SULIT

3472/1
Additional Mathematics
Set 1
2010
2 hours

Name: _____

Class: _____

JABATAN PELAJARAN NEGERI PERAK

GERAK GEMPUR

SIJIL PELAJARAN MALAYSIA 2010

Additional Mathematics

SET 1 (Paper 1)

Two Hours

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

This questions paper consists of 13 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 spaces 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 4 to 6.*

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

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

The following formulae may be useful in answering 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

   $= \int_a^b y \, dx$ or $= \int_a^b x \, dy$
5. Volume generated

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

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

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

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. $I = \dfrac{Q_1}{Q_0}$ x 100

7. $\bar{I} = \dfrac{\sum IW}{\sum W}$

8. $\bar{I} = \dfrac{\sum W_i I_i}{\sum W_i}$

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

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

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

12. $P(X = r) = {}^nC_r\, p^r q^{n-r}$, $p + q = 1$

13. Mean , $\mu = np$

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

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

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

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

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

1. Diagram 1 shows the relation between set *W* and set *V*.
Rajah 1 menunjukkan hubungan antara set W dan set V.

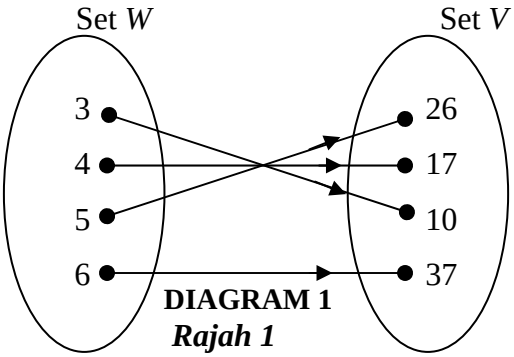

DIAGRAM 1
Rajah 1

(a) Represent the relation by ordered pairs.
Wakilkan hubungan tersebut dengan set pasangan bertertib.

(b) State the type of the relation between set W and set V.
Nyatakan jenis hubungan antara set W dan set V

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

Answer/*Jawapan*: (a) ……..……

(b) ……..……...

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2. Given that functions $f : x \to 3x + r$ and $f^{-1} : x \to mx - \frac{6}{7}$, where *r* and *m* are constants, find the values of *r* and of *m*. [3 *marks*]

Diberi fungsi $f : x \to 3x + r$ *dan* $f^{-1} : x \to mx - \frac{6}{7}$, *dengan keadaan r dan m adalah pemalar, cari nilai r dan m.* [3 *markah*]

Answer/*Jawapan* : *r* = ……..……...

m = …….

3. Given the functions $f : x \mapsto 3x - 2$ and $fg : x \mapsto 3x^2 - 5$, find *g* (–3). [3 marks]

Diberi fungsi $f : x \mapsto 3x - 2$ *dan* $fg : x \mapsto 3x^2 - 5$ *, cari g (–3).* [3 *markah*]

Answer/*Jawapan*: …….

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4. Solve the quadratic equation $2x(x+2) = 5(x+1) + 2$. Give your answer correct to four significant figures. [3 *marks*]
Selesaikan persamaan kuadratik $2x(x+2) = 5(x+1) + 2$. *Berikan jawapan anda betul kepada empat angka bererti.*
[3 *markah*]

Answer/*Jawapan*: ……

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5. Find the range of the values of n for which $(1+n)(6-n) < -8$. [3 *marks*]
Cari julat nilai n bagi $(1+n)(6-n) < -8$ [3 *markah*]

Answer/*Jawapan*: ..……

6. Diagram 6 shows the graph of the function $y = -(x+2)^2 + m$, where *m* is a constant. The curve touches $y = 13$ at point *A* and cut the y-axis at point B.

Rajah 6 menunjukkan suatu graf fungsi kuadratik $y = -(x+2)^2 + m$, *dimana m adalah pemalar. Lengkungan menyentuh garis* $y = 13$ *pada titik A dan memotong paksi-y pada titik B.*

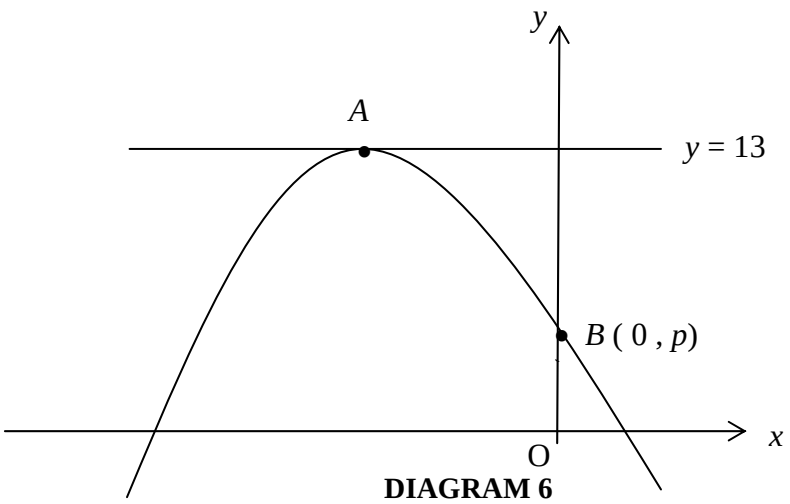

DIAGRAM 6
Rajah 6

State

Nyatakan

(*a*) the maximum point for the curve.
titik maksimum bagi lengkungan itu

(b) the equation of the axis of symmetry
persamaan paksi simetri lengkung itu.

(c) the value of *p*.
nilai p. [3 *marks*]
[3 *markah*]

Answer/*Jawapan*: *a*) ……

b) ……..……

c) *p* = ……...

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7. Solve the equation $\left(\frac{1}{5}\right)^{2-x} = \sqrt{125}$.

Selesaikan persamaan $\left(\frac{1}{5}\right)^{2-x} = \sqrt{125}$ [3 *marks*]

[3 *markah*]

Answer/*Jawapan*: ……

8. Solve the equation $3(\log_{27} y)^2 - 2\log_{27} y = 0$.

Selesaikan persamaan $3(\log_{27} y)^2 - 2\log_{27} y = 0$ [4 *marks*]

[4 markah]

Answer/*Jawapan*: ……

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9. The sum of the first n terms of an arithmetic progression is given by $S_n = 3n - 2n^2$, find the 10^{th} term . [2 *marks*]
Hasil tambah n sebutan yang pertama bagi suatu janjang aritmatik diberi oleh $S_n = 3n - 2n^2$, *cari sebutan yang ke-sepuluh*. [2 *markah*]

Answer/*Jawapan*: ……..……

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10. Given that 50, 47, 44, …., -4 , -7 is an arithmetic progression. Find the sum of all the terms in the progression.
Diberi 50, 47, 44, …, -4, -7 adalah satu janjang aritmatik. Cari hasil tambah semua sebutan dalam janjang itu.

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

Answer/*Jawapan*: : …….

11. Given 36, *x*, 4 are three consecutive terms of a geometric progression with a negative common ratio .

Diberi 36, *x*, 4 *adalah tiga sebutan berutrutan bagi suatu janjang geometri dengan nisbah sepunya yang negative .*

Find,
Cari,

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

(b) the sum to infinity of the geometric progression.
Hasil tambah hingga sebutan ketakterhinggaan bagi janjang itu.

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

Answer/*Jawapan* : a) *x* = ……

b) …….

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12. Diagram 12 shows a sector ABCO with centre O .
Rajah 12 menunjukkan sebuah sector ABCO dengan pusat O.

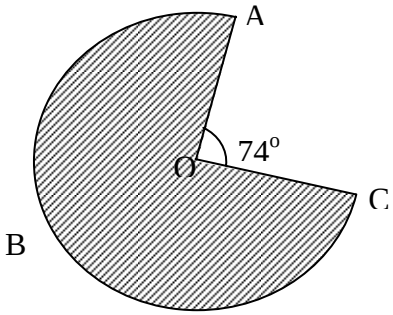

DIAGRAM 12
Rajah 12

(Use $\pi = 3.142$)

Calculate
Hitung

(a) the angle of the major sector in radian.
Sudut major sector itu dalam radian

(b) the length of the radius such that the area of the shaded region is 390 cm^2 .
panjang jejari sektor itu dengan keadaan luas kawasan berlorek adalah 390 cm^2.

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

Answer : (a) ……

(b)……

13. Diagram 13 shows two vectors, $\overrightarrow{OP}$ and $\overrightarrow{OQ}$.

Rajah 13 menunjukkan dua vector $\vec{OP}$ *dan* $\vec{OQ}$.

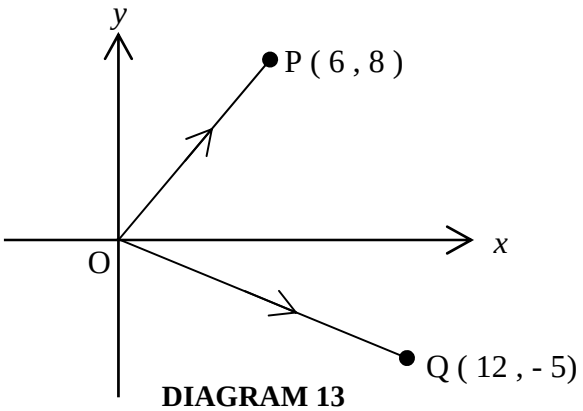

DIAGRAM 13
Rajah 13

(a) Express $\vec{PQ}$ in the form of $\begin{pmatrix} x \\ y \end{pmatrix}$.

Ungkapkan $\vec{PQ}$ *dalam bentuk* $\begin{pmatrix} x \\ y \end{pmatrix}$.

(b) Find the unit vector in the direction of $\vec{PQ}$

Cari unit vector unit dalam arah $\vec{PQ}$ [3 *marks*]
[3 *markah*]

Answer/*Jawapan*: (a) $\vec{PQ}$ = ……

(b) ……

---

14. Given that $\vec{AB} = 9i - 4j$ and $\vec{BC} = -6i + pj$, calculate the values of *p* such that $\left|\vec{AC}\right| = 5$.

Diberi $\vec{AB} = 9i - 4j$ dan $\vec{BC} = -6i + pj$, hitungkan nilai-nilai *p* jika $\left|\vec{AC}\right| = 5$.

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

Answer/*Jawapan*: *p* =……

15. Diagram 15 shows a straight line graph of xy^2 against x^3.

Rajah 15 menunjukkan satu garis lurus bagi graf xy^2 *melawan* x^3 .

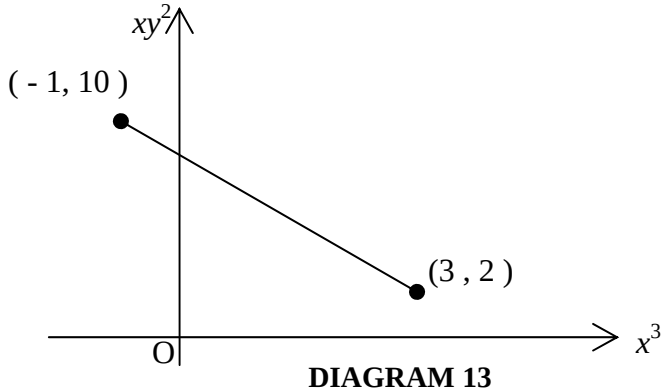

DIAGRAM 13
Rajah 13

Given that $\frac{y^2}{x} - px = \frac{q}{x^2}$, calculate the value of *p* and of *q* . [4 *marks*]

Diberi bahawa $\frac{y^2}{x} - px = \frac{q}{x^2}$ *, hitungkan nilai p dan q .* [4 *markah*]

Answer/*Jawapan*: *p* = ……..

q = ……..

16. Solve the equation $2\sec^2 x - \tan x - 3 = 0$ for $0° \le x \le 360°$. [4 mark]
Selesaikan persamaan $2\sec^2 x - \tan x - 3 = 0$ *untuk* $0° \le x \le 360°$. [4 *markah*]

Answer/*Jawapan*: : ……

17. It is given that $\sin 25^\circ = p$ and $\cos 55^\circ = q$, find in terms of *p* or *q*.

Diberi sin 25° = p dan cos 55° = q, cari dalam sebutan p atau q .

(a) sin 55°

(b) cos 50° [3 *marks*]
[3 *markah*]

Answer/*Jawapan* : a) ……

b) ……

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18. Given that $g(x) = \frac{1}{(5x-6)^2}$, evaluate $g''(1)$. [3 *marks*]

Diberi bahawa $g(x) = \frac{1}{(5x-6)^2}$ *, nilaikan* $g''(1)$. [3 *markah*]

Answer/*Jawapan* : ……

---

19. Given $V = 9x - \frac{3}{2}x^2$, find the small change in V when x change from 2 to 2.03.

Diberi $V = 9x - \frac{3}{2}x^2$*, cari perubahan kecil dalam V apabila x berubah dari 2 kepada 2.03*

[3 *marks*]

Answer/*Jawapan :* ……

20. A hemisphere bowl contains water to the depth of *x cm*. The volume of the water, *v* is given by $\frac{2}{3}\pi x^2(24-x)\ cm^3$. If water is poured into the bowl at the constant rate of 2.2 cm^3s^{-1}, find the rate of change of the depth of the water when the depth is 5 *cm*. [3 *marks*]

Sebuah mangkuk berbentuk hemisfera mengandungi air sedalam x cm. Isipadu air ,v diberi oleh $\frac{2}{3}\pi x^2(24-x)\ cm^3$. *Jika air dituang ke dalam mangkuk dengan kadar sekata* 2.2 cm^3s^{-1}, *cari kadar perubahan kedalaman air dalam mangkuk itu apabila dalam air ialah 5 cm.* [3 *markah*]

Answer/*Jawapan :* $m =$……

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21. Given that $\int_1^3 f(x)\ dx = 8$, find the value of *k* if $\int_1^3 [f(x) - kx]\ dx = 4$. [3 *marks*]

Diberi bahawa $\int_1^3 f(x)\ dx = 8$, *cari nilai k jika* $\int_1^3 [f(x) - kx]\ dx = 4$. [3 *markah*]

Answer/*Jawapan :* ……

22. A committee which consists of a president, a secretary, a treasurer and 3 committee members is to be formed from 4 males and 6 females.
Satu jawatankuasa mengandungi seorang pengerusi, seorang setiausaha , seorang bendahari dan 3 orang ahli jawatankuasa akan dibentuk daripada 4 lelaki dan 6 perempuan.
Find
Cari

(a) the number of different committees that can be formed if there are no conditions,
bilangan jawatankuasa berlainan yang dapat dibentuk jika tiada syarat dikenakan

(b) the number of different committee that can be form if the president must be a male but the secretary and the treasurer must be females.
bilangan jawatankuasa berbeza yang dapat dibentuk jka pengerusi mestilah seorang lelaki tetapi setiausaha dan bendahari mesti seorang perempuan.

[4 *marks*]
[4 markah]

Answer/*Jawapan :* (a) ……..

(b) ……..

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23. A survey found that 40% of the children in a village are not schooling.
Satu kajian mendapati bahawa 40% daripada kanak-kanak di sebuah kampong tidak bersekolah.

(a) If 7 children are chosen at random from that village, find the probability that 4 of them are not schooling.
Jika 7 orang kanak-kanak dipilih secara rawak daripada kampung itu, hitungkan kebarangkalian bahawa 4 daripada mereka tidak bersekolah.

(b) If there are 400 children in the village, find the standard deviation of the children that are not schooling.
Sekiranya terdapat 400 orang kanak-kanak di kampung itu, hitungkan sisihan piawai bagi kanak-kanak yang tidak bersekolah.

[4 *mark*s]
[4 *markah*]

Answer/*Jawapan :* a) ……

b) ……

24. Given a set of data, which has the following information:
Diberi satu set data mempunyai maklumat yang berikut :

$\bar{x} = 27,$
$\sum x = 189,$
$\sum x^2 = 5278.$

Calculate the standard deviation of the set of data. [3 *marks*]
Hitungkan sisihan piawai bagi set data tersebut. [3 *markah*]

Answer/*Jawapan::* …….

25. The height of coconut trees in a farm have a normal distribution with a mean of 650 cm and varians of 576 cm^2.
Tinggi pokok kelapa di sebuah ladang mempunyai taburan normal dengan min 650 cm dan varians 576 cm^2.

a) Find the z – score of the coconut tree with a height of 680 cm.
Cari skor-z bagi pokok kelapa yang tingginya 680 cm.

b) Find the percentage of the coconut trees that have a height between 614 cm and 680 cm.
Cari peratus bagi pokok kelapa yang tingginya antara 614 cm dan 680 cm.

[4 *mark*s]
[4 *markah*]

Answer: a) ……

b) ……

THE END OF QUESTION PAPER

SULIT

3472/2
Additional Mathematics
Set 1
2010
2 ½ hours

Name: _____

Class: _____

JABATAN PELAJARAN NEGERI PERAK

GERAK GEMPUR

SIJIL PELAJARAN MALAYSIA 2010

Additional Mathematics

SET 1 (Paper 2)

Two Hours Thirty Minutes

Section	Question	Full Marks	Marks Obtained
A	1	5	
	2	6	
	3	6	
	4	7	
	5	8	
	6	8	
B	7	10	
	8	10	
	9	10	
	10	10	
C	11	10	
	12	10	
	13	10	
	14	10	
Total		100	

The following formulae may be useful in answering 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

   $= \int_a^b y \, dx$ 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. $I = \dfrac{Q_1}{Q_0}$ x 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
$= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

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

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

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

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

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

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

Answer **all** questions from this section.
Jawab **semua** *soalan dalam bahagian ini.*

1. Solve the simultaneous equations $\frac{1}{4}h - k = 2$ and $h + 4 = k(k+8)$. [5 *marks*]

Selesaikan persamaan serentak $\frac{1}{4}h - k = 2$ *dan* $h + 4 = k(k+8)$. [5 *markah*]

2. (a) Given that $\frac{dy}{dx} = 2x + 5$ and $y = 5$ when $x = 2$, find y in terms of x. [3 *marks*]

Diberi $\frac{dy}{dx} = 2x + 5$ *dan* $y = 5$ *apabila* $x = 2$, *cari* y *dalam sebutan* x. [3 *markah*]

(b) Hence, find the values of x if $x^2\frac{d^2y}{dx^2} + (x-1)\frac{dy}{dx} + y = -10$. [3 *marks*]

Seterusnya, cari niali x jika $x^2\frac{d^2y}{dx^2} + (x-1)\frac{dy}{dx} + y = -10$. [3 *markah*]

3.

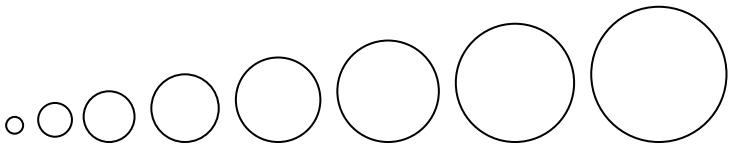


DIAGRAM 3
Rajah 3

A piece of wire of length 136π cm is cut to form eight circles as shown in Diagram 3. The diameter of each circle increases by 1 cm in sequence.
Seutas wayar dengan panjangnya 136π *cm dipotong untuk membentuk lapan bulatan seperti mana yang ditunjukkan dalam Rajah 3. Diameter setiap bulatan itu bertambah secara jujukan sebanyak 1 cm.*
Find
Cari

(a) the diameter of the smallest circle, [3 *marks*]
diameter bulatan yang terkecil [3 *markah*]

(b) the maximum number of circles that can be form if the length of wire used is 460π cm. [3 *marks*]
bilangan maksimum bagi bulatan yang dapat dibentuk jika panjang wayer yang digunakan ialah 460π cm. [3 *markah*]

4. Table 4 shows the distribution of books borrowed by 140 students at the school library from January to April, 2007.
Jadual 4 menunjukkan taburan buku yang dipinjam oleh 140 orang pelajar di perpustakaan sebuah sekolah dari bulan Januari hingga bulan April , 2010.

Number of books *Bilangan buku*	Frequency *Kekerapan*
1 – 5	8
6 – 10	25
11 – 15	40
16 – 20	32
21 – 25	24
26 – 30	11

TABLE 4
Jadual 4

(a) Find the mean of the distribution. [2 *marks*]
Cari min bagi taburan tersebut. [2 *markah*]

(b) Construct a cumulative frequency table, hence, without using an ogive calculate the inter quartile range. [5 *marks*]
Bina satu jadual kekerapan longgikan, seterusnya, tanpa menggunakan ogif, hitungkan julat antara kuartil. [5 *markah*]

5. (a) Prove that $\text{cosec } 2x - \sin x \sec x = \cot 2x$. [2 *mark*s]
Buktikan $\text{cosec } 2x - \sin x \sec x = \cot 2x$. [2 *markah*]

(b) (i) Sketch the graph of $y = 3\sin 2x$ for $0 \le x \le 2\pi$.
Lakarkan graf $y = 3\sin 2x$ *untuk* $0 \le x \le 2\pi$.

(ii) Hence, by using the same axes, draw a suitable straight line to find the number of solutions satisfying the equation $\frac{3}{2}\pi \sin 2x = x - \pi$.
Seterusnya, dengan menggunakan paksi yang sama, lukiskan satu garis lurus untuk mencari bilangan penyelesaian yang memuaskan persamaan $\frac{3}{2}\pi \sin 2x = x - \pi$. [6 *marks*]

[6 *markah*]

6

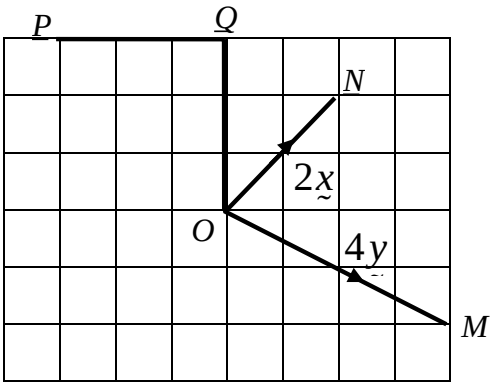


DIAGRAM 6
Rajah 6

(a) In Diagram 6, $\overrightarrow{ON} = 2\underset{\sim}{x}$ and $\overrightarrow{OM} = 4\underset{\sim}{y}$ .Express
Dalam Rajah 6, $\overrightarrow{OQ} = 2\underset{\sim}{x}$ *dan* $\overrightarrow{OM} = 4\underset{\sim}{y}$ *, ungkapkan*

(i) $\overrightarrow{OQ}$,

(ii) $\overrightarrow{PQ}$ in terms of $\underset{\sim}{x}$ and $\underset{\sim}{y}$.
$\overrightarrow{PQ}$ *dalam sebutan* $\underset{\sim}{x}$ *dan* $\underset{\sim}{y}$. [3 *marks*]
[3 *markah*]

(b) Given that *WXYZ* is a parallelogram, $\overrightarrow{XY} = \underset{\sim}{i} + 2\underset{\sim}{j}$ and $\overrightarrow{YZ} = -3\underset{\sim}{i} - 3\underset{\sim}{j}$. Find
Diberi WXYZ adalah sebuah segiempat selari, $\overrightarrow{XY} = \underset{\sim}{i} + 2\underset{\sim}{j}$ and $\overrightarrow{YZ} = -3\underset{\sim}{i} - 3\underset{\sim}{j}$ *.Cari*

(i) $\overrightarrow{WY}$,
(ii) the unit vector in the direction of $\overrightarrow{WY}$.
unit vector dalam arah $\overrightarrow{WY}$ [5 *marks*]
[5 *markah*]

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

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

7. Table 7 shows the values of two variables R and S , obtained from an experiment. The variable R and S are related by equation $\frac{1}{S} = \sqrt{\frac{(R+p)}{k}}$, where *k* and *p* are constants.

Jadual 7 menunjukkan nilai-nilai bagi dua pembolehubah R dan S yang diperolehi daripada satu eksperimen. Pembolehubah R dan S dihubungkan oleh persamaan $\frac{1}{S} = \sqrt{\frac{(R+p)}{k}}$ *, dengan keadaan k dan p adalah pemalar.*

R	1	0.8	0.5	0.3	0.1
S	0.82	0.88	1.00	1.12	1.30

TABLE 7
Jadual 7

a) Plot $\frac{1}{S^2}$ against R, by using 2 cm to 0.2 unit on both axes.
Hence , draw a line of best fit.
Plotkan $\frac{1}{S^2}$ *melawan* R *, gunakan skala 2 cm kepada 0.2 unit pada kedua-dua paksi, seterusnya, lukiskan garis penyuaian terbaik.*

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

b) Use the graph in (a) to find
Gunakan graf di (a) untuk mencari

i) the values of *k* and of *p*
nilai k dan p

ii) the value of S when R = 0.4 .
nilai S apabila R = 0.4

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

8 (a) A drop of oil which drips on a piece of paper expands in the shape of a circle. If the radius of the circle increases at a uniform rate of 12 mm in 4 seconds, find the rate of change in the area of circle when the radius is 5 mm. [4 *marks*]

Setitik minyak terjatuh di atas sekeping kertas dan mengembang dengan bentuk bulatan. Jika jejari bulatan bertambah dengan kadar sekata 12 mm dalam 4 saat, cari kadar perubahan luas bulatan itu apabila jejarinya 5 mm. [4 *markah*]

(b)

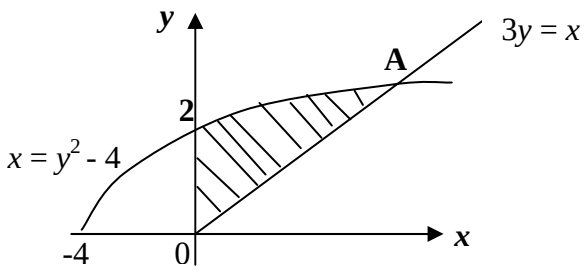


DIAGRAM 8
Rajah 8

Diagram 8 shows a curve $x = y^2 - 4$ which intersects the straight line $3y = x$ at A. Calculate the volume generated when the shaded region is revolved 360^o about the y-axis. [6 *marks*]

Rajah 8 menunjukkan suatu lengkungan $x = y^2 - 4$ *yang bersilang dengan satu garis lurus* $3y = x$ *pada A. Hitungkan isipadu yang dijanakan apabila kawasan lorek dikisarkan melalui* 360^o *pada paksi-y.* [6 *markah*]

9. Diagram 9 shows a trapezium *ABCD*. Given that the equation of *AB* is $2y + x - 11 = 0$.
Rajah 9 menunjukkan satu trapezium ABCD. Diberi persamaan AB ialah $2y + x - 11 = 0$.

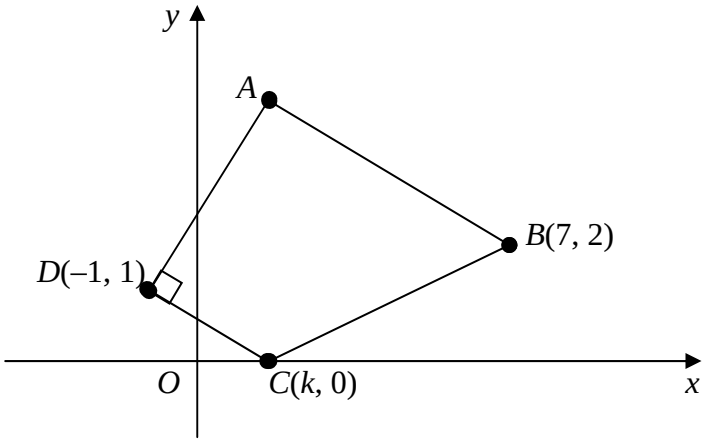


DIAGRAM 4
Rajah 4

Find
Cari

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

nilai k [3 *markah*]

(b) the equation of *AD* and hence the coordinates of point *A,* [4 *marks*]

persamaan AD dan seterusnya koordinat titik A, [4 *markah*]

(c) A point P moves such that triangle BPD is a right-angled triangle with $\angle BPD = 90°$. Find the equation of the lokus P. [3 *marks*]

Suatu titik P bergerak dengan keadaan segitiga BPD bersudut tegak dengan $\angle BPD = 90°$. *Cari persamaan lokus bagi P.* [3 *markah*]

10. Diagram 10 shows two circles each with a radius of 3 cm , touch each other at point E. Both of the circles touch the arc of another circle with centre O at C and D .

Rajah 10 menunjukkan dua buah bulatan berjejari 3 cm yang menyentuh satu sama lain di titik E. Kedua-dua bulatan menyentuh lengkuk satu bulatan lain berpusat O di titik C dan D.

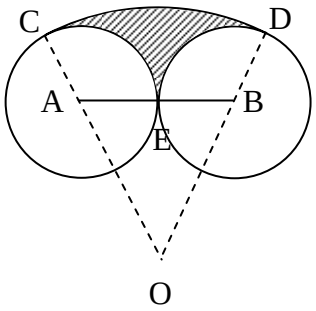


DIAGRAM 10
Rajah 10

Given that OC = 9 cm , calculate
Diberi OC = 9 cm, hitung

a) the angle of AOB in radian [1 *marks*]
sudut AOB dalam radian [1 *markah*]

b) the perimeter of the shaded region. [3 *marks*]
perimeter kawasan berlorek [3 *markah*]

c) i) the area of sector COD
luas sector COD

ii) the area of shaded region.
luas kawasan berlorek [6 *marks*]
[6 *markah*]

11. The mass of hens from a farm follows a normal distribution with a mean of 1300 g and a standard deviation of 100 g.

Jisim ayam dalam satu lading bertabur secara normal dengan min 1300 g dan sisihan piawai 100g

(a) If a hens is chosen at random, find the probability that the mass of the hens is less than 1500 g. [2 *mark*s]
Jika seekor ayam dipilih secara rawak, cari kebarangkalian bahawa jisim ayam tersebut kurang daripada 1500 g. [2 *markah*]

(b) Find the number of hens that has a mass between 1000 g and 1400 g if 2000 hens are produced by the farm in a certain period of time. [5 *marks*]
Cari bilangan ayam yang mempunyai jisim di antara 1000 g dan 1400 g jika 2000 ekor ayam dihasilkan oleh lading tersebut dalam satu jangkamasa yang tertentu. [5 *markah*]

(c) Given that 5% of the hens have a mass of more than k g, find the value of k. [3 *marks*]
Diberi 5% daripada ayam itu mempunyai jisim lebih daripada k g, cari nilai k. [5 *markah*]

SECTION C
Bahagian C
[20 *marks*]
[20 *markah*]

Answer **TWO** questions from this section.
Jawab **dua** *soalan daripada bahagian ini.*

12 Diagram 12 shows a quadrilateral VPQR such that VQ and PR are the diagonals.
Rajah 12 menunjukkan sebuah segiempat VPQR dengan keadaan VQ dan PR adalah pepenjuru-pepenjurunya.

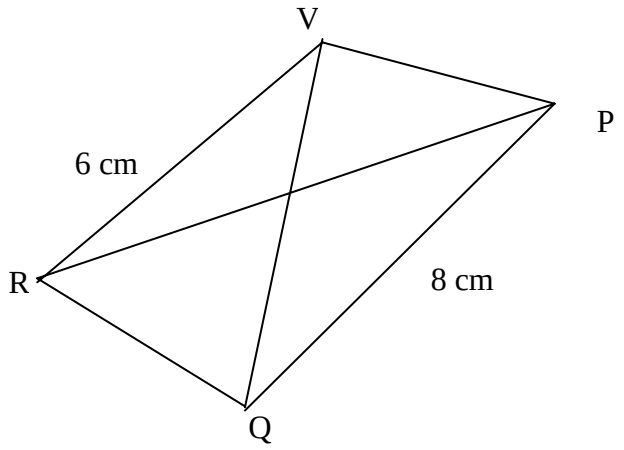


DIAGRAM 12
Rajah 12

Given that PQ = 8 cm, RV = 6 cm, PR = 9 cm, VQ = 7 cm and the area of triangle PQR is 20 cm^2, calculate

Diberi PQ = 8 cm , RV = 6 cm, PR = 9 cm, VQ = 7 cm dan luas segitiga PQR ialah 20 $cm^{2,}$ *hitungkan*

(a) the length of QR [4 *marks*]
panjang QR [4 *markah*]

(b) the angle of VQR [2 *marks*]
sudut VQR [2 *markah*]

(c) the length of VP [4 *marks*]
panjang VP [4 *markah*]

13 Table 13 shows the price index and weightages of five health products consumed by Mr. Wong.

Jadual 13 menunjukkan harga indeks dan pemberat bagi lima jenis peralatan kesihatan yang dibeli oleh Mr. Wong.

Health product	Price index for the year 2004 (2002=100)	Price index for the year 2006 (2004=100)	Weightage
P	110	105	16
Q	115	150	12
R	105	120	*x*
S	125	100	5
T	120	130	9

Table 13
Jadual 13

(a) Calculate
Hitung

(i) the price of Q in the year 2002 if its price in the year 2004 was RM 32,
harga barangan Q pada tahun 2002 jika harganya pada tahun 2004 ialah RM 32.

(ii) the price index of T in the year 2006 based on the year 2002.
harga indeks untuk T pada tahun 2006 berdasarkan tahun 2002.

[5 *marks*]
[5 *markah*]

(b) The composite index number of the health products consumption for the year 2006 based on the year 2004 is 122.2.

Indeks gubahan untuk peralatan kesihatan pada tahun 2006 berasaskan tahun 2004 ialah 122.2

Calculate
Hitung

(i) the value of *x*,
nilai x ,

(ii) Mr. Tan paid RM 285 per month in the year 2002 for the five health products. How much should he pay for the same amount of health products in the year 2004?

En. Tan bayar RM 285 setiap bulan dalam tahun 2002 untuk lima peralatan kesihatan itu . Berapakah yang perlu dibayarnya dalam tahun 2004 untuk jumlah peralatan kesihatan yang sama ? [5 *marks*]
[5 *markah*]

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

A farmer has 70 acres of land available for planting crops. He plants x acres of soybeans and y acres of wheat. The cost of preparing the soil, the workdays required, and the expected profit per acre planted for each type of crop are given in Table 14:

Seorang petani mempunyai 70 ekar tanah untuk menanam pokok. Dia telah menanam x ekar pokok kacang soya dan y ekar pokok gandum. Kos untuk penyediaan tapak, bilangan hari bekerja yang diperlukan dan jangkaan keuntungan setiap ekar tanah berdasarkan jenis tanaman diberi dalam Jadual 14.

The farmer cannot spend more than RM 5400 in preparation costs nor more than a total of 120 workdays.

Petani itu tidak boleh belanja lebih daripada RM 5400 untuk kos penyediaan tapak dan tidak boleh bekerja lebih daripada 120 hari.

	Soybeans *Kacang soya*	Wheat *Gandum*
Preparation cost per acre *Kos penyediaan tapak per ekar*	RM 180	RM 90
Workdays require per acre *Bilangan hari kerja yang diperlukan*	3	4
Profit per acre *Keuntungan per ekar*	RM 540	RM 300

Table 14
Jadual 14

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

(b) Using a scale of 2 cm to 5 acres, construct and shade the region R which satisfies all the above constraints. [3 *marks*]

Dengan menggunakan skala 2 cm kepada 5 ekar, lukiskan graf bagi ketiga-tiga ketaksamaan dan seterusnya lorekkan rantau R yang memenuhi syarat-syarat di atas. [3 *markah*]

(c) Use your graph in 14(b) to find
Gunakan graf di 14(b) untuk mencari

(i) the number of acres of each crop that should be planted in order to maximize the profit.
bilangan ekar tanah untuk setiap tanaman yang perlu ditanam supaya memperolehi keuntungan maksimum.

(ii) the maximum profit.
keuntungan maksimum. [4 *marks*]
[4 *markah*]

15 A particle moves along a straight line and passes through a fixed point O. Its velocity, v ms^{-1}, t seconds after passing through point O is given by $v = 3t^2 - 12t - 15$, and its displacement from O is x m. It is given that after moving for 1 s, the particle is 22 m on the left of point O.
(Assume the displacement 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 $v = 3t^2 - 12t - 15$, dengan keadaan t ialah masa, dalam saat, selepas meninggalkan titik O. Sesarannya dari titik O ialah x m. Diberi bahawa selepas bergerak 1 saat, zarah itu berada sejauh 22 m di sebelah kiri titik O. (Anggapkan gerakan ke arah kanan sebagai positif.)

Find
Cari

(a) x in terms of t [*3 marks*]
x dalam sebutan t [*3 markah*]

(b) the distance travelled during the third second. [2 *marks*]
jarak yang dilalui dalam saat ketiga [*3 markah*]

(c) the maximum velocity of the particle [3 *marks*]
Halaju maksimum zarah itu [*3 markah*]

(d) the range of time when the particle is moving to the left. [2 *marks*]
Julat masa apabila zarah itu bergerak kea rah kiri. [2 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

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

   Kertas soalan ini mengandungi tiga bahagian: ***Bahagian* A**, ***Bahagian* B** *dan* ***Bahagian* C**.

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

   Jawab **semua** *soalan dalam* ***Bahagian* A**, mana-mana **empat** *soalan daripada* ***Bahagian* B** *dan* mana-mana **dua** *soalan daripada* ***Bahagian* C**.

3. Write your answers on the 'buku jawapan' provided. If the 'buku jawapan' is insufficient, you may ask for 'helaian tambahan' from the invigilator.

   Jawapan anda hendaklah ditulis di dalam buku jawapan yang disediakan. Sekiranya buku jawapan tidak mencukupi, sila dapatkan helaian tambahan daripada pengawas peperiksaan.

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

   Tunjukkan langkah-langkah penting dalam kerja mengira anda. Ini boleh membantu anda untuk mendapatkan markah.

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

   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

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

   Markah yang diperuntukkan bagi setiap soalan dan ceraian soalan ditunjukkan dalam kurungan.

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

   Satu senarai rumus disediakan di halaman 3 *hingga* 5.

8. Graph paper and a booklet of four-figure mathematical tables is provided.

   Kertas graf dan sebuah buku sifir matematik empat angka disediakan.

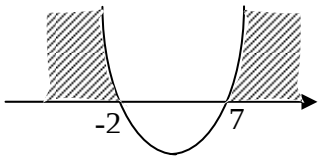
9. You may use a non-programmable scientific calculator.

   Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogram.

10. Tie the 'helaian tambahan' and the graph papers together with the 'buku jawapan' and hand in to the invigilator at the end of the examination.

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

Jabatan Pelajaran Perak
Additional Mathematics Marking Scheme
Gerak Gempur 2010 Set 1 Paper 1

Q	Solution & Notes	Marks	
1	(a) {(3,10), (4, 17), (5, 26), (6, 37)}	1	
	(b) One-to-one relation.	1	2
2	$m = \frac{1}{3}$, $r = \frac{18}{7}$	3	
	B2 : $m = \frac{1}{3}$ *or* $r = \frac{18}{7}$		
	B1 : $f^{-1}(x) = \frac{x}{3} - \frac{r}{3}$		3
3	8	3	
	B2 : $g(x) = x^2 - 1$		
	B1 : $3(g(x)) - 2 = 3x^2 - 5$		3
4	2.137 , –1.637	3	
	B2 : $\frac{-(-1) \pm \sqrt{(-1)^2 - 4(2)(-7)}}{2(2)}$		
	B1 : $2x^2 - x - 7 = 0$		3
5	$n < -2$, $n > 7$	3	
	B2 :  shown		
	B1 : $(n-7)(n+2) > 0$ *or* $(-n+7)(n+2) < 0$		3
6	a) $(-2, 13)$	1	
	b) $x = -2$	1	
	c) $p = 9$	1	
			3

Q	Solution & Notes	Marks	
7	$x = \frac{7}{2}$ B2 : $x - 2 = \frac{3}{2}$ B1 : 5^{x-2} or $5^{\frac{3}{2}}$	3	3
8	y = 1 , 9 B3 : y=27^0 and $y = 27^{\frac{2}{3}}$ B2 : $\log_{27} y = 0$, $\log_{27} y = \frac{2}{3}$ B1 : $\log_{27} y(3\log_{27} y - 2) = 0$	4	4
9	-35 B1 : $\left[3(10) - 2(10)^2\right] - \left[3(9) - 2(9)^2\right]$	2	2
10	430 B2 : $S_{20} = \frac{20}{2}\left[2(50) + (20-1)(-3)\right]$ B1 : $50 + (n-1)(-3) = -7$ *or* $n = 20$	3	3
11	a) $x = -12$ $(r < 0)$ B1 : $\frac{x}{36} = \frac{4}{x}$ or $x^2 = 144$ b) 27 B1 : $\frac{36}{1-(-\frac{1}{3})}$	2 2	4
12	a) 4.992 rad b) r = 12.5 cm B1 : $\frac{1}{2}r^2(4.992)^* = 390$	1 2	3

Q	Solution & Notes	Marks	
13	(a) $\begin{pmatrix} 6 \\ -13 \end{pmatrix}$ B1 : $-\begin{pmatrix} 6 \\ 8 \end{pmatrix}+\begin{pmatrix} 12 \\ -5 \end{pmatrix}$ (b) $\frac{1}{\sqrt{205}}\begin{pmatrix} 6 \\ -13 \end{pmatrix}$ *or* $\frac{1}{\sqrt{205}}(6i-13j)$	2 1	 3
14	p = 0 , 8 B2 : $3^2+(p-4)^2=5^2$ or $\sqrt{3^2+(p-4)^2}=5$ B1 : $\vec{AC}=3i+(p-4)j$	3	 3
15	p = - 2 , q = 8 B3 : 2 = - 2(3) + q or 10 = -2 (-1)+ q *OR p=-2 or q=8* B2 : $m=$ $p=\frac{10-2}{-1-3}$ *OR 2=3p + q , 10=-p + q* B1 : $xy^2=px^3+q$	4	 4
16	$x = 45°, 153.43°, 225°, 333.43°$ B3 : $x = 153.43°$ or 45° B2 : $(2\tan x+1)(\tan x-1)=0$ $\tan x=-\frac{1}{2}$ or $\tan x=1$ B1 : $2(\tan^2 x+1)-\tan x-3=0$ or $2\tan^2 x-\tan x-1=0$	4	 4
17	(a) $\sqrt{1-q^2}$ (b) $1-2p^2$ B1 : $1-2\sin^2 25$	1 2	 3

Q	Solution & Notes	Marks	
18	$g''(1) = 150$ B2 : $g''(x) = 30(5x-6)^{-4}(5)$ B1 : $g'(x) = -2(5x-6)^{-3}(5)$	3	3
19	0.09 B2 : $\partial V \approx (9-3x)(0.03)$ or *3* x *0.03* B1 : $9-3x$	3	3
20	$\frac{1}{50\pi}$ *or* $\frac{0.02}{\pi}$ B2 : $\frac{1}{110\pi} \times 2.2$ B1 : 110π *or* $32\pi x - 2\pi x^2$	3	3
21	$k = 1$ B2 : $8 - \left[\frac{kx^2}{2}\right]_1^3 = 4$ B1 : $\left[\frac{kx^2}{2}\right]_1^3$ or $\int_1^3 f(x)dx - \int_1^3 kx\,dx = 4$	3	3
22	(a) 25200 B1 : ${}^{10}P_3 \times {}^7C_3$ (b) 4200 B1 : ${}^4C_1 \times {}^6P_2 \times {}^7C_3$	2 2	4
23	(a) 0.1935 B1 : ${}^7C_4(0.4)^4(0.6)^3$ (b) 9.798 B1 : $\sqrt{400(0.4)(0.6)}$	2 2	4

Q	Solution & Notes	Marks	
24	$\sigma = 5$ B2 : $\sigma = \sqrt{\left(\frac{5278}{7}\right) - (27)^2}$ B1 : $27 = \frac{189}{n}$ or $n = 7$	3	3
25	(a) 1.25 B1 : $\frac{680 - 650}{24}$ (b) 0.8276 B1 : $P(-1.5 < z < 1.25)$	2 2	4

MARKING SCHEME OF GERAK GEMPUR SPM PERAK 2010
ADDITIONAL MATHEMATICS SET 1

Q	Solution and notes	Marks	
1	$h = 8 + 4k$ *or* $k = \frac{h-8}{4}$	1	
	$(8 + 4k) + 4 = k^2 + 8k$ $\quad h + 4 = \left(\frac{h-8}{4}\right)^2 + 8\left(\frac{h-8}{4}\right)$	1	
	$(k-2)(k+6) = 0$ $\quad (h+16)(h-16) = 0$	1	
	$k = 2, -6$ $\quad h = -16, 16$	1	
	$h = -16, 16$ $\quad k = 2, -6$	1	
			5
2(a)	$y = x^2 + 5x + c$	1	
	Substitute $y = 5$ and $x = 2$ to find the value of y : $5 = (2)^2 + 5(2) + c$	1	
	$y = x^2 + 5x - 9$	1	
(b)	$\frac{d^2y}{dx^2} = 2$ is used.	1	
	Substitute $\frac{d^2y}{dx^2} = 2$, $\frac{dy}{dx} = 2x + 5$ and $y = x^2 + 5x - 9$ into equation $x^2(2) + (x-1)(2x+5) + (x^2 + 5x - 9) = -10$	1	
	$x = \frac{2}{5}$ or -2	1	
			6

Q	Solution and notes	Marks	
3(a)	D = diameter of the smallest circle		
	$T_1 = \pi D \ , \ T_2 = \pi(D+1) \ , \ T_3 = \pi(D+3)$,.....		
	$a = \pi D \ , \ d = \pi(D+1) - \pi D = \pi$	1	
	$S_8 = \frac{8}{2}[2(\pi D) + 7\pi] = 136\pi$	1	
	$2\pi D + 7\pi = 34\pi$		
	$2D = 27$		
	$D = 13.5 \ cm$	1	
(b)	$\frac{n}{2}\left(2(13.5\pi) + (n-1)\pi\right) \le 460\pi$	1	
	$27n + n^2 - n \le 920$		
	$n^2 + 26n - 920 \le 0$		
	$(n+46)(n-20) \le 0$	1	
	$-46 \le n \le 20$		
	$n = 20$	1	
			6
4(a)	mean, $\bar{x} = \frac{(3)(8)+(8)(25)+(13)(40)+(18)(32)+(23)(24)+(28)(11)}{8+25+40+32+24+11}$	1	
	$= \frac{2180}{140}$	1	
	$= 15.57$		
(b)			

Number of books	Frequency	Cumulative frequency
1 – 5	8	8
6 – 10	25	33
11 – 15	40	73
16 – 20	32	105
21 – 25	24	129
26 – 30	11	140

1

$$Q_1 = 10.5 + \left[\frac{\frac{1}{4}(140) - 33}{40}\right](5) = 10.75$$ 1

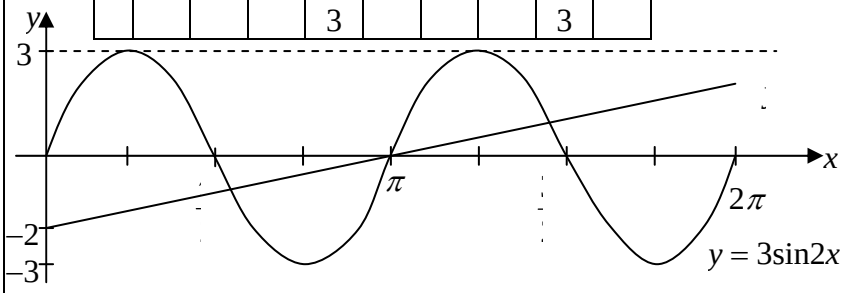
$$Q_3 = 15.5 + \left[\frac{\frac{3}{4}(140) - 73}{32}\right](5) = 20.5$$ 1

Inter quartile range = 20.5 – 10.75 1

= 9.75 1 7

Q	Solution and notes	Marks	
5(a)	LHS $= \dfrac{1}{\sin 2x} - \sin x\left(\dfrac{1}{\cos x}\right)$		
	$= \dfrac{1}{2\sin x\cos x} - \dfrac{\sin x}{\cos x}$	1	
	$= \dfrac{1-2\sin^2 x}{2\sin x\cos x}$		
	$= \dfrac{\cos 2x}{\sin 2x}$	1	
	$= \cot 2x$ (RHS)		
(b)			

x	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3}{4}\pi$	π	$\frac{5}{4}\pi$	$\frac{3}{2}\pi$	$\frac{7}{4}\pi$	2π
y	0	3	0	-3	0	3	0	-3	0



3

Notes: Sinusoidal shape 1 mark
Amplitude 1 mark
Period 1 mark

$\dfrac{3}{2}\pi\sin 2x = x - \pi$

$3\sin 2x = \dfrac{2}{\pi}x - 2$ 1,1

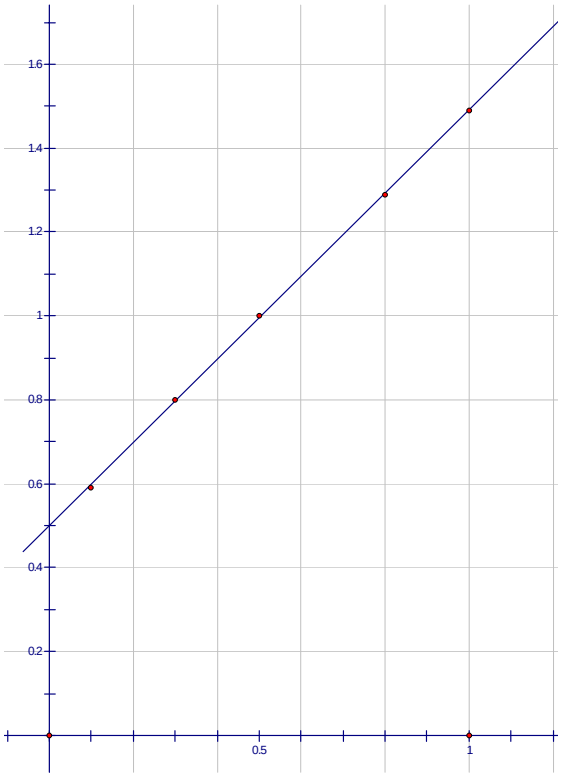
$y = \dfrac{2}{\pi}x - 2$ Draw straight line 1

There are 3 solutions.

8

Q	Solution and notes	Marks	
6(a)	$(i)\ \overrightarrow{OP} = 2\underset{\sim}{x} - 2\underset{\sim}{y}$	1	
	$(ii)\ \overrightarrow{PQ} = \frac{1}{2}(4\underset{\sim}{y} + 2\underset{\sim}{x})$ $= 2\underset{\sim}{y} + \underset{\sim}{x}$ * (4y + 2x) get 1 mark	2	
(b)	$(i)\ \underset{\sim}{i} + 2\underset{\sim}{j} - (-3\underset{\sim}{i} - 3\underset{\sim}{j})$	1	
	$4\underset{\sim}{i} + 5\underset{\sim}{j}$	1	
	$(ii)\sqrt{41}$	1	
	$\frac{1}{\sqrt{41}}(4\underset{\sim}{i} + 5\underset{\sim}{j})$	1	
	$\frac{4}{\sqrt{41}}\underset{\sim}{i} + \frac{5}{\sqrt{41}}\underset{\sim}{j}$	1	8
7(a)			

R	1	0.8	0.5	0.3	0.1
$\frac{1}{S^2}$	1.49	1.29	1	0.80	0.59



Correct axes and scale — 1

5 points is plotted — 1

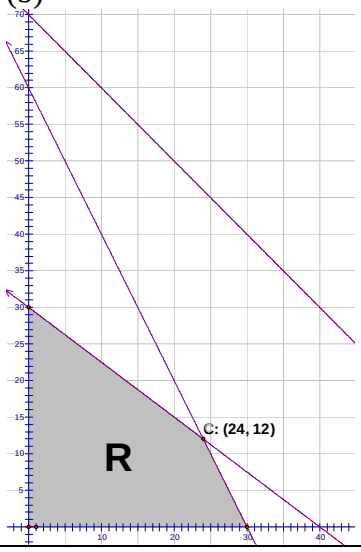
Best fit line — 1

10

Q	Solution and notes	Marks	
	b)i) $\frac{1}{S^2} = \frac{1}{k}(R) + \frac{p}{k}$	1	
	$\frac{1}{k} = \frac{1.5 - 0.7}{1 - 0.2}$ $k = 1$	1	
	$\frac{p}{k} = 0.5$ $p = 0.5$	1	
	ii) $R = 0.4$, $\frac{1}{S^2} = 0.9$	1	
	$S^2 = 1.111$	1	
	$S = 1.054$	1	
8(a)	$\frac{dr}{dt} = 3 mm/\text{sec}ond$	1	
	Differentiate A = πr^2 to get $\frac{dA}{dr} = 2\pi r$	1	
	Use $\frac{dA}{dt} = \frac{dA}{dr} X \frac{dr}{dt}$	1	
	30 π mm^2/sec or 94.248 mm^2/sec or 94.26 mm^2/sec	1	
(b)	Solve the two equations $3y = x$ and $x = y^2 - 4$ to get **A(12, 4)**	1	
	Volume generated by $3y = x$. V_1 **= 192** π or $\frac{1}{3}\pi(12)^2(4)$ or $\int_0^4 \pi(3y)^2 dy$	1	
	Volume generated by $x = y^2 - 4$ by using integration. $\int^*(y^4 - 8y^2 + 16)dy$ or $\left[\frac{y^5}{5} - \frac{8y^3}{3} + 16y\right]$	1	
	Use limit $\int_2^4$ into $\left[\frac{y^5}{5} - \frac{8y^3}{3} + 16y\right]$	1	
	$V_1 - V_2 = 192\pi - \frac{1216}{15}\pi$	1	
	$\frac{1664}{15}\pi$ unit^3 or 348.51 unit^3 or 348.55 unit^3	1	10

Q	Solution and notes	Marks	
9(a)	$y = -\frac{1}{2}x + \frac{11}{2}$	1	
	$m_{CD} = -\frac{1}{2}$	1	
	$k = 1$	1	
(b)	Using $m_1 \times m_2 = -1$ $m_{AD} = 2$	1	
	Equation AD : y = 2x + 32	1	
	Solving simultaneous equation: $y = 2x + 3$ *and* $2y + x - 11 = 0$	1	
	A (1, 5)	1	
(c)	$\left[\sqrt{(x-7)^2 + (y-2)^2}\right]^2 + \left[\sqrt{(x+1)^2 + (y-1)^2}\right]^2 = \left[\sqrt{(7+1)^2 + (2-1)^2}\right]^2$	1, 1	
	$2x^2 - 12x + 2y^2 - 6y - 10 = 0$ $x^2 + y^2 - 6x - 3y - 5 = 0$	1	
	Or $m_{BP} \times m_{PD} = -1 \Rightarrow \frac{y-2}{x-7} \times \frac{y-1}{x+1} = -1$ $x^2 + y^2 - 6x - 3y - 5 = 0$		10
10	a) $\frac{\pi}{3}$ rad. or 1.047 rad.	1	
	b) $S_{CD} = 9(1.047)$ $S_{CE} = S_{DE} = 3(2 \times 1.047)$	1	
	Perimeter = 9(1.047) + 2 [3(2 x 1.047)] = 21.987	1 1	
	c) i) $\frac{1}{2}(9)^2(1.047)$ or equivalent	1	
	= 42.404 cm^2 .	1	
	ii) $\frac{1}{2}(9)^2(1.047)$ - $\frac{1}{2}(6)^2 \sin 60$ - $2\left(\frac{1}{2} \times 3^2 \times 2(1.047)\right)$	1,1, 1	
	= 7.969 cm^2 or 7.970 cm^2	1	10

Q	Solution and notes	Marks	
11	(a) P (x < 1500)		
	= p (z < $\frac{1500-1300}{100}$)	1	
	= p (z < 2)		
	= 0.97725	1	
	(b) P (1000 < x < 1400)		
	= P $\left(\frac{1000-1300}{100} < Z < \frac{1400-1300}{100}\right)$	1,1	
	= p (-3 < Z < 1)		
	= 0.83999	1	
	The number of hens = 0.83999 x 2000 = 1679.98	1	
	= 1679	1	
	(c) P (x > k) = 5% ➔ p $\left(Z > \frac{k-1300}{100}\right)$ = 0.05	1	
	$\frac{k-1300}{100} = 1.96$	1	
	k = 1496	1	
			10
12	(a) ½ (8) (9) sin RPQ = 20	1	
	$\angle$ RPQ = 33.75^o	1	
	(RQ) ^{2} = 8^2 + 9^2 – 2(8)(9) cos 33.75^o	1	
	RQ = 5.027	1	
	(b) (6)^2 = (5.027)^2 + (7)^2 – 2(5.027)(7) cos $\angle$ VQR	1	
	$\angle$ VQR = 57.06^o	1	
	(c) 9^2=8^2 +(5.027) ^{2} –2(8)(5.027)cos $\angle$ RQP or $\frac{\sin\angle RQP}{9} = \frac{\sin 33.75}{5.027}$	1	
	$\angle$ RQP = 84.10 ^{o} or 84.07^o	1	
	(VP)^2 = 7^2 + 8^2 – 2(7)(8) cos (84.07^o – 57.06^o)	1	
	VP = 2.364 or 2.366	1	10

Q	Solution and notes	Marks	
13	(a) (i) Using $\frac{P_{04}}{P_{02}} \times 100$	1	
	P_{02} = RM 27.83	1	
	(ii) Using $\frac{P_{06}}{P_{02}} \times 100 = \frac{P_{06}}{P_{04}} \times \frac{P_{04}}{P_{02}} \times 100$	1	
	= 1.3 x 1.2 x 100	1	
	= 156	1	
	(b) (i) $\frac{105(16)+150(12)+120(x)+100(5)+130(9)}{16+12+x+5+9} = 122.2$	1	
	x = 8	1	
	(ii) Composite index for 2004 based on 2002 = $\frac{110(16)+115(12)+105(its'\ x)+125(5)+120(9)}{50} = 113.7$	1√	
	Using $\frac{P_{04}}{RM\,285} \times 100 = 113.7$	1	
	RM 324.05	1√	10
14	(a) $x + y \le 70$	1	
	$180x + 90y \le 5400$ or $2x + y \le 60$	1	
	$3x + 4y \le 120$	1	
	(b) 		
	At least one straight line correct	1	
	All three lines correct	1	
	Region R	1	10

Q	Solution and notes	Marks	
	(c) (i) (24,12) is labeled or line $540x+300y = C$ is drawn	1	
	24 acres of soybeans and 12 acres of wheat	1	
	(ii) Max profit = 540 x 24 +300 x 12	1	
	= RM 16,560	1	
15	(a) $s = \int v dt = \int (3t^2 - 12t - 15)\, dt$	1	
	$s = t^3 - 6t^2 - 15t + c$		
	$x = t^3 - 6t^2 - 15t + c$		
	$t = 1, s = -22 \rightarrow -22 = (1)^3 - 6(1)^2 - 15(1) + c$	1	
	$-22 + 20 = c$		
	$c = -2$		
	$\therefore x = t^3 - 6t^2 - 15t - 2$	1	
	(b) $S_3 = (3)^3 - 6(3)^2 - 15(3) - 2 = -74$	1	
	$S_2 = (2)^3 - 6(2)^2 - 15(2) - 2 = -48$		
	Distance travelled during the third second = $S_3 - S_2$		
	= 74 - 48		
	= 26 m	1	
	(c) V_{max} ➔ a = 0 , $v = 3t^2 - 12t - 15$		
	$a = 6t - 12 = 0$		
	$t = 2$	1	
	$t = 2,\ v = 3(2)^2 - 12(2) - 15$	1	
	$= -27$	1	
	(d)		
	$v < 0$		
	$3t^2 - 12t - 15 < 0$	1	
	$t^2 - 4t - 5 < 0$		
	$(t+1)(t-5) < 0$		
	$0 < t < 5$	1	
			10