3472/1
Matematik Tambahan
Kertas 1
2009
2 Jam

Name : ……..……

Form : ……..……

SEKOLAH-SEKOLAH MENENGAH ZON A KUCHING
LEMBAGA PEPERIKSAAN
PEPERIKSAAN PERCUBAAN SPM 2009

MATEMATIK TAMBAHAN
Kertas 1
Dua jam

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

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 and sub-part of a question are shown in brackets.*

9. *A list of formulae is provided on pages 2 to 3.*

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 .*

For examiner's use only		
Question	**Total Marks**	**Marks Obtained**
1	2	
2	3	
3	3	
4	3	
5	3	
6	3	
7	3	
8	3	
9	3	
10	3	
11	3	
12	4	
13	3	
14	3	
15	4	
16	3	
17	4	
18	4	
19	3	
20	3	
21	3	
22	3	
23	3	
24	4	
25	4	
TOTAL	**80**	

Kertas soalan ini mengandungi 15 halaman bercetak

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

ALGEBRA

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

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

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

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

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

6 $\log_a \dfrac{m}{n} = \log_a m - \log_a n$

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

8 $\log_a b = \dfrac{\log_c b}{\log_c a}$

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

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

11 $T_n = ar^{n-1}$

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

13 $S_\infty = \dfrac{a}{1 - r}$, $|r| < 1$

CALCULUS

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

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

3 $\dfrac{dy}{dx} = \dfrac{dy}{du} \times \dfrac{du}{dx}$

4 Area under a curve

$= \int_a^b y \, dx$ 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 $= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

2 Midpoint

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

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

4 $\hat{r} = \dfrac{xi + yj}{\sqrt{x^2 + y^2}}$

5 A point dividing a segment of a line

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

6 Area of triangle

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

STATISTIC

1 $\bar{x} = \dfrac{\sum x}{N}$

2 $\bar{x} = \dfrac{\sum fx}{\sum f}$

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

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

5 $m = L + \left[\dfrac{\frac{1}{2}N - F}{f_m}\right]C$

6 $I = \dfrac{Q_1}{Q_0} \times 100$

7 $\bar{I} = \dfrac{\sum w_1 I_1}{\sum w_1}$

8 ${}^nP_r = \dfrac{n!}{(n-r)!}$

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

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

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

12 Mean $\mu = np$

13 $\sigma = \sqrt{npq}$

14 $z = \dfrac{x - \mu}{\sigma}$

TRIGONOMETRY

1 Arc length, $s = r\theta$

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

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

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

5 $\text{cosec}^2 A = 1 + \cot^2 A$

6 $\sin 2A = 2 \sin A \cos A$

7 $\cos 2A = \cos^2 A - \sin^2 A$
$= 2\cos^2 A - 1$
$= 1 - 2\sin^2 A$

8 $\tan 2A = \dfrac{2\tan A}{1 - \tan^2 A}$

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

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

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

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

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

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

For examiner's use only

Answer **all** *questions.*

1 Diagram 1 shows a graph of the relation between two variables x and y.

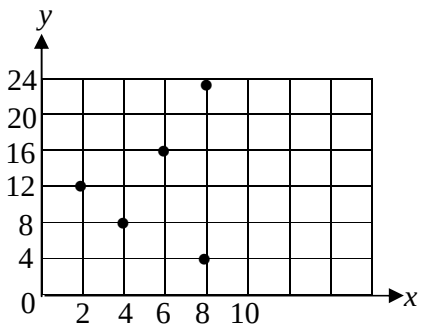

DIAGRAM 1

State

(a) the object of 8,

(b) the type of relation between x and y.

[2 *marks*]

Answer : (a) ……..

(b) ……...

1

2

---

2 Given that the function $f(x) = 2x + 5$, $g(x) = x^2 - 4$, find

(a) $gf(x)$

(b) $gf(-2)$

[3 *marks*]

2

Answer : (a) ……..

(b) ……...

3

3 Given that the function $f : x \to \frac{3x+2}{5}$, find

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

(*b*) the value of x such that $f^{-1}(x) = 3$

[3 *marks*]

Answer : (*a*) ……..

(*b*) ……...

3

3

---

4 The quadratic equation $2x^2 - 5x + p - 3 = 0$ has two different roots, find the range of values of p.

[3 *marks*]

Answer : .....……

4

3

For examiner's use only

5 Given α and β are the roots of the quadratic equation $3x^2 + 4x - 6 = 0$, form the quadratic equation whose roots are 3α and 3β .

[3 *marks*]

Answer : .....

5

3

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6 Diagram 2 shows the graph of the quadratic function $y = 2(x - 3)^2 - p$ which has a minimum value of -5.

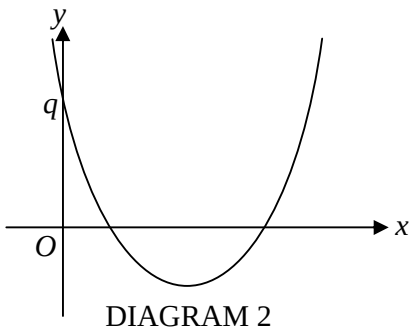

DIAGRAM 2

Find

(*a*) the value of *p*,

(*b*) the value of *q*,

(*c*) the equation of the axis of symmetry.

[3 *marks*]

Answer : (*a*) …….....

(*b*) …….....

(*c*).....

6

3

For examiner's use only

7 Find the range of values of x for which $(2x - 3)(x + 1) \geq x + 1$. [3 *marks*]

7

3

Answer : .....

---

8 Solve the equation $27 \times 9^{x+1} = \frac{1}{3^x}$.

[3 *marks*]

8

3

Answer : .....

---

9 Solve the equation $\log_2 (x + 3) = 1 + \log_2 (3x - 1)$.

[3 *marks*]

9

3

Answer : .....

For examiner's use only

10 The sum of the first *n* terms of an arithmetic progression is given by $S_n = \frac{3}{2}\left[7n^2 - 3n\right]$. Find

(*a*) the common difference,

(*b*) the eleventh term

of the progression

[3 *marks*]

Answer : (*a*) ……..

(*b*).……..……

10

3

---

11 Express the recurring decimal 0.21212121… as a fraction in its simplest form.

[3 *marks*]

Answer : …..……..…..

11

3

For examiner's use only

12 Diagram 3 shows the graph $y = x^2 + px$.

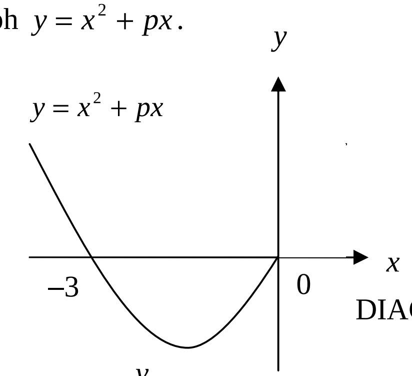

DIAGRAM 3

Based on the graph above a table of $\frac{y}{x}$ against x is obtained as show in table 1

$\frac{y}{x}$	-3	r
x	q	-1

TABLE 1

Calculate the values of p, q and r.

[4 *marks*]

Answer : p =……..…………..….......

q= ....

r= ....

12

4

---

13 Find the coordinates of point M which divides line segment joining the points $A(-3, 3)$ and $B(7, 8)$ such that $AM : AB = 2 : 5$. [3 *marks*]

13

3

Answer : ………………..……

For examiner's use only

14 Given the straight lines $y + ax = 3$ and $4y + bx = 4$ are perpendicular to each other. Express *a* in terms of *b*.

[3 *marks*]

Answer : ……

14

3

---

15 In Diagram 4, *QR* is parallel to *PS* and *T* is the midpoint of *QR*.

[4 *marks*]

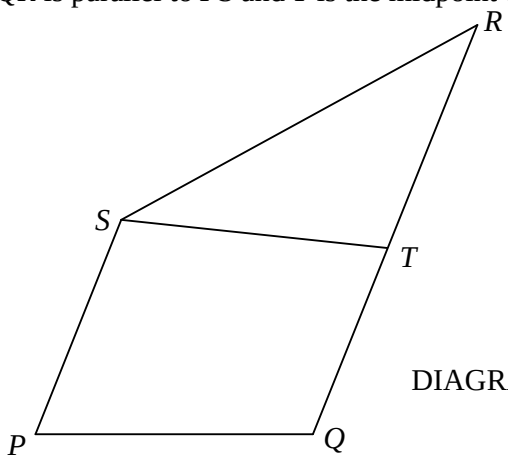

DIAGRAM 4

Given that *PS* : *QR* = 3 : 5, $\overrightarrow{PQ} = 3\underline{u}$ and $\overrightarrow{PS} = 6\underline{v}$, express, in terms of $\underline{u}$ and $\underline{v}$, of

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

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

[4 *marks*]

15

Answer : (*a*)…..……..…....

(*b*) .....

4

For examiner's use only

16 Given $\overrightarrow{OP} = -2\underset{\sim}{i} + 3\underset{\sim}{j}$ and $\overrightarrow{OQ} = 10\underset{\sim}{i} - 2\underset{\sim}{j}$. Find, in terms of the unit vectors, $\underset{\sim}{i}$ and $\underset{\sim}{j}$,

(*a*) $\overrightarrow{PQ}$

(*b*) the vector whose magnitude is 2 units and in the direction of $\overrightarrow{PQ}$.

[3 *marks*]

16

3

Answer : (*a*) $\overrightarrow{PQ}$ = ……..……...

(*b*) ……..

---

17 Solve the equation $2 \sin x + \dfrac{1}{\sin x} = -3$ for $0° \leq x \leq 360°$. [4 *marks*]

17

4

Answer : …...……..…....

For examiner's use only

18 Diagram 5 shows a semicircle with centre *O*.

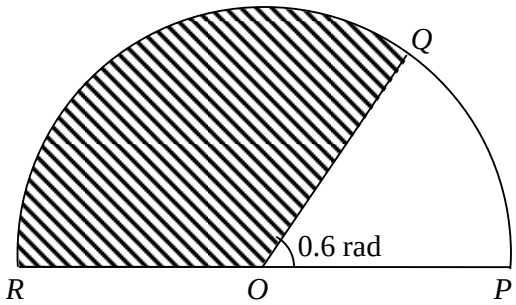

DIAGRAM 5

The diameter of the circle is 16 cm and $\angle POQ = 0.6$ radian.
Calculate

(*a*) the length of arc *QP*,

(*b*) area of the shaded region.

[4 *marks*]

Answer : (*a*) ……..

(*b*) ……..……

18

4

---

19 Find the coordinates of the minimum point of the curve $y = x^2 - \frac{3}{2}x + 10$.

[3 *marks*]

Answer : ……

19

3

For examiner's use only

20 Two variables, x and y, are related by the equation $y = 3x + \frac{16}{x}$. Given that y increases at a constant rate of 10 unit per second, find the rate of change of x when $x = 2$.

[3 *marks*]

20

3

Answer : …..……..…..…..

---

21 Given that $\int_3^6 g(x)\,dx = 2$, find

(*a*) $\int_6^3 3g(x)\,dx$,

(*b*) the value of k if $\int_3^6 [g(x) + kx]\,dx = 10$.

[3 *marks*]

21

3

Answer : (*a*) ……..

(*b*) ……..……

---

22 Given that the mean and variance of a set of n numbers $x_1, x_2, \ldots, x_n$ are 3 and 2.56 respectively. Find the mean and standard deviation of the new set of n numbers $5x_1 - 2, 5x_2 - 2, \ldots, 5x_n - 2$.

[3 *marks*]

22

3

Answer : Mean = ……..

Standard deviation = ……..……

For examiner's use only

23 The probability that Kamal is chosen as a school librarian is $\frac{2}{5}$ whereas the probability that Alisa is chosen as a school librarian is $\frac{5}{12}$.

Find the probability that

(*a*) neither of them is chosen as a school librarian,

(*b*) only one of them is chosen as a school librarian.

[3 *marks*]

Answer : (*a*) ……..

(*b*) ……..……

23

3

---

24 Mathematics Club of a school has 8 Form 5 students, 10 Form 4 students and 12 Form 3 students.

(*a*) A teacher wants to choose Form 5 students to form a committee consisting a president, a vice president and a secretary, find the number of ways the committee can be formed.

(*b*) A team is to be formed to take part in a Mathematics competition. How many different teams, each comprising 3 Form 5 students, 2 Form 4 students and 1 Form 3 student can be formed?

[4 *marks*]

Answer : (*a*) ……..

(*b*) ……..……

24

4

For examiner's use only

25 The mass of a packet of biscuit is normally distributed with a mean of 125 g and a variance of 16 g^2.

(*a*) Find the probability that a packet of biscuit chosen at random from a sample will have mass not less than 128 g.

(*b*) If 30% of the packets chosen at random have mass more than *m* g, find the value of *m*.

[4 *marks*]

25

4

Answer : (*a*) ……..

(*b*) ……..……

END OF QUESTION PAPER