

NAMA : _____

SULIT

KELAS : _____



JABATAN PELAJARAN NEGERI SABAH

**SIJIL PELAJARAN MALAYSIA
EXCEL 2
ADDITIONAL MATHEMATICS
PAPER 1
SEPT 2009**

3472/1

2 Jam

Dua jam

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

**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.*

This paper consists of 17 printed pages.

**[Lihat sebelah
SULIT**

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

$$1. \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2. \quad a^m \times a^n = a^{m+n}$$

$$3. \quad a^m \div a^n = a^{m-n}$$

$$4. \quad (a^m)^n = a^{mn}$$

$$5. \quad \log_a mn = \log_a m + \log_a n$$

$$6. \quad \log_a \frac{m}{n} = \log_a m - \log_a n$$

$$7. \quad \log_a m^n = n \log_a m$$

$$8. \quad \log_a b = \frac{\log_c b}{\log_c a}$$

$$9. \quad T_n = a + (n-1)d$$

$$10. \quad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$11. \quad T_n = ar^{n-1}$$

$$12. \quad S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, r \neq 1$$

$$13. \quad S_\infty = \frac{a}{1 - r}, |r| < 1$$

CALCULUS

$$1. \quad y = uv, \quad \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$2. \quad y = \frac{u}{v}, \quad \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

$$3. \quad \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

4. Area under a curve

$$= \int_a^b y \, dx \quad \text{or}$$

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

5. Volume generated

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

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

1.
$$\bar{x} = \frac{\sum x}{N}$$

2.
$$\bar{x} = \frac{\sum fx}{\sum f}$$

3.
$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N}} = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$$

4.
$$\sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}} = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$$

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

6.
$$I = \frac{Q_1}{Q_0} \times 100$$

7.
$$\bar{I} = \frac{\sum W_i I_i}{\sum W_i}$$

8.
$${}^n P_r = \frac{n!}{(n-r)!}$$

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

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

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

12. Mean, $\mu = np$

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

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

GEOMETRY

1. Distance

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

2. Midpoint

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

3. A point dividing a segment of a line

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

4. Area of triangle =

$$\frac{1}{2} |(x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3)|$$

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

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

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. $\operatorname{cosec}^2 A = 1 + \cot^2 A$
6. $\sin 2A = 2 \sin A \cos A$
7. $\cos 2A = \cos^2 A - \sin^2 A$
 $= 2 \cos^2 A - 1$
 $= 1 - 2 \sin^2 A$
8. $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
9. $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
10. $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$
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

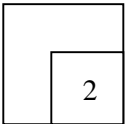
Answer **all** questions.
Jawab **semua** soalan.

1 Given the function $k(x) = |2x - 5|$, find the value of $k(-1)$.

Diberi fungsi $k(x) = |2x - 5|$, cari nilai bagi $k(-1)$.

[2 marks]
[2 markah]

1



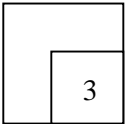
Answer / Jawapan :

2 Given the function $f(x) = x - 3$ and composite function $gf(x) = 2x - 5$, find the function g .

Diberi fungsi $f(x) = x - 3$ dan fungsi gubahan $gf(x) = 2x - 5$, cari fungsi g .

[3 marks]
[3 markah]

2



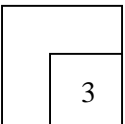
Answer / Jawapan :

3 Given $f(x) = 3 - 4x$ and $f^{-1}(x) = kx + m$, find the value of m and of k .

Diberi $f(x) = 3 - 4x$ dan $f^{-1}(x) = kx + m$, cari nilai m dan k .

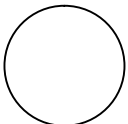
[3 marks]
[3 markah]

3



Answer / Jawapan : $m =$

$k =$



4 (a) Express the quadratic equation $2(x+1)^2 = 5x+3$ in the general form.

Ungkapkan persamaan kuadratik $2(x+1)^2 = 5x+3$ dalam bentuk am.

(b) Given that 4 is one of the roots of the quadratic equation $2x^2 - hx + 4 = 0$, find the value of h .

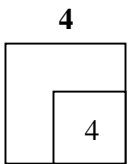
Diberi 4 ialah salah satu daripada punca-punca persamaan kuadratik $2x^2 - hx + 4 = 0$, cari nilai bagi h .

[4 marks]

[4 markah]

Answer / Jawapan : (a)

(b)



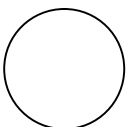
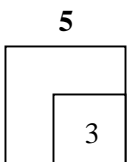
5 Given that the graph of the quadratic function $f(x) = x^2 - 2x + p$ does not intersect the x -axis. Find the range of values of p .

Diberi graf bagi fungsi kuadratik $f(x) = x^2 - 2x + p$ tidak menyilang paksi- x . Cari julat bagi nilai p .

[3 marks]

[3 markah]

Answer / Jawapan :



For
Examiner's
Use

6 Diagram 1 shows the graph of the function $y = -(x - k)^2 - 3$, where k is a constant.

Rajah 1 menunjukkan graf bagi fungsi $y = -(x - k)^2 - 3$, dengan keadaan k ialah pemalar.

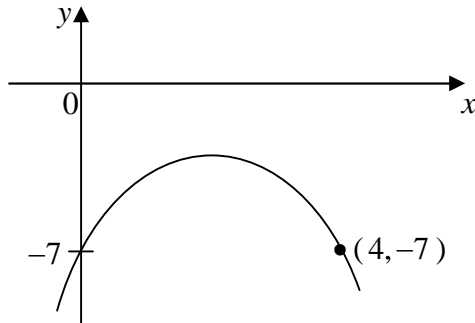


Diagram 1
Rajah 1

Find

Cari

- a) the value of k ,
nilai bagi k ,
- b) the equation of the axis of symmetry,
persamaan paksi simetri,
- c) the coordinates of the maximum point.
koordinat titik maksimum.

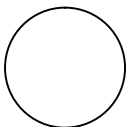
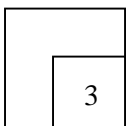
[3 marks]
[3 markah]

Answer / Jawapan : (a) $k = \dots\dots\dots$

(b) $\dots\dots\dots$

(c) $\dots\dots\dots$

6



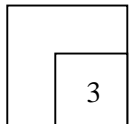
7 Given that $\log_a 5 = p$ and $\log_a 7 = q$, express $\log_{35} a$ in terms of p and q .

Diberi $\log_a 5 = p$ dan $\log_a 7 = q$, ungkapkan $\log_{35} a$ dalam sebutan p dan q .

[3 marks]
[3 markah]

For
Examiner's
Use

7



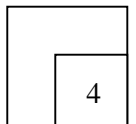
Answer / Jawapan :

8 Solve the equation $\frac{1}{\sqrt{16^{x-1}}} = 256^{x+1}$.

Selesaikan persamaan $\frac{1}{\sqrt{16^{x-1}}} = 256^{x+1}$.

[4 marks]
[4 markah]

8



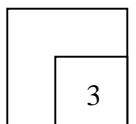
Answer / Jawapan :

9 A point P moves such that its distance from point $A(2, 7)$ is always 4 units. Find the equation of the locus of P .

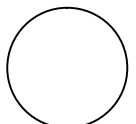
Suatu titik P bergerak dengan keadaan jaraknya dari titik $A(2, 7)$ adalah sentiasa 4 unit. Cari persamaan lokus bagi P .

[3 marks]
[3 markah]

9



Answer / Jawapan :



For
Examiner's
Use

- 10 In Diagram 2, the straight line AB has an equation $\frac{x}{3} + \frac{y}{4} = 1$. Point A lies on the x -axis and point B lies on the y -axis.

Dalam Rajah 2, garis lurus AB mempunyai persamaan $\frac{x}{3} + \frac{y}{4} = 1$. Titik A terletak pada paksi- x dan titik B terletak pada paksi- y .

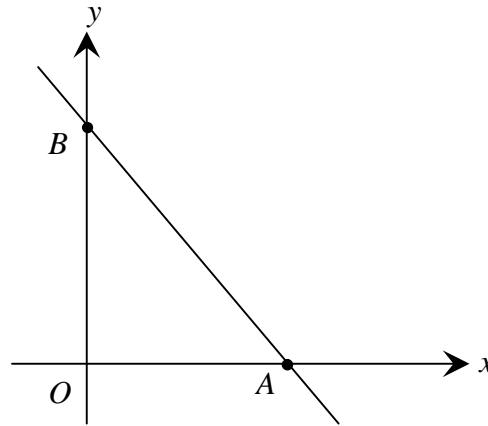


Diagram 2
Rajah 2

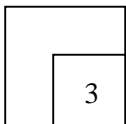
Find the equation of the straight line perpendicular to AB and passing through B .

Cari persamaan garis lurus yang berserenjang dengan AB dan melalui B .

[3 marks]

[3 markah]

10



Answer / Jawapan :

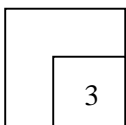
- 11 A set of data consists of four numbers. The sum of the numbers is 28 and the standard deviation is $2\sqrt{3}$. Find the sum of squares of the numbers.

Satu set data mengandungi empat nombor. Hasil tambah bagi nombor-nombor itu ialah 28 dan sisihan piawainya ialah $2\sqrt{3}$. Cari hasil tambah kuasa dua nombor-nombor itu.

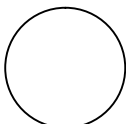
[3 marks]

[3 markah]

11



Answer / Jawapan :



12

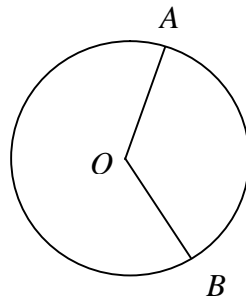


Diagram 3
Rajah 3

Diagram 3 shows a circle with centre O . Given that the arc of the minor sector AOB is 10 cm and $\angle AOB$ of the major sector AOB is $\frac{4}{3}\pi$ rad.

Rajah 3 menunjukkan satu bulatan yang berpusat di O . Diberi bahawa panjang lengkok bagi sektor minor AOB adalah 10 cm dan $\angle AOB$ bagi sektor major AOB adalah $\frac{4}{3}\pi$ rad.

Find the length of radius, in cm, in terms of π .

[3 marks]

Cari panjang jejari, dalam cm, dalam sebutan π .

[3 markah]

For
Examiner's
Use

12

3

Answer / Jawapan :

13 Differentiate $x\sqrt{2x+1}$ with respect to x .

Bezakan $x\sqrt{2x+1}$ terhadap x .

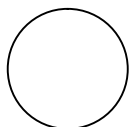
[3 marks]

[3 markah]

13

3

Answer / Jawapan :



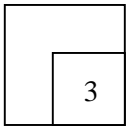
For
Examiner's
Use

14 A point P lies on the curve $y = \frac{1}{2}(2x - 5)^2$. Given that the tangent to the curve at P is parallel to the straight line $2x + y + 1 = 0$. Find the coordinates of P .

Suatu titik P terletak pada lengkung $y = \frac{1}{2}(2x - 5)^2$. Diberi bahawa tangen kepada lengkung itu pada P adalah selari dengan garis lurus $2x + y + 1 = 0$. Cari koordinat bagi P .

[3 marks]
[3 markah]

14



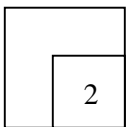
Answer / Jawapan :

15 Given a geometric progression $x, 3, \frac{9}{x}, y, \dots$, express y in terms of x .

Diberi suatu janjang geometri $x, 3, \frac{9}{x}, y, \dots$, ungkapkan y dalam sebutan x .

[2 marks]
[2 markah]

15



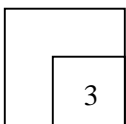
Answer / Jawapan :

16 The first three terms of an arithmetic progression are $3x - 1, 4x + 1$ and $6x - 3$. Find the first term of the arithmetic progression.

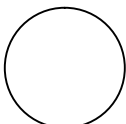
Tiga sebutan pertama suatu janjang aritmetik ialah $3x - 1, 4x + 1$ dan $6x - 3$. Cari sebutan pertama janjang aritmetik itu.

[3 marks]
[3 markah]

16



Answer / Jawapan :



- 17 Express the recurring decimal 0.474747... as a fraction in its simplest form.
 Ungkapkan perpuluhan jadi semula 0.474747... dalam bentuk pecahan yang termudah.

[3 marks]
 [3 markah]

For
 Examiner's
 Use

17

3

Answer / Jawapan :

18

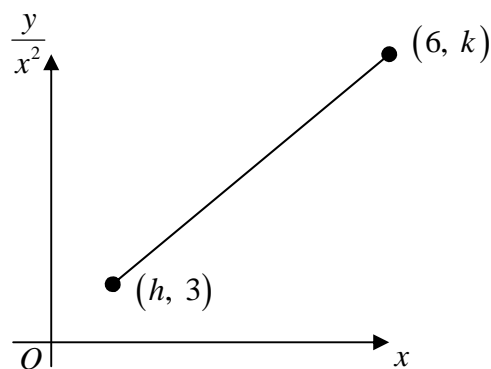


Diagram 4
 Rajah 4

Diagram 4 shows a straight-line graph of $\frac{y}{x^2}$ against x .

Given that $y = 2x^2 + x^3$, calculate the value of h and of k .

Rajah 4 menunjukkan satu garis lurus $\frac{y}{x^2}$ melawan x .

Diberi bahawa $y = 2x^2 + x^3$, hitung nilai h dan nilai k .

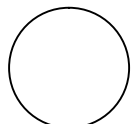
[3 marks]
 [3 markah]

18

3

Answer / Jawapan : $h =$

$k =$



For
Examiner's
Use

19 Given that $\int_1^4 g(x)dx = 5$, find

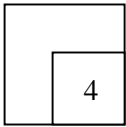
Diberi bahawa $\int_1^4 g(x)dx = 5$, cari

(a) $\int_4^1 g(x)dx,$

(b) $\int_1^4 [2g(x) - 3x]dx.$

[4 marks]
[4 markah]

19



Answer / Jawapan : (a)

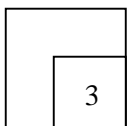
(b)

20 Given $\underline{a} = \begin{pmatrix} 2 \\ 5 \end{pmatrix}$ and $\underline{b} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$, find the unit vector in the direction of $3\underline{a} + \underline{b}$.

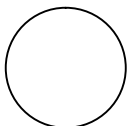
Diberi $\underline{a} = \begin{pmatrix} 2 \\ 5 \end{pmatrix}$ dan $\underline{b} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$, cari vektor unit dalam arah $3\underline{a} + \underline{b}$.

[3 marks]
[3 markah]

20



Answer / Jawapan :



For
Examiner's
Use

21 Diagram 5 shows a parallelogram $OPQR$ where $\vec{OP} = \underline{a}$ and $\vec{OQ} = \underline{b}$. It is given that Y is the midpoint of QR , express \vec{PY} in terms of \underline{a} and \underline{b} .

Rajah 5 menunjukkan segi empat selari $OPQR$ di mana $\vec{OP} = \underline{a}$ dan $\vec{OQ} = \underline{b}$.

Diberi bahawa Y adalah titik tengah QR , ungkapkan \vec{PY} dalam sebutan \underline{a} dan \underline{b} .

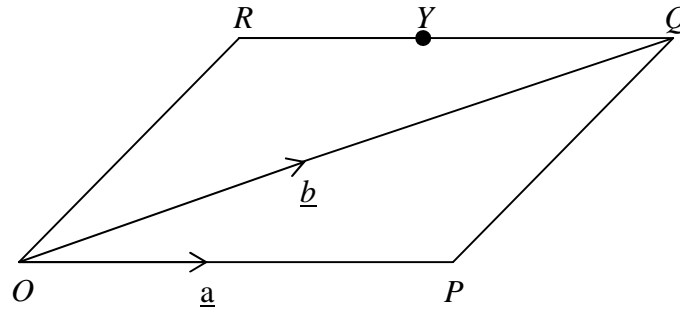


Diagram 5
Rajah 5

[3 marks]
[3 markah]

Answer / Jawapan :

21

3

22 Solve the equation $\cos 2x - 5 \sin x = 3$, for $0^\circ \leq x \leq 360^\circ$.

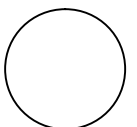
Selesaikan persamaan $\cos 2x - 5 \sin x = 3$, bagi $0^\circ \leq x \leq 360^\circ$.

[4 marks]
[4 markah]

Answer / Jawapan :

22

4



For
Examiner's
Use

23 A disciplinary committee consisting of 6 teachers is to be chosen from 7 male teachers and 5 female teachers.

Satu jawatankuasa lembaga disiplin terdiri daripada 6 orang guru yang dipilih daripada kalangan 7 orang guru lelaki dan 5 orang guru perempuan.

Calculate the number of different committees that can be formed if

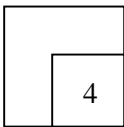
Hitung bilangan cara yang berlainan jawatankuasa itu boleh dibentuk jika

- (a) there is no restriction,
tiada syarat dikenakan,
- (b) the committee contains at least 4 female teachers.
jabatankuasa itu mempunyai sekurang-kurangnya 4 orang guru perempuan.

[4 marks]

[4 markah]

23



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

(b).....

24 A badminton match will end if any one of the players wins two sets out of the three sets. The probability that Rashid will beat Hashim in any set is $\frac{3}{5}$.

Satu perlawanan badminton akan tamat jika salah seorang pemain menang dua set daripada tiga set. Kebarangkalian bahawa Rashid akan mengalahkan

Hashim dalam mana-mana set ialah $\frac{3}{5}$.

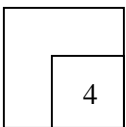
Find the probability that
Cari kebarangkalian bahawa

- (a) the game will end in two sets only,
perlawanan akan berakhir dalam dua set sahaja,
- (b) Hashim will win the match in three sets.
Hashim akan menang perlawanan dalam tiga set.

[4 marks]

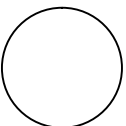
[4 markah]

24



Answer / Jawapan : (a)

(b)



SULIT

17

3472/1

25 X is a random variable of a normal distribution with a mean of 50 and a standard deviation of $2 \cdot 4$.

X ialah pembolehubah rawak suatu taburan normal dengan min 50 dan sisihan piawai $2 \cdot 4$.

Find

Carikan

(a) the Z score if $X = 54$,

skor Z jika $X = 54$,

(b) $P(43 \leq X \leq 54)$.

[4 marks]

[4 markah]

*For
Examiner's
Use*

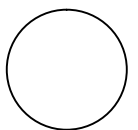
Answer / Jawapan : (a)

(b)

25

4

END OF QUESTION PAPER
KERTAS SOALAN TAMAT



Skema jawapan Kertas 1 Matematik Tambahan SPM

Number	Solution and Marking Scheme	Sub Marks	Full Marks
1	7 $ 2(-1) - 5 $	2 B1	2
2	$g(x) = 2x + 1$ $g(y) = 2(x + 3) - 5$ $y = x + 3$	3 B2 B1	3
3	$m = \frac{3}{4}$ and $k = -\frac{1}{4}$ $m = \frac{3}{4}$ or $k = -\frac{1}{4}$ $f^{-1}(x) = \frac{3}{4} - \frac{x}{4}$	3 B2 B1	3
4 (a)	$2x^2 - x - 1 = 0$ $2(x^2 + 2x + 1) = 5x + 3$	2 B1	
(b)	$h = 9$ $2(4)^2 - h(4) + 4 = 0$	2 B1	4
5	$p > 1$ $-4p < -4$ $(-2)^2 - 4(1)(p) < 0$	3 B2 B1	3
6 (a) (b) (c)	$k = 2$ $x = 2$ $(2, -3)$	1 1 1	3
7	$\frac{1}{p+q}$ $\frac{1}{\log_a 5 + \log_a 7}$ $\frac{1}{\log_a 35}$	3 B2 B1	3
9	$x^2 + y^2 - 4x - 14y + 37 = 0.$ $(x - 2)^2 + (y - 7)^2 = 4^2$ <i>or equivalent</i> $x^2 - 4x + 4 + y^2 - 14y + 49 = 16$ $AP = 4$ or $\sqrt{(x-2)^2 + (y-7)^2} = 4$	3 B2 B1	3

Number	Solution and Marking Scheme	Sub Marks	Fu Mar
10	$y = \frac{3}{4}x + 4$ <p>Gradient of line perpendicular to AB, $m = \frac{3}{4}$</p> <p>Gradient of AB: $-\frac{4}{3}$</p>	<p>3</p> <p>B2</p> <p>B1</p>	3
11	<p>244</p> $2\sqrt{3} = \sqrt{\frac{\sum x^2}{4} - 7^2}$ <p>$\bar{x} = 7$</p>	<p>3</p> <p>B2</p> <p>B1</p>	3
12	$r = \frac{15}{\pi} \text{ cm}$ $r = \frac{10}{\frac{2}{3}\pi}$ <p>$\angle AOB = 2\pi - \frac{4}{3}\pi$ OR $\frac{2}{3}\pi$</p>	<p>3</p> <p>B2</p> <p>B1</p>	3
13	$\frac{3x+1}{\sqrt{2x+1}}$ $\sqrt{2x+1} + \frac{x}{\sqrt{2x+1}}$ $\sqrt{2x+1} + x\left(\frac{1}{2}\right)(2)(2x+1)^{-\frac{1}{2}}$	<p>3</p> <p>B2</p> <p>B1</p>	3
14	<p>$P\left(2, \frac{1}{2}\right)$</p> <p>$2(2x-5) = -2$ or $x = 2$</p> <p>$\frac{dy}{dx} = 2(2x-5)$</p>	<p>3</p> <p>B2</p> <p>B1</p>	3
15	$y = \frac{27}{x^2}$ <p>$y = x\left(\frac{3}{x}\right)^3$ or $\frac{9}{x}\left(\frac{3}{x}\right)$ or $a = x$ and $r = \frac{3}{x}$</p>	<p>2</p> <p>B1</p>	2

Number	Solution and Marking Scheme	Sub Marks	Fu Mar
16	17 $x = 6$ $(4x+1) - (3x-1) = (6x-3) - (4x+1)$	3 B2 B1	3
17	$\frac{47}{99}$ $\frac{0.47}{1-0.01}$ $0.47 + 0.0047 + 0.000047 + \dots$	3 B2 B1	3
18	$k = 8, h = 1$ $k = 1(6) + 2$ or $3 = 1(h) + 2$ $\frac{y}{x^2} = 2 + x$	3 B2 B1	3
19 (a)	-5	1	
(b)	-12.5 $10 - \left[\frac{3}{2} x^2 \right]_1^4$ $2 \int_1^4 g(x) dx - \int_1^4 3x dx$	3 B2 B1	4
20	$\frac{10i}{\sqrt{269}} + \frac{13j}{\sqrt{269}}$ $ 3\underline{a} + \underline{b} = \sqrt{10^2 + 13^2} = \sqrt{269}$ $\begin{pmatrix} 10 \\ 13 \end{pmatrix}$	3 B2 B1	3
21	$\overline{PY} = \underline{b} - \frac{3}{2}\underline{a}$ $\overline{PY} = -\underline{a} + \underline{b} + \frac{1}{2}(-\underline{a})$ $\overline{PQ} = -\underline{a} + \underline{b}$ or $\overline{QY} = -\frac{1}{2}\underline{a}$	3 B2 B1	3
22	$210^\circ, 330^\circ$ $\sin x = -\frac{1}{2}, \sin x = -2$ (both) $(2 \sin x + 1)(\sin x + 2) = 0$	4 B3 B2	

Number	Solution and Marking Scheme	Sub Marks	Full Marks
	$\cos 2x = 1 - 2\sin^2 x$	B1	4
23 (a)	924	1	
(b)	112 ${}^5C_4 \times {}^7C_2 + {}^5C_3 \times {}^7C_1$ ${}^5C_4 \times {}^7C_2$ or ${}^5C_3 \times {}^7C_1$	3	
		B2	4
		B1	
24 (a)	$\frac{13}{25}$ $\frac{3}{5} \times \frac{3}{5} + \frac{2}{5} \times \frac{2}{5}$	2	
		B1	
(b)	$\frac{24}{125}$ $2 \times \left(\frac{2}{5}\right)^2 \left(\frac{3}{5}\right)$	2	
		B1	4
25 (a)	1.667 $Z = \frac{54 - 50}{2.4}$	2	
		B1	
(b)	0.9505 $1 - 0.00177 - 0.04776$ $P\left(\frac{43 - 50}{2.4} \leq Z \leq \frac{54 - 50}{2.4}\right)$	2	
		B1	4

SULIT

NAMA : _____

KELAS : _____



JABATAN PELAJARAN NEGERI SABAH

**SIJIL PELAJARAN MALAYSIA
EXCEL 2
ADDITIONAL MATHEMATICS
Paper 2
Sept 2009**

3472/2

2 hours 15 minutes

Two hours thirty minutes

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 17 printed pages.

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

ALGEBRA

$$1. \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2. \quad a^m \times a^n = a^{m+n}$$

$$3. \quad a^m \div a^n = a^{m-n}$$

$$4. \quad (a^m)^n = a^{mn}$$

$$5. \quad \log_a mn = \log_a m + \log_a n$$

$$6. \quad \log_a \frac{m}{n} = \log_a m - \log_a n$$

$$7. \quad \log_a m^n = n \log_a m$$

$$8. \quad \log_a b = \frac{\log_c b}{\log_c a}$$

$$9. \quad T_n = a + (n-1)d$$

$$10. \quad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$11. \quad T_n = ar^{n-1}$$

$$12. \quad S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, r \neq 1$$

$$13. \quad S_\infty = \frac{a}{1 - r}, |r| < 1$$

CALCULUS

$$1. \quad y = uv, \quad \frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$2. \quad y = \frac{u}{v}, \quad \frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

$$3. \quad \frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$$

4. Area under a curve

$$= \int_a^b y \, dx \text{ or}$$

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

5. Volume generated

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

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

STATISTICS

$$1. \quad \bar{x} = \frac{\sum x}{N}$$

$$2. \quad \bar{x} = \frac{\sum fx}{\sum f}$$

$$3. \quad \sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{N}} = \sqrt{\frac{\sum x^2}{N} - \bar{x}^2}$$

$$4. \quad \sigma = \sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}} = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$$

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

$$6. \quad I = \frac{Q_1}{Q_0} \times 100$$

$$7. \quad \bar{I} = \frac{\sum W_i I_i}{\sum W_i}$$

$$8. \quad {}^n P_r = \frac{n!}{(n-r)!}$$

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

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

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

$$12. \quad \text{Mean, } \mu = np$$

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

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

GEOMETRY

1. Distance

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

2. Midpoint

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

3. A point dividing a segment of a line

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

4. Area of triangle =

$$\frac{1}{2} |(x_1 y_2 + x_2 y_3 + x_3 y_1) - (x_2 y_1 + x_3 y_2 + x_1 y_3)|$$

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

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

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. $\operatorname{cosec}^2 A = 1 + \cot^2 A$
6. $\sin 2A = 2 \sin A \cos A$
7. $\cos 2A = \cos^2 A - \sin^2 A$
 $= 2 \cos^2 A - 1$
 $= 1 - 2 \sin^2 A$
8. $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
9. $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
10. $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$
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.
Jawab semua soalan.

- 1** Solve the following simultaneous equations :

Selesaikan persamaan serentak berikut :

$$2(x - y) = x + y - 1 = 2x^2 - 11y^2 \quad [5 \text{ marks}]$$

[5 markah]

- 2** A quadratic function $f(x) = -x^2 + kx - 8$ has a maximum point $(2, h)$ and intersects the y -axis at point A .

Satu fungsi kuadratik $f(x) = -x^2 + kx - 8$ mempunyai titik maksimum $(2, h)$ dan menyalang paksi- y pada titik A .

- (a) State the coordinates of A . [1 mark]

Nyatakan koordinat titik A . [1 markah]

- (b) Find the value of k and of h . [4 marks]

Cari nilai k dan nilai h . [4 markah]

- (c) Determine the range of values of x , if $f(x) \leq -5$. [3 marks]

Tentukan julat nilai bagi x , jika $f(x) \leq -5$. [3 markah]

- 3 A string of length x cm is cut into n pieces, with the length of each piece forming an arithmetic progression. The two shortest pieces are of lengths 3 cm and 6 cm.

Seutas benang dengan panjang x cm telah dipotong kepada n bahagian, dengan panjang setiap bahagian membentuk suatu jantang aritmetik. Panjang dua bahagian yang terpendek ialah 3 cm dan 6 cm.

If $x = 630$ cm, find

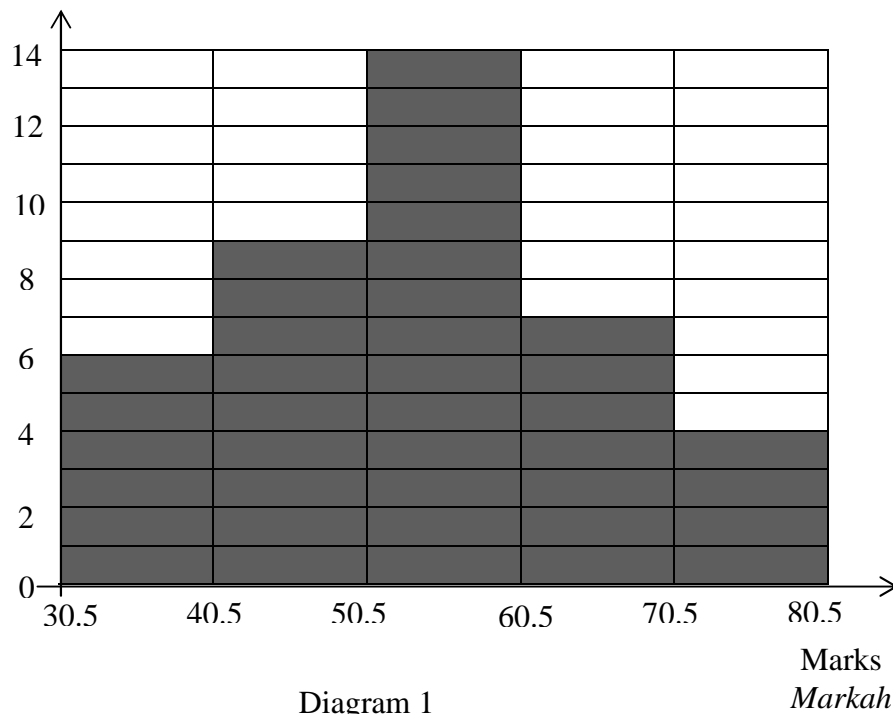
Jika $x = 630$ cm, cari

- (a) the value of n , [4 marks]
nilai n , [4 markah]
- (b) the length of the longest piece. [2 marks]
panjang bahagian yang terpanjang itu. [2 markah]
- 4 (a) Sketch the graph of $y = -2 \sin 2x$ for $0 \leq x \leq 2\pi$. [4 marks]
Lakarkan graf bagi $y = -2 \sin 2x$ untuk $0 \leq x \leq 2\pi$. [4 markah]
- (b) Hence, using the same axes, sketch a suitable straight line to find the number of solutions for the equation $x + 4\pi \sin 2x = 0$ for $0 \leq x \leq 2\pi$. State the number of solutions. [3 marks]
Seterusnya, dengan menggunakan paksi yang sama, lakarkan garis lurus yang sesuai untuk mencari bilangan penyelesaian bagi persamaan $x + 4\pi \sin 2x = 0$ untuk $0 \leq x \leq 2\pi$. Nyatakan bilangan penyelesaian itu. [3 markah]

- 5 Diagram 1 is a histogram which represents the distribution of the marks obtained by 40 students in a test.

Rajah 1 ialah histogram yang mewakili taburan markah bagi 40 orang murid dalam suatu ujian.

Number of Pupils
Bilangan Murid



- (a) Without using an ogive, calculate the median mark. [3 marks]
Tanpa menggunakan ogif, hitungkan markah median. [3 markah]
- (b) Calculate the standard deviation of the distribution. [4 marks]
Hitungkan sisihan piawai bagi taburan markah itu. [4 markah]

6 Solution by scale drawing will not be accepted.

Penyelesaian secara lukisan berskala tidak diterima.

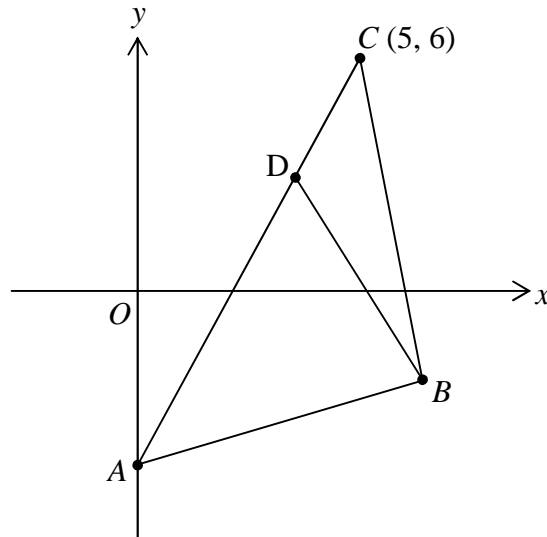


Diagram 2
Rajah 2

Diagram 2 shows a triangle ABC with point A on the y -axis. The equation of the straight line ADC is $y - 2x + 4 = 0$ and the equation of the straight line BD is $2y + x - 12 = 0$.

Rajah 2 menunjukkan sebuah segitiga ABC dengan titik A terletak pada paksi- y . Persamaan garis lurus ADC ialah $y - 2x + 4 = 0$ dan persamaan garis lurus BD ialah $2y + x - 12 = 0$.

Find

Cari

- | | |
|-------------------------------------|------------|
| (a) coordinates of A , | [1 mark] |
| <i>koordinat A,</i> | [1 markah] |
| (b) coordinates of D , | [3 marks] |
| <i>koordinat D,</i> | [3 markah] |
| (c) the ratio $AD : DC$. | [3 marks] |
| <i>nisbah $AD : DC$.</i> | [3 markah] |

Section B
Bahagian B

[40 marks]
[40 markah]

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

- 7 Table 1 shows the values of two variables, x and y , obtained from an experiment. Variables x and y are related by the equation $y = pk^{\sqrt{x}}$, where p and k are constants.

Jadual 1 menunjukkan nilai-nilai bagi dua pembolehubah, x dan y , yang diperoleh daripada satu eksperimen. Pembolehubah x dan y dihubungkan oleh persamaan $y = pk^{\sqrt{x}}$, dengan keadaan p dan k ialah pemalar.

x	1	4	9	16	25	36
y	1.80	2.70	4.05	6.08	9.11	13.67

Table 1
Jadual 1

- (a) Plot $\log_{10} y$ against \sqrt{x} , using a scale of 2 cm to 1 unit on the \sqrt{x} -axis and 2 cm to 0.1 unit on the $\log_{10} y$ -axis.
Hence, draw the line of best fit. [5 marks]

Plot $\log_{10} y$ melawan \sqrt{x} , dengan menggunakan skala 2 cm kepada 1 unit pada paksi- \sqrt{x} dan 2 cm kepada 0.1 unit pada paksi- $\log_{10} y$. Seterusnya, lukis garis lurus penyuaiian terbaik. [5 markah]

- (b) Use your graph in 7(a) to find the value of
Gunakan graf anda di 7(a) untuk mencari nilai
- (i) p ,
 - (ii) k .

[5 marks]

[5 markah]

- 8 Diagram 3 shows a parallelogram $OABC$. Point P is the midpoint of AB and OP intersects with AC at Q . Given that $\overrightarrow{OA} = 3\mathbf{i} + 4\mathbf{j}$ and $\overrightarrow{OC} = 6\mathbf{i} + \mathbf{j}$.

Rajah 3 menunjukkan segiempat selari $OABC$. Titik P ialah titik tengah AB dan OP bersilang dengan AC di Q . Diberi bahawa $\overrightarrow{OA} = 3\mathbf{i} + 4\mathbf{j}$ dan $\overrightarrow{OC} = 6\mathbf{i} + \mathbf{j}$.

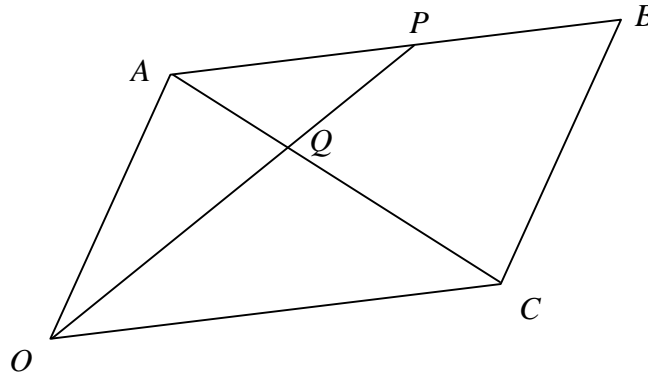


Diagram 3
Rajah 3

- (a) Express, in terms of \mathbf{i} and \mathbf{j} ,

Ungkapkan, dalam sebutan \mathbf{i} dan \mathbf{j} ,

- (i) \overrightarrow{AC} ,
(ii) \overrightarrow{OP} .

[3 marks]

[3 markah]

- (b) Find the unit vector in the direction of \overrightarrow{OB} .

[3 marks]

Carikan vektor unit pada arah \overrightarrow{OB} .

[3 markah]

- (c) Given that $\overrightarrow{OQ} = \overrightarrow{OA} + h\overrightarrow{AC}$ and $\overrightarrow{OQ} = k\overrightarrow{OP}$ such that h and k are constants, find the value of h and of k .

[4 marks]

Diberi $\overrightarrow{OQ} = \overrightarrow{OA} + h\overrightarrow{AC}$ dan $\overrightarrow{OQ} = k\overrightarrow{OP}$ dengan keadaan h dan k adalah pemalar, cari nilai h dan nilai k .

[4 markah]

- 9 (a) In a Mathematics quiz, each participant is required to answer 10 questions. The probability that a participant gives a correct answer is p . It is found that the mean number of correct answers given by a participant is 4.2.

Dalam suatu kuiz Matematik, setiap peserta dikehendaki menjawab 10 soalan. Kebarangkalian seorang peserta dapat memberi jawapan betul ialah p . Diketahui bahawa min bilangan jawapan betul yang diberi peserta ialah 4.2.

- (i) Find the value of p .

Cari nilai p .

- (ii) If a participant is chosen at random, calculate the probability that he answers at least 2 questions correctly.

Jika seorang peserta dipilih secara rawak, hitung kebarangkalian bahawa dia menjawab sekurang-kurangnya 2 soalan dengan betul.

[4 marks]

[4 markah]

- (b) The marks of 3400 candidates in an examination is normally distributed with a mean of 43 and a standard deviation of 5.

Markah untuk 3400 orang calon dalam suatu peperiksaan adalah bertaburan secara normal dengan min 43 dan sisihan piawai 5.

- (i) If the minimum mark to pass the examination is 50, estimate the number of candidates who passed the examination.

Jika markah minimum untuk lulus peperiksaan ialah 50, anggarkan bilangan calon yang dijangka lulus dalam peperiksaan tersebut.

- (ii) If 20% of the candidates failed the examination, calculate the minimum mark to pass the examination.

Jika 20% daripada calon gagal dalam peperiksaan tersebut, hitung markah minimum untuk lulus peperiksaan tersebut.

[6 marks]

[6 markah]

- 10 (a) Diagram 4 shows the curve $x = y(5 - y)$ and the straight line $y = x$.

Rajah 4 menunjukkan lengkung $x = y(5 - y)$ dan garis lurus $y = x$.

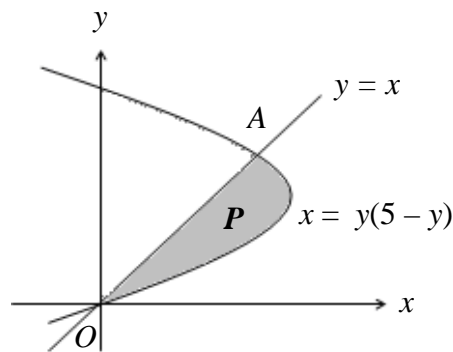


Diagram 4

Rajah 4

- (i) Find the coordinates of the point of intersection A of the curve $x = y(5 - y)$ and the straight line $y = x$. [2 marks]

Cari titik persilangan, A, antara lengkung $x = y(5 - y)$ dengan garis lurus $y = x$. [2 markah]

- (ii) Find the area of the shaded region P. [3 marks]

Cari luas rantau berlorek P. [3 markah]

- (b) Diagram 5 shows a container of the shape of a pyramid with a square base, sides measuring 9 cm and height 10 cm. Initially, the container is filled with water and water leaks from the vertex at the bottom of the container at a rate of $20 \text{ cm}^3 \text{ s}^{-1}$.

Rajah 5 menunjukkan sebuah bekas berbentuk piramid yang bertapak segi empat sama, sisinya 9 cm dan tingginya 10 cm. Pada mulanya, bekas itu diisi dengan air dan air mengalir keluar dari bucu bawah bekas itu dengan kadar $20 \text{ cm}^3 \text{ s}^{-1}$ kerana kebocoran.

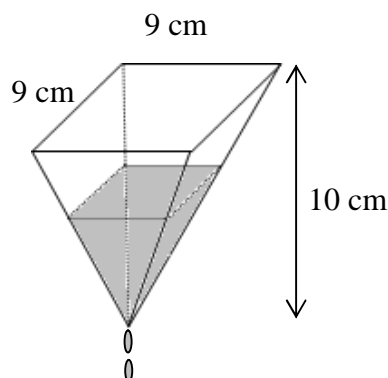


Diagram 5

Rajah 5

- (i) Find the height of the water level in the container after 9.5 seconds. [3 marks]

Cari tinggi aras air dalam bekas itu selepas 9.5 saat. [3 markah]

- (ii) Hence, find the rate of change of the height of water level at that instant. [2 marks]

Seterusnya, cari kadar perubahan tinggi aras air pada ketika itu. [2 markah]

11

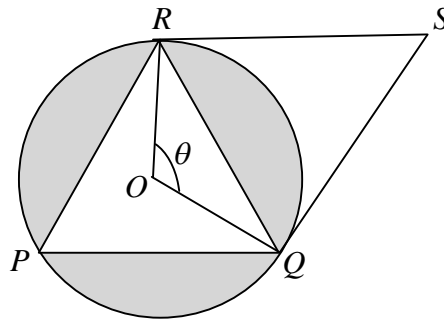


Diagram 6
Rajah 6

Diagram 6 shows a circle PQR with radius 5 cm. RS and QS are tangent to the circle and $\angle ROQ = \theta$. Given that PQR is an equilateral triangle.

Rajah 6 menunjukkan satu bulatan PQR dengan jejari 5 cm. RS dan QS adalah tangen kepada bulatan dan $\angle ROQ = \theta$. Diberi bahawa PQR ialah segitiga sama sisi..

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

Find

Cari

- (a) the value of θ in degrees, [1 mark]
nilai θ dalam darjah, [1 markah]
- (b) the length of OS , [2 marks]
panjang OS , [2 markah]
- (c) area of the whole diagram, [4 marks]
luas seluruh rajah, [4 markah]
- (d) perimeter of the shaded region. [3 marks]
perimeter kawasan berlorek. [3 markah]

Section C
Bahagian C

[20 marks]
[20 markah]

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

- 12** A particle moves in a straight line passing through a fixed point O . Its velocity, $v \text{ ms}^{-1}$, is given by $v = 18 + 12t - 6t^2$, where t is the time in seconds after passing through point O .

Suatu zarah bergerak di sepanjang garis lurus melalui titik tetap O . Diberi halajunya, $v \text{ ms}^{-1}$ ialah $v = 18 + 12t - 6t^2$, di mana t ialah masa dalam saat selepas zarah melalui titik O .

(Assume motion to the right is positive.)

(Anggapkan gerakan ke arah kanan sebagai positif.)

Find

Cari

- (a) the initial velocity of the particle, in ms^{-1} , [1 mark]
halaju permulaan zarah itu, dalam ms^{-1} , [1 markah]
- (b) the maximum velocity of the particle, in ms^{-1} , before it stops momentarily, [3 mark]
halaju maksimum zarah, dalam ms^{-1} , sebelum zarah berhenti seketika, [3 markah]
- (c) the range of values of t for which the particle moves to the right, [3 mark]
julat nilai t apabila zarah bergerak ke arah kanan, [3 markah]
- (d) the total distance, in m, travelled by the particle in the first 3 seconds. [3 marks]
jumlah jarak, dalam m, yang dilalui oleh zarah dalam 3 saat pertama. [3 markah]

- 13 (a) The price indices of an item for the year 2005 based on the year 2000 and the year 1995 are 120 and 135 respectively. Given that the price of the item is RM45 in 2000, find the cost of the item in 1995. [3 marks]

Indeks harga bagi sesuatu barangan pada tahun 2005 berdasarkan pada tahun 2000 dan tahun 1995 adalah 120 dan 135 masing-masing. Diberikan harga bagi barangan itu ialah RM45 pada tahun 2000, carikan kos barangan itu pada tahun 1995. [3 markah]

- (b) A particular kind of machine is made by using four components P , Q , R and S . Table 2 shows the price index of the components in 2005 based on 2000, the changes in the price index from 2005 to 2008 and the related weightage.

Sejenis mesin dibuat dengan menggunakan empat komponen P , Q , R dan S . Jadual 2 menunjukkan indeks harga bagi komponen tersebut pada tahun 2005 berdasarkan tahun 2000, perubahan indeks harga dari tahun 2005 ke 2008 dan pemberat yang berkaitan.

Component <i>Komponen</i>	Price index 2005 based on the year 2000 <i>Indeks harga 2005 berdasarkan tahun 2000</i>	Changes in price index from 2005 to 2008 <i>Perubahan indeks harga dari tahun 2005 ke 2008</i>	Weightage <i>Pemberat</i>
P	120	Decreased 5% <i>Berkurangan 5%</i>	5
Q	130	Unchanged <i>Tidak berubah</i>	4
R	105	Increased 20% <i>Meningkat 20%</i>	3
S	115	Unchanged <i>Tidak berubah</i>	3

Table 2
Jadual 2

Calculate
Hitungkan

- (i) the composite index for the year 2005, based on the year 2000,
indeks gubahan bagi tahun 2005 berdasarkan tahun 2000,
- (ii) the composite index for the year 2008, based on the year 2000,
indeks gubahan bagi tahun 2008 berdasarkan tahun 2000,
- (iii) the cost of making the machine in the year 2008 if the corresponding cost in the year 2000 is RM1080. .

kos membuat mesin itu pada tahun 2008 jika kos yang sepadan pada tahun 2000 ialah RM1080.

[7 marks]
[7 markah]

- 14 (a) Diagram 7 shows a triangle PQR .

Rajah 7 menunjukkan segitiga PQR .

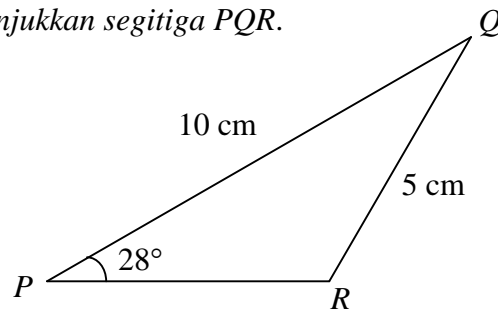


Diagram 7
Rajah 7

Calculate

Hitung

- (i) the obtuse angle PRQ ,
sudut cakah PRQ ,
- (ii) the area of the new triangle if PR is lengthened while the length of PQ , the length of QR and $\angle QPR$ are maintained.

luas segitiga yang baru jika PR dipanjangkan sementara panjang PQ , QR and $\angle QPR$ dikekalkan.

[5 marks]

[5 markah]

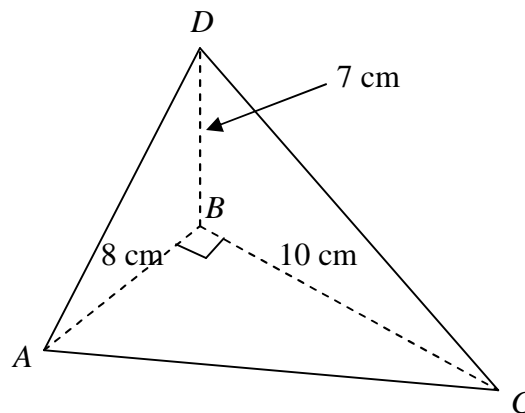


Diagram 8
Rajah 8

- (b) Diagram 8 shows a pyramid with a horizontal triangular base ABC . Given that $AB = 8$ cm, $BC = 10$ cm and $\angle ABC = 90^\circ$. Peak D is 7 cm vertically above B . Calculate the surface area of the inclined plane.

Rajah 8 menunjukkan satu piramid atas tapak segitiga ABC yang mengufuk. Diberi $AB = 8$ cm, $BC = 10$ cm dan $\angle ABC = 90^\circ$. Puncak D ialah 7 cm tegak di atas B . Hitung luas permukaan satah condong.

[5 marks]

[5 markah]

- 15** Ahmad has an allocation of RM250 to buy x kg of prawns and y kg of fish. The total mass of the commodities is not less than 20 kg. The mass of prawns is at most three times that of fish. The price of 1 kg of prawns is RM10 and the price of 1 kg of fish is RM6.

Ahmad mempunyai peruntukan sebanyak RM250 bagi membeli x kg udang dan y kg ikan. Jumlah jisim kedua-dua barangan itu tidak kurang daripada 20 kg. Jisim udang adalah selebih-lebihnya tiga kali jisim ikan. Harga 1 kg udang ialah RM10 dan harga 1 kg ikan ialah RM6.

- (a) Write down three inequalities, other than $x \geq 0$ and $y \geq 0$, that satisfy all the above constraints. [3 marks]

Tulis tiga ketaksamaan selain, $x \geq 0$ dan $y \geq 0$, yang memenuhi semua kekangan di atas. [3 markah]

- (b) Hence, using a scale of 2 cm to 5 kg on both axes, construct and shade the region R that satisfies all the above constraints. [4 marks]

Seterusnya, dengan menggunakan skala 2 cm kepada 5 kg pada kedua-dua paksi, bina dan lorekkan rantau R yang memenuhi semua kekangan di atas. [4 markah]

- (c) Use your graph in **15(b)** to find the maximum amount of money that could remain from his allocation if Ahmad buys 15kg of fish. [3 marks]

*Gunakan graf anda di **15(b)** untuk mencari baki maksimum peruntukannya jika Ahmad membeli 15 kg ikan.* [3 markah]

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

NO. KAD PENGENALAN

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ANGKA GILIRAN

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Arahan Kepada Calon

- 1 Tulis **nombor kad pengenalan** dan **angka giliran** anda pada ruang yang disediakan.
- 2 Tandakan (\surd) untuk soalan yang dijawab.
- 3 Ceraikan helaian ini dan ikat sebagai muka hadapan bersama-sama dengan buku jawapan.

<i>Kod Pemeriksa</i>				
Bahagian	Soalan	Soalan Dijawab	Markah Penuh	Markah Diperoleh (Untuk Kegunaan Pemeriksa)
A	1		5	
	2		8	
	3		6	
	4		7	
	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				

No.	Solution and Mark Scheme	Sub Marks	Total Marks
1	$x = 3y - 1 \quad \text{OR} \quad y = \frac{x+1}{3} \quad \text{P1}$ <p><i>substitute correctly</i></p> $2*(3y-1) - 2y = 2*(3y-1)^2 - 11y^2 \quad \text{K1}$ <p>Or $2x - 2*\left(\frac{x+1}{3}\right) = 2x^2 - 11*\left(\frac{x+1}{3}\right)^2$</p> $7y^2 - 16y + 4 = 0 \quad \text{OR} \quad 7x^2 - 34x - 5 = 0 \quad \text{K1}$ $(7y-2)(y-2) = 0 \quad \text{OR} \quad (7x+1)(x-5) = 0$ $y = \frac{2}{7}, 2 \quad \text{N1}$ $x = -\frac{1}{7}, 5 \quad \text{N1}$ $\therefore x = -\frac{1}{7}, y = \frac{2}{7}; x = 5, y = 2$	5	5
2	<p>(a) $A(0, -8) \quad \text{N1}$</p> <p>(b) <u>By using completing the square method</u></p> $f(x) = -\left(x - \frac{k}{2}\right)^2 + \frac{k^2}{4} - 8 \quad \text{K1}$ $\frac{k}{2} = 2 \quad \text{or} \quad \frac{k^2}{4} - 8 = h \quad \text{K1}$ $k = 4 \quad \text{N1}$ $h = \frac{4^2}{4} - 8 = -4 \quad \text{N1}$	1	

	<p><i>By using differentiation method</i></p> <p>$-2x + k = 0$ K1</p> <p>$-2(2) + k = 0$</p> <p>$k = 4$ N1</p> <p>$h = f(2)$ K1</p> <p>$= -(2)^2 + 4(2) - 8$ N1</p> <p>$= -4$</p> <p>(c) $-x^2 + 4x - 8 \leq -5$ K1</p> <p>$x^2 - 4x + 3 \geq 0$ K1</p> <p>$(x - 3)(x - 1) \geq 0$</p> <p>$x \leq 1, x \geq 3$ N1</p>	4	8
3	<p>(a) $a = 3, a + d = 6, \therefore d = 3$ K1</p> <p>$\frac{n}{2}[2(3) + (n - 1)3] = 630$ K1</p> <p>$n^2 + n - 420 = 0$</p> <p>$(n - 20)(n + 21) = 0$ K1</p> <p>$n = 20$ N1</p> <p>(b) $T_{20} = 3 + (20 - 1)3$ K1</p> <p>$= 60$ N1</p>	4	6
4	<p>(a)</p> <p>Shape of $\sin x$ P1</p> <p>Maximum = 2, minimum = -2 P1</p> <p>2 periods for $0 \leq x \leq 2\pi$ P1</p> <p>Inverted $\sin x$ P1</p>	4	

(b)	$y = \frac{x}{2\pi} \text{ or equivalent} \quad \mathbf{N1}$ <p>Draw the straight line $y = \frac{x}{2\pi}$ $\mathbf{L1}$</p> <p>No. of solutions = 5 $\mathbf{N1}$</p>	3	7
5(a)	<p>$L = 50.5$ or $F_m = 15$ or $f_m = 14$ $\mathbf{P1}$</p> $\text{Median} = 50.5 + \left[\frac{\frac{40}{2} - 15}{14} \right] 10 \quad \mathbf{K1}$ <p>Median = 54.07 $\mathbf{N1}$</p> <p>(b) $\bar{x} = \frac{35.5(6) + 45.5(9) + 55.5(14) + 65.5(7) + 75.5(4)}{40} \quad \mathbf{K1}$</p> <p>$= 54 \quad \mathbf{N1}$</p> $\sigma = \sqrt{\frac{35.5^2(6) + 45.5^2(9) + 55.5^2(14) + 65.5^2(7) + 75.5^2(4)}{40} - 54^2} \quad \mathbf{K1}$ <p>$= 11.74 \quad \mathbf{N1}$</p>	3	
6	<p>(a) $A(0, -4) \quad \mathbf{N1}$</p> <p>(b) $y = 2x - 4 \quad \mathbf{K1}$</p> <p>$2y + x - 12 = 0$</p> <p>$2(2x - 4) + x - 12 = 0 \quad \mathbf{K1}$</p> <p>$D(4, 4) \quad \mathbf{N1}$</p>	1	3

(c)	$AD : DC = m : n$ $A(0, -4)$ $\frac{(5)m + (0)n}{m + n} = 4^*$ K1 $m = 4n$ K1 $\frac{m}{n} = \frac{4}{1}$ $AD : DC = 4 : 1$ N1	3	7																
7	<p>(a)</p> <table border="1" data-bbox="277 703 1091 801"> <tbody> <tr> <td>\sqrt{x}</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>N1</td> </tr> <tr> <td>$\log_{10} y$</td> <td>0.2553</td> <td>0.4314</td> <td>0.6075</td> <td>0.7839</td> <td>0.9595</td> <td>1.136</td> <td>N1</td> </tr> </tbody> </table> <p>Using the correct, uniform scale and axes P1 All points plotted correctly P1 Line of best fit P1</p> <p>(b)</p> $\log_{10} y = (\log_{10} k)\sqrt{x} + \log_{10} p$ (or implied) P1 <p>use $*m = \log_{10} k$ K1 $k = 1.501$ N1</p> <p>use $*c = \log_{10} p$ K1 $p = 1.202$ N1</p>	\sqrt{x}	1	2	3	4	5	6	N1	$\log_{10} y$	0.2553	0.4314	0.6075	0.7839	0.9595	1.136	N1	5	10
\sqrt{x}	1	2	3	4	5	6	N1												
$\log_{10} y$	0.2553	0.4314	0.6075	0.7839	0.9595	1.136	N1												

8	<p>(a)</p> <p>(i) $\overline{AC} = \overline{AO} + \overline{OC}$ $= -3\underset{\sim}{i} - 4\underset{\sim}{j} + 6\underset{\sim}{i} + \underset{\sim}{j}$ $= 3\underset{\sim}{i} - 3\underset{\sim}{j}$ N1</p> <p>(ii) $\overline{AP} = \frac{1}{2}\overline{AB}$ $= 3\underset{\sim}{i} + \frac{1}{2}\underset{\sim}{j}$ $\overline{OP} = \overline{OA} + \overline{AP}$ $= 3\underset{\sim}{i} + 4\underset{\sim}{j} + 3\underset{\sim}{i} + \frac{1}{2}\underset{\sim}{j}$ K1 $= 6\underset{\sim}{i} + \frac{9}{2}\underset{\sim}{j}$ N1</p> <p>(b) $\overline{OB} = \overline{OC} + \overline{CB} = 6\underset{\sim}{i} + \underset{\sim}{j} + 3\underset{\sim}{i} + 4\underset{\sim}{j}$ $= 9\underset{\sim}{i} + 5\underset{\sim}{j}$ K1</p> <p>$\overline{OB} = \sqrt{9^2 + 5^2}$ $= \sqrt{106}$ K1</p> <p>$\frac{9\underset{\sim}{i}}{\sqrt{106}} + \frac{5\underset{\sim}{j}}{\sqrt{106}}$ N1</p> <p>(c) $\overline{OQ} = \overline{OA} + h\overline{AC}$ OR $\overline{OQ} = k\overline{OP}$ K1 $= (3+3h)\underset{\sim}{i} + (4-3h)\underset{\sim}{j}$ $= 6k\underset{\sim}{i} + \frac{9}{2}k\underset{\sim}{j}$</p> <p>Solve the simultaneous equations:</p> <p>$6k = 3 + 3h$ and $\frac{9}{2}k = 4 - 3h$</p> <p>$\frac{9}{2}k = 4 - 3(2k - 1)$ K1</p> <p>$k = \frac{2}{3}$ N1</p> <p>$h = \frac{1}{3}$ N1</p>		
		3	
		3	
		4	10

<p>9(a)</p> <p>(i) $p = 0.42$ N1</p> <p>(ii) $P(X \geq 2)$ K1 $= 1 - [P(X = 0) + P(X = 1)]$ K1 $= 1 - [{}^{10}C_0(0.42)^0(0.58)^{10} + {}^{10}C_1(0.42)^1(0.58)^9]$ K1 $= 1 - [0.004308 + 0.031196]$ N1 $= 0.9645$</p> <p>(b) $P(X \geq 50)$ K1 $= P(Z \geq 1.4)$ K1 $= 0.0808$</p> <p>Number of candidates who passed the examination $= 0.0808 \times 3400$ K1 $= 274$ N1</p> <p>$P(X \leq x) = 0.2$ $P(Z \leq \frac{x-43}{5}) = 0.2$ K1 $\frac{x-43}{5} = -0.842$ K1 $x = 38.79 // 39$ (accept from 38 – 39 inclusive) N1</p>	<p>1</p> <p>3</p> <p>3</p> <p>3</p> <p>3</p> <p>3</p>	<p>10</p>
<p>10</p> <p>(a)</p> <p>(i) $y(5-y) = y$ K1 $y = 4$ $A(4,4)$ N1</p> <p>(ii) Area of $P = \int_0^4 (5y - y^2) dy - \frac{1}{2}(4 \times 4)$ K1 $= \left[\frac{5}{2}y^2 - \frac{y^3}{3} \right]_0^4 - 8$ K1 $= \frac{32}{3}$ N1</p>	<p>5</p>	

(b) (i)	$V = \frac{1}{3}(9^2)(10) = 270 \text{ cm}^3 \text{ or } \delta V = -9.5 \times 20 = -190 \text{ cm}^3 \text{s}^{-1} \quad \mathbf{P1}$ $\frac{1}{3}\left(\frac{9}{10}h\right)^2 h = 80 \quad \mathbf{K1}$ $h = \frac{20}{3} \text{ cm} \quad \mathbf{N1}$	3	
(ii)	$\frac{dV}{dt} = \frac{dV}{dh} \times \frac{dh}{dt}$ $\frac{dV}{dt} = \frac{81}{100} h^2 \times \frac{dh}{dt}$ $-20 = \frac{81}{100} \left(\frac{20}{3}\right)^2 \times \frac{dh}{dt} \quad \mathbf{K1}$ $\frac{dh}{dt} = -\frac{5}{9} \text{ cm s}^{-1} \quad \mathbf{N1}$	2	10
11			
(a)	$\theta = 120^\circ \quad \mathbf{P1}$	1	
(b)	$\cos 60^\circ = \frac{5}{OS}$ $OS = 10 \text{ cm} \quad \mathbf{N1}$	2	
(c)	$SQ = \sqrt{10^2 - 5^2}$ $= 8.660 \text{ cm} \quad \mathbf{N1}$ Area of the diagram $\mathbf{K1} \quad \mathbf{K1}$ $= 2\left(\frac{1}{2}\right)(5)(8.66) + \frac{1}{2}\left(\frac{240}{180}\right)(3.142)(5^2)$ $= 43.30 + 52.37$ $= 95.67 \text{ cm}^2 \quad \mathbf{N1}$	4	
(d)	Chord $QR = 2(5 \sin 60^\circ)$ $= 8.660 \text{ cm} \quad \mathbf{N1}$ Perimeter of the shaded region = $2(3.142)(5) + 3(8.660) \quad \mathbf{K1}$ $= 57.4 \text{ cm} \quad \mathbf{N1}$	3	10

(ii)	Price index for 2008 : 114 , 130 , 126 , 115 N1 $\bar{I}_{2008/2000} = \frac{114 \times 5 + 130 \times 4 + 126 \times 3 + 115 \times 3}{15}$ $= \frac{1813}{15}$ $= 120.87$ N1		
(iii)	$120.87 = \frac{Q_{2008}}{1080} \times 100$ $Q_{2008} = \frac{120.87 \times 1080}{100}$ $= \text{RM } 1305.40$ K1 N1	7	10
14 (a) (i)	$\frac{\sin \angle PRQ}{10} = \frac{\sin 28^\circ}{5}$ K1 $\angle PRQ = 69.87^\circ \quad \text{OR}$ Obtuse angle $PRQ = 180^\circ - 69.87^\circ$ $= 110.13^\circ$ N1		
(ii)	$\angle PQR_2 = 180^\circ - 28^\circ - 69.87^\circ$ $= 82.13^\circ$ P1 Area of the new $\Delta PQR_2 = \frac{1}{2} \times 10 \times 5 \times \sin 82.13^\circ$ K1 $= 24.76 \text{ cm}^2$ N1	5	
(b)	$AD = \sqrt{8^2 + 7^2} = \sqrt{113} \quad \text{OR}$ $DC = \sqrt{7^2 + 10^2} = \sqrt{149} \quad \text{OR}$ $AC = \sqrt{8^2 + 10^2} = \sqrt{164}$ P1 $(\sqrt{164})^2 = (\sqrt{113})^2 + (\sqrt{149})^2 - 2(\sqrt{113})(\sqrt{149})\cos \angle ADC$ K1 $\angle ADC = 67.81^\circ$ N1 Area of $\Delta ADC = \frac{1}{2} \times \sqrt{113} \times \sqrt{149} \times \sin 67.81^\circ$ K1 $= 60.07 \text{ cm}^2$ N1	5	10

Soalan 7(a)

