\angle MOK = \frac{123.855x\pi}{180} = 2.162 \ rad$	**N1**	
(*b*)	$Perimter = 2(\sqrt{17^2-8^2})+17(2.162)$	**K1 K1**	
	$= 66.754 \ cm$	**N1**	
(c)	$Area = \frac{1}{2}(17^2)(2.162)-\frac{1}{2}(17^2)\sin(123.855)$	**K1 K1**	
	$= 312.409-120$	**K1**	
	$= 192.409$	**N1**	
11(a)	$\mu = nk = 360$ and $\sigma^2 = nkq = 72$	**P1**	**10**
	$360q = 72$	**K1**	
	$q = 0.2$	**N1**	
	$\therefore k = 0.8$		
	$nk = 360$		
	$n = \frac{360}{0.8}$	**K1**	
	$= 450$	**N1**	
(b)	(i) $\mu = 140 \quad \sigma = 10$		
	$P\left(\frac{135-140}{10} < z < \frac{145-140}{10}\right)$	**K1**	
	$P(-0.5 < z < 0.5)$		
	$= 2(0.1915)$	**N1**	
	$= 0.3829$		
(c)	(ii)		
	$(ii) \ P\left(z > \frac{150-140}{10}\right)$	**K1**	
	$P(z > 1.0)$		
	$= 0.1587$		
	$\frac{80}{N} = 0.1587 \quad \therefore N = 504/505$	**K1**	
		N1	

12(a)

$(i)\ QS = \sqrt{7^2 + 18.2^2 - 2(7)(18.2)\cos(52^o)}$ **K1**

$= \sqrt{223.3695}$

$= 14.946\ cm$ **N1**

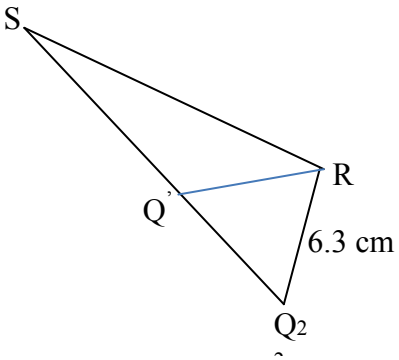
$(ii)\ \dfrac{\sin\angle PQS}{7} = \dfrac{\sin 52^o}{14.946}$ **K1**

$\sin\angle PQS = 0.3691$

$\angle PQS = 21.66^o\ /\ 21^o40'$ **N1**

(b)

(i)



N1

(ii)

$\dfrac{\sin\angle QSR}{6.3} = \dfrac{\sin 110^o}{14.946}$ **K1**

$\angle QSR = 23^o20'$ **N1**

$\therefore\ \angle SQR = 180^o - 110^o - 23^o20'$

$= 46^o40'$

and **N1**

$\therefore\ \angle QRQ' = 180^o - 2(46^o40')$

$= 86^o40'$

Area of Q'RS $= \dfrac{1}{2}(14.946)(6.3)(\sin 46^o40') - \dfrac{1}{2}(6.3)(6.3)\sin 86^o40'$ **K1**

$= 34.2447 - 19.8114$

$= 14.433\ cm^2$ **N1**

10

13 (*a*)	Use $I = \frac{Q_1}{Q_o} \times 100$ $x = 140, \quad y = 7$	**K1** **N1**	
(*b*)	$I_{05/02} = \frac{120(4)+140(2)+125(3)+110(1)}{4+2+3+1}$ $= 124.5$	**K1** **N1** **N1**	
(*c*)	$\frac{P_{05}}{9600} x100 = 124.5$ $P_{05} = RM11952$	**K1** **N1**	**10**
(*d*)	<table><tr><td></td><td>$I_{07/02}$</td><td>w</td></tr><tr><td>P</td><td>120x1.1= 132</td><td>4</td></tr><tr><td>Q</td><td>140x1.1=154</td><td>2</td></tr><tr><td>R</td><td>125x1.05=131.25</td><td>3</td></tr><tr><td>S</td><td>110x1.05=115.5</td><td>1</td></tr></table> $\mathbf{I_{07/02}} = \frac{132x4+154x2+131.25x3+115.5x1}{10}$ $= 134.525$	**P1** **K1** **N1**	
14 (a)	$x + y \leq 9$ ` $x \leq 2y \quad or \quad y \geq \frac{1}{2}x$ $900x + 400y \geq 3600 \quad or \quad 9x + 4y \geq 36$	**N1** **N1** **N1**	
(b)	Draw correctly all three straight line which involves x and y. Region shaded correctly	**K1** **N1 N1**	**10**
(c)	(i) $x = 4, \quad y = 5$ (ii) Use $45x + 20y$ for point in the shaded region $(6, 3) : 45(6) + 20(3)$ $= 330$	**N1** **K1** **N1** **N1**	

15(a)	$v = \int 2t - 8 \ dt$ $= t^2 - 8t + 12$	**K1**	
	V minimum, a =0 $2t - 8 = 0$ $t = 4$	**N1**	
	$V_{\min} = (4^2) - 8(4) + 12$ $= -4ms^{-1}$	**K1** **N1**	
(b)	rest, v =0 $t^2 - 8t + 12 = 0$ $(t-2)(t-6) = 0$	**K1**	
	$t = 2, \ t = 6$	**N1**	
(c)	$s = \int t^2 - 8t + 12 \ dt$ $= \frac{t^3}{3} - 4t^2 + 12t$	**K1**	**10**
	$total \ \ distance = \int_0^2 v dt + \left\| \int_2^4 v dt \right\|$ $= \left[\frac{t^3}{3} - 4t^2 + 12t \right]_0^2 + \left\| \frac{t^3}{3} - 4t^2 + 12t \right\|_2^4$ $= \frac{32}{3} + \left\| -\frac{16}{3} \right\|$ $= 16 \, m$	**K1 K1** **N1**	