



PEPERIKSAAN PERTENGAHAN TAHUN 2009
TINGKATAN 5

NAMA :

TINGKATAN :

**ADDITIONAL
MATHEMATICS**

Kertas 1
Dua jam

**DO NOT OPEN THIS QUESTION PAPER
UNTIL YOU ARE TOLD TO DO SO**

1. *This question paper consists of 25 questions.*
2. *Answer all questions.*
3. *Give only one answer for each question.*
4. *Write your answers in the spaces provided in this 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. *You may use a non-programmable scientific calculator and a four-figure mathematical table.*
10. *This question paper must be handed in at the end of the examination.*

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

This question paper consists of 23 printed pages.

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

Rumus-rumus berikut boleh membantu anda menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.

ALGEBRA

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

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

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

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

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

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

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

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

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

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

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

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

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

CALCULUS / KALKULUS

$$1. \quad y = uv$$

$$\frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

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

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

$$4. \quad \text{Area under a curve} \\ \text{Luas di bawah lengkung} \\ = \int_a^b y \, dx \quad \text{or / atau}$$

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

$$5. \quad \text{Volume generated} \\ \text{Isipadu janaan} \\ = \int_a^b \pi y^2 \, dx \quad \text{or / atau} \\ = \int_a^b \pi x^2 \, dy$$

STATISTICS / STATISTIK

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

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

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

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

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

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

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

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

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

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

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

$$12. \quad \text{Mean / Min} = np$$

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

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

GEOMETRI (GEOMETRY)

1. Distance / Jarak

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

2. Midpoint / Titik tengah

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

3. A point dividing a segment of a line
Titik yang membahagi suatu tembereng garis

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

4. Area of triangle / Luas segi tiga

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

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

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

TRIGONOMETRY / TRIGONOMETRI

1. Arc length, $s = r\theta$
Panjang lengkok, $s = j\theta$
2. Area of sector $= \frac{1}{2} r^2 \theta$
Luas sektor, $L = \frac{1}{2} j^2 \theta$
3. $\sin^2 A + \cos^2 A = 1$
 $\sin^2 A + \text{kos}^2 A = 1$
4. $\sec^2 A = 1 + \tan^2 A$
 $\text{sek}^2 A = 1 + \tan^2 A$
5. $\text{cosec}^2 A = 1 + \cot^2 A$
 $\text{kosek}^2 A = 1 + \text{kot}^2 A$
6. $\sin 2A = 2 \sin A \cos A$
 $\sin 2A = 2 \sin A \text{kos} A$
7. $\cos 2A = \cos^2 A - \sin^2 A$
 $= 2 \cos^2 A - 1$
 $= 1 - 2 \sin^2 A$
 $\text{kos } 2A = \text{kos}^2 A - \sin^2 A$
 $= 2 \text{kos}^2 A - 1$
 $= 1 - 2 \sin^2 A$
8. $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$
 $\sin(A \pm B) = \sin A \text{kos} B \pm \text{kos} A \sin B$
9. $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
 $\text{kos}(A \pm B) = \text{kos} A \text{kos} B \mp \sin A \sin B$
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. $a^2 = b^2 + c^2 - 2bc \cos A$
 $a^2 = b^2 + c^2 - 2bc \text{kos} A$
14. Area of triangle / Luas segi tiga
 $= \frac{1}{2} ab \sin C$

Answer all questions.

Jawab semua soalan.

- 1 Diagram 1 shows the relation between set S and set T .
Rajah 1 menunjukkan hubungan antara set S dan set T .

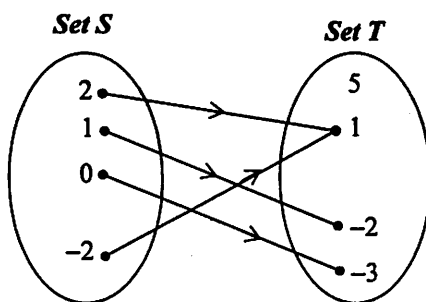


Diagram 1 /Rajah 1

State / Nyatakan

- (a) the range of the relation,
julat hubungan itu,
- (b) the objects of 1.
objek-objek bagi 1.

[2 marks]

[2 markah]

Answer/Jawapan : (a)

(b)

For
examiner's
use only

- 2 Diagram 2 shows the function $g: x \rightarrow \frac{x}{a} + 1$, where a is a constant.

Rajah 2 menunjukkan fungsi $g: x \rightarrow \frac{x}{a} + 1$, dengan keadaan a adalah pemalar.

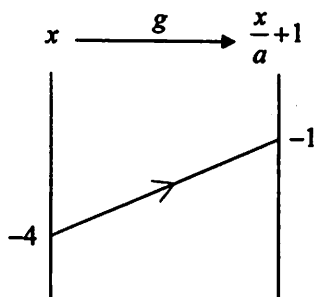


Diagram 2 / Rajah 2

Find the value of a .

Cari nilai a .

[2 marks]

[2 markah]

Answer/Jawapan : $a = \dots\dots\dots$

- 3 Write the quadratic equation $(2x - 1)(x + 2) = 3$ in the general form.

[2 marks]

Tulis persamaan kuadratik $(2x - 1)(x + 2) = 3$ dalam bentuk am.

[2 markah]

Answer/Jawapan : $\dots\dots\dots$

- 4 The quadratic equation $x^2 + mx - n = 0$ has the roots -2 and 5 . Find the value of m and of n . [3 marks]

Persamaan kuadratik $x^2 + mx - n = 0$ mempunyai punca-punca -2 dan 5 . Cari nilai m dan nilai n . [3 markah]

Answer/Jawapan : $m = \dots\dots\dots$

$n = \dots\dots\dots$

- 5 The quadratic equation $x(x + 2) = 3kx - 4$ has two real and distinct roots. Find the range of values of k . [4 marks]

Persamaan kuadratik $x(x + 2) = 3kx - 4$ mempunyai dua punca nyata dan berbeza.

Cari julat nilai k . [4 markah]

Answer/Jawapan : $\dots\dots\dots$

For
examiner's
use only

- 6 Diagram 3 shows the graph of the function $y = m(x - 2)^2 + k$ where m and k are constants.
Rajah 3 menunjukkan graf fungsi $y = m(x - 2)^2 + k$ dengan keadaan m dan k adalah pemalar.

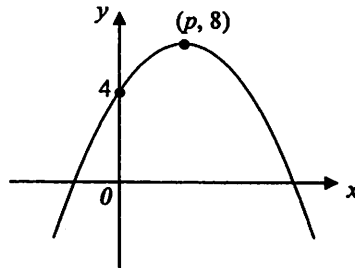


Diagram 3 / Rajah 3

- (a) Find the value of k , p and m .
Cari nilai bagi k , p dan m .
- (b) State the equation of the axis of symmetry.
Nyatakan persamaan paksi simetri.

[4 marks]

[4 markah]

Answer/Jawapan : (a) $k =$

$p =$

$m =$

(b)

- 7 Diagram 4 shows a straight line $y = 3x + 6$ which is perpendicular to the straight line AB .

Rajah 4 menunjukkan satu garis lurus $y = 3x + 6$ yang berserenjang dengan garis lurus AB .

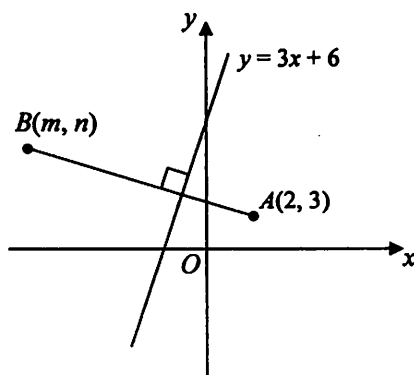


Diagram 4 / Rajah 4

Express m in terms of n .

Ungkapkan m dalam sebutan n .

[3 marks]

[3 markah]

Answer/Jawapan :

For
examiner's
use only

- 8 Diagram 5 shows a straight line passing through $S(-3, 0)$ and $T(0, 5)$.

Rajah 5 menunjukkan satu garis lurus yang melalui $S(-3, 0)$ dan $T(0, 5)$.

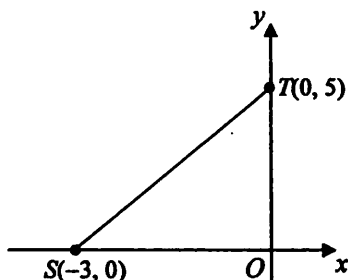


Diagram 5 / Rajah 5

- (a) Write down the equation of the straight line ST in the form $\frac{x}{a} + \frac{y}{b} = 1$.

Tuliskan persamaan garis lurus ST dalam bentuk $\frac{x}{a} + \frac{y}{b} = 1$.

- (b) A point $P(x, y)$ moves such that $PS = PT$. Find the equation of the locus of P .

Satu titik $P(x, y)$ yang bergerak dengan keadaan $PS = PT$. Carikan persamaan lokus bagi P .

[4 marks]

[4 markah]

Answer/Jawapan : (a)

(b)

- 9 Diagram 6 shows a sector OAB of a circle with centre O .
Rajah 6 menunjukkan sektor OAB bagi sebuah bulatan berpusat O .

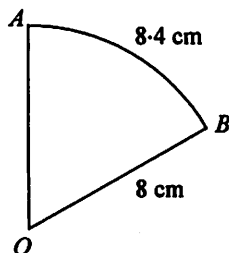


Diagram 6 / *Rajah 6*

Find the area of the sector.
Cari luas sektor itu.

Use / *Gunakan* $\pi = 3.142$.

[3 marks]

[3 markah]

Answer/Jawapan :

For
examiner's
use only

- 10 Given that $p + 2$, $2p - 5$ and $p + 8$ are the three consecutive terms of an arithmetic progression. Find its common difference. [3 marks]

Diberi bahawa $p + 2$, $2p - 5$ and $p + 8$ adalah tiga sebutan berturutan bagi suatu jangjang aritmetik, cari beza sepunyanya. [3 markah]

Answer/Jawapan :

- 11 It is given that the first term of a geometric progression is 27 and the fourth term is 1.

Diberi bahawa sebutan pertama suatu jangjang geometri ialah 27 dan sebutan keempatnya adalah 1.

Find / Cari

- (a) the common ratio,
nisbah sepunya,
- (b) the sum to infinity
hasil tambah sehingga ketakterhinggaan,
- of the geometric progression.
jangjang geometri itu.

[4 marks]

[4 markah]

Answer/Jawapan : (a)

(b)

For
examiner's
use only

SULIT

14

3472/1

12 Solve the equation $\frac{3}{2^{3x-1}} = 48$.

[2 marks]

Selesaikan persamaan $\frac{3}{2^{3x-1}} = 48$.

[2 markah]

Answer/Jawapan :

13 Solve the equation $2^{2x} (3^{2x}) = 7^{x+1}$

[3 marks]

Selesaikan persamaan $2^{2x} (3^{2x}) = 7^{x+1}$

[3 markah]

Answer/Jawapan :

- 14 Given that $\log_3 2 = m$ and $\log_3 4 = n$, find the value of x if $\log_3 x = 5m - 3n + 2$.

[4 marks]

Diberi $\log_3 2 = m$ dan $\log_3 4 = n$, cari nilai x jika $\log_3 x = 5m - 3n + 2$

[4 markah]

Answer/Jawapan : $x = \dots\dots\dots$

- 15 Solve the equation $\log_2 x - \log_8 x = 2$.

[4 marks]

Selesaikan persamaan $\log_2 x - \log_8 x = 2$.

[4 markah]

Answer/Jawapan : $\dots\dots\dots$

For
examiner's
use only

- 16 Table 1 shows a data arranged in ascending order.
Jadual 1 menunjukkan data yang disusun secara menaik.

Score <i>Skor</i>	2	$m - 2$	7	$m + 2$	11	12
Frequency <i>Frekuensi</i>	2	4	2	3	2	3

Table 1 / Jadual 1

Given that the inter quartile range of the data is 7, find the value of m .
Diberi bahawa julat antara kuartil bagi data tersebut ialah 7, cari nilai bagi m .

[3 marks]

[3 markah]

Answer / Jawapan : $m =$

For
examiner
use only

17 A set of data of six numbers has a mean of 9 and standard deviation of 4.

Satu set data terdiri daripada enam nombor mempunyai min 9 dan sisihan piawai 4.

Find / Cari

- (a) the sum of squares of these numbers,
hasil tambah kuasa dua nombor-nombor itu,
- (b) the new variance of the data, if each number in the set is multiplied by 3 and then subtracted by 2.
nilai bagi varians baru data tersebut, jika setiap nombor di dalam set data tersebut didarab dengan 3 dan ditolak dengan 2.

[4 marks]

[4 markah]

Answer/Jawapan : (a)

(b)

For
examiner's
use only

- 18 Given that the gradient of tangent to the curve $y = 3 + 4x - 2x^2$ is 8.

Diberi kecerunan tangent kepada lengkung $y = 3 + 4x - 2x^2$ adalah 8.

Find the value of x .

Cari nilai x .

[2 marks]

[2 markah]

Answer/Jawapan : $x = \dots\dots\dots$

- 19 Given that $\int_0^2 f(x) dx = 4$, find

Diberi $\int_0^2 f(x) dx = 4$, cari

(a) $\int_0^2 3f(x) dx$,

(b) the value of k if $\int_0^2 [f(x) + kx] dx = 12$.

nilai k jika $\int_0^2 [f(x) + kx] dx = 12$.

[4 marks]

[4 markah]

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

(b) $k = \dots\dots\dots$

- 20 Given that $\mathbf{p} = \mathbf{i} + 3\mathbf{j}$ and $\mathbf{q} = 2\mathbf{i} + \mathbf{j}$. Find the value of k if $4\mathbf{p} + 3k\mathbf{q}$ is parallel to x-axis.

[3 marks]

Diberi $\mathbf{p} = \mathbf{i} + 3\mathbf{j}$ dan $\mathbf{q} = 2\mathbf{i} + \mathbf{j}$. Cari nilai k jika $4\mathbf{p} + 3k\mathbf{q}$ adalah selari dengan paksi-x.

[3 markah]

Answer / Jawapan : $k = \dots\dots\dots$

- 21 Given that $\int_1^k 4(2x-1)^3 dx = 312$, find the positive value of k .

[3 marks]

Diberi bahawa $\int_1^k 4(2x-1)^3 dx = 312$, cari nilai positif bagi k .

[3 markah]

Answer/Jawapan : $k = \dots\dots\dots$

For
examiner's
use only

22 Given that $y = 3x^2 - 8x + 4$,

Diberi $y = 3x^2 - 8x + 4$,

find / cari

(a) the value of $\frac{dy}{dx}$ when $x = 2$,

nilai $\frac{dy}{dx}$ bila $x = 2$,

(b) the small change in y , when x changes from 2 to 2.01.

perubahan kecil bagi y bila x berubah dari 2 kepada 2.01.

[4 marks]

[4 markah]

Answer/Jawapan : (a)

(b)

- 23 The variables x and y are related by the equation $x^2y = ax^2 - b$, where a and b are constants. A straight line is obtained by plotting y against $\frac{1}{x^2}$ as shown in Diagram 7.

Pembolehubah x dan y dihubungkan oleh persamaan $x^2y = ax^2 - b$, dengan keadaan a dan b adalah pemalar. Satu garis lurus diperoleh apabila diplotkan y melawan $\frac{1}{x^2}$ sebagaimana ditunjukkan dalam Rajah 7.

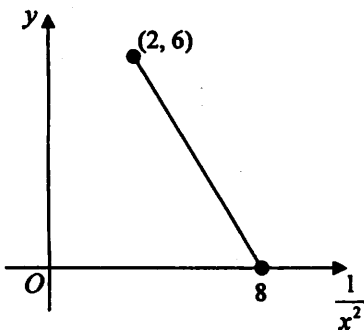


Diagram 7 / Rajah 7

Find the value of a and of b .

Cari nilai a dan nilai b .

[3 marks]

[3 markah]

Answer/Jawapan : $a = \dots\dots\dots$

$b = \dots\dots\dots$

24 Given that $O(0, 0)$, $A(-2, 3)$ and $B(13, 8)$, find in terms of the unit vectors, \mathbf{i} and \mathbf{j} .

Diberi $O(0, 0)$, $A(-2, 3)$ dan $B(13, 8)$, cari dalam sebutan vektor unit, \mathbf{i} and \mathbf{j} .

(a) \vec{AB} ,

(b) the unit vector in the direction of \vec{AB} .
vektor unit dalam arah \vec{AB}

[3 marks]

[3 markah]

Answer/Jawapan : (a)

(b)

For
examiner's
use only

- 25 Given that $\sin \theta = \frac{k}{3}$, such that θ is an acute angle.

Diberi $\sin \theta = \frac{k}{3}$, dengan keadaan θ adalah sudut tirus.

Find / Cari

- (a) cosec θ in terms of k ,
kosek θ dalam sebutan k ,
- (b) the values of k if $\tan^2 \theta = 2$.
nilai-nilai k jika $\tan^2 \theta = 2$.

[4 marks]

[4 markah]

Answer/ Jawapan (a)

(b) $k =$

END OF QUESTION PAPER
KERTAS SOALAN TAMAT