



Name :

Form :

SEKTOR SEKOLAH BERASRAMA PENUH
KEMENTERIAN PELAJARAN MALAYSIA
PEPERIKSAAN PERTENGAHAN TAHUN TINGKATAN 5

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	4	
3	2	
4	3	
5	3	
6	2	
7	3	
8	3	
9	3	
10	4	
11	4	
12	4	
13	4	
14	3	
15	3	
16	2	
17	4	
18	4	
19	4	
20	4	
21	3	
22	3	
23	3	
24	3	
25	3	
TOTAL	80	

Kertas soalan ini mengandungi 13 halaman bercetak

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

ALGEBRA

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

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

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

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

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

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

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

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

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

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

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

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

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

CALCULUS

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

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

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

4 Area under a curve

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

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

5 Volume generated

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

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

GEOMETRY

$$1 \quad \text{Distance} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

2 Midpoint

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

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

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

5 A point dividing a segment of a line

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

6 Area of triangle

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

STATISTICS

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

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

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

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

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

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

$$7 \quad \bar{I} = \frac{\sum w_1 I_1}{\sum w_1}$$

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

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

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

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

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

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

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

TRIGONOMETRY

$$1 \quad \text{Arc length, } s = r\theta$$

$$2 \quad \text{Area of sector, } L = \frac{1}{2} r^2 \theta$$

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

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

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

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

$$7 \quad \begin{aligned} \cos 2A &= \cos^2 A - \sin^2 A \\ &= 2 \cos^2 A - 1 \\ &= 1 - 2 \sin^2 A \end{aligned}$$

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

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

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

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

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

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

$$14 \quad \text{Area of triangle} = \frac{1}{2} ab \sin C$$

Answer all questions.

1. Diagram 1 shows the relation between two sets of numbers .

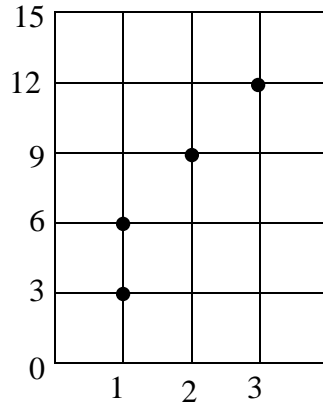


DIAGRAM 1

State,

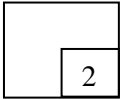
- (a) the image of 1,
- (b) the type of relation

[2 marks]

Answer : (a)

(b)

1



2. Given $f : x \rightarrow \frac{5}{x}, x \neq 0$ and $g : x \rightarrow 3x + 6$. Find

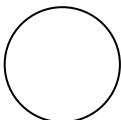
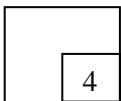
- (a) $g^{-1}(x)$,
- (b) $fg^{-1}(3)$.

[4 marks]

Answer : (a)

(b)

2



3 Form the quadratic equation which has the roots $-\frac{1}{3}$ and 4 .
Give your answer in the form $ax^2 + bx + c = 0$, where a, b and c are constants.
[2 marks]

Answer : (a)

3

2

4 A quadratic equation $2x^2 - x + p - 1 = 0$, has no roots.
Find the range of values of p .
[3 marks]

Answer :

4

3

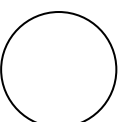
5 Given that the roots of quadratic equation $2x^2 + (h-1)x + k = 0$ are -3 and 6.
Find
(a) the value of h , [1 marks]
(b) the value of k . [2 marks]

Answer : (a)

(b)

5

3



6 It is given that the quadratic function $f(x) = 2[(x-3)^2 + 5]$.

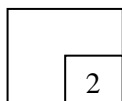
- (a) Write the equation of the axis of symmetry,
- (b) State the coordinates of the minimum point.

[2 marks]

Answer : (a)

(b).....

6

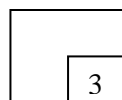


7 Find the range of the values of x for $x(2x+5) \geq 12$.

[3 marks]

Answer :

7

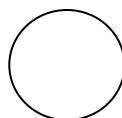
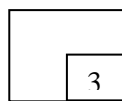


8 Solve the equation $\frac{4^{x-1}}{2} = 16^{x+1}$.

[3 marks]

Answer :

8

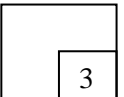


9 Solve the equation $\log_5(2x+3) = 1 + \log_5(x-1)$

[3 marks]

Answer :

9

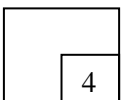


10 Given that $\log_3 2 = m$ and $\log_3 5 = n$, express $\log_9 20$ in terms of m and n .

[4 marks]

Answer :

10



11 The 5th term of an arithmetic progression is 45 and the 7th term is 5.
Find

a) the first term and the common difference

[2 marks]

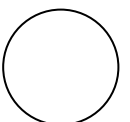
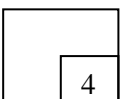
b) the sum of the first six terms

[2 marks]

Answer: a).....

b)

11



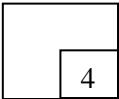
12. The n th term of a geometric progression can be determined by using the formula $T_n = 2^{3-2n}$. Calculate

- a) the common ratio of the progression. [2 marks]
- b) the sum to infinity. [2 marks]

Answer :a).....

b)

12



13 Diagram 3 shows a linear graph of xy against $\frac{1}{x}$

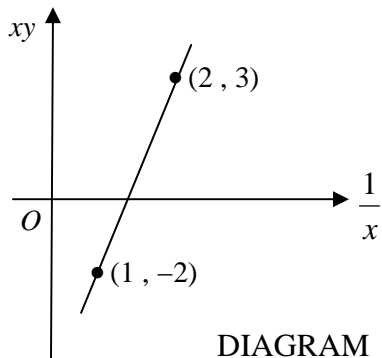
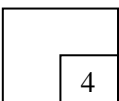


DIAGRAM 3

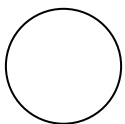
- (a) Express y in terms of x . [3 marks]
- (b) Find the value of y when $x = 4$ [1 marks]

13



Answer : (a)

(b)



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- 14 The points $P(2k, k)$, $Q(h, t)$ and $R(2h, 3t)$ are on a straight line. Q divides PR internally in the ratio $2:3$. Express h in terms of t [3 marks]

Answer : $h = \dots\dots\dots$

14

3

- 15 Given point $R(-2,0)$ and point $S(2,3)$. Point P moves such that $PR : PS = 3 : 2$. Find the equation of the locus of P . [3 marks]

Answer :

15

3

- 16 Diagram 3 shows a triangle OAB such that $\vec{OA} = \underline{a}$, $\vec{OB} = \underline{b}$ and $2\vec{AP} = \vec{AB}$

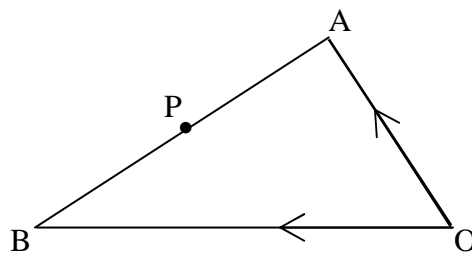


DIAGRAM 3

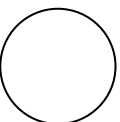
Find \vec{OP} in terms of \underline{a} and \underline{b} [2 marks]

Answer :

16

2

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17. Diagram 4 shows vectors \vec{OR} , \vec{OS} and \vec{OT} drawn on a Cartesian plane.

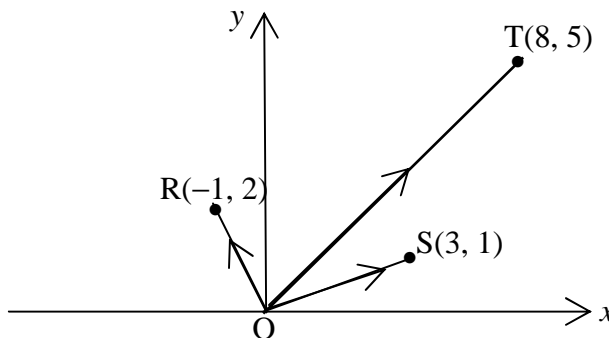


DIAGRAM 4

Find the value of m and n such that $\vec{OR} + m\vec{OS} = n\vec{OT}$.

[4 marks]

Answer :

17

4

18. Table 2 shows the number of story books read by a group of students in a certain school.

Number of story books read	0	1	2	3
Number of students	7	9	3	x

TABLE 2

- (a) State the largest possible value of x given that the mode is 1. [1 mark]
- (b) State the largest possible value of x given that the median is 1. [1 mark]
- (c) Calculate the value of x given that the mean is 1. [2marks]

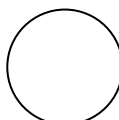
Answer : a).....

b).....

c).....

18

4



19 Diagram 5 shows a circle with centre O. The length of the radius is 2.5 cm and the area of sector AOB is 6.25 cm^2 .

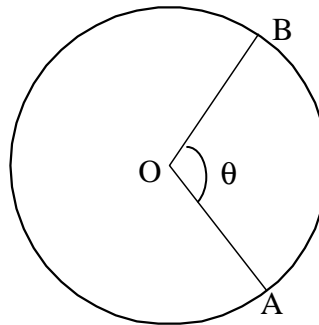


DIAGRAM 5

Calculate

- (a) the value of θ [2 marks]
- (b) the perimeter of the sector AOB. [2 marks]

Answer : (a).....

(b).....

19

4

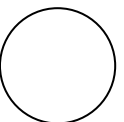
20 Solve the equation $\cos 2x - \cos x = 0$ for $0^\circ \leq x \leq 360^\circ$.

[4 marks]

Answer :

20

4



*For
examiner's
use only*

- 21** It is given that $\sin A = p$, $0^\circ < A < 90^\circ$
Find
(a) $\cos (90^\circ - A)$
(b) $\sin 2A$
in terms of p

[3 marks]

21

3

Answer : (a)
(b)

- 22** The curve $y = x^2 - 3x + 2$ has a gradient of 2 at point $P (t , 5)$.
Find

- (a) the value of t .
(b) the equation of the normal at point P .

[3 marks]

22

3

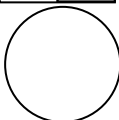
Answer : (a).....
(b)

- 23.** Given that $y = 2x(x - 5)$. Find the rate of change of y at $(2,1)$ when the rate of change of x is 3 units per second [3 marks]

23

3

Answer :



24 Given that $\int_k^0 (2x + 3)dx = -4$, where k is a constant. Find the possible value of k .

[3 marks]

Answer :

24

3

25. Given that $y = \frac{3x + 1}{x^2}$ and $\frac{dy}{dx} = 4k(x)$ with $k(x)$ is a function in terms of x .

Find the value of $\int_{-1}^1 k(x) dx$.

[3 marks]

Answer :

25

3

END OF THE QUESTION PAPER

