

UNIT PEPERIKSAAN
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TRIAL EXAMINATION SPM 2012
ADDITIONAL MATHEMATICS

3472 / 1

Paper 1

2 hour

SULIT

PLEASE DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD

Name: _____

Form 5 : A / T / R

1. Write your name and class in the space provided.
2. Answer all questions.
3. Write your answer clearly in the space provided in the question paper.
4. Show your working clearly in order to get marks.
5. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
6. The diagrams in the questions are not drawn to scale unless stated.
7. The marks allocated for each question is shown in brackets.
8. You may use a non-programmable scientific calculator.

For Examiner Use Only		
Question	Full Mark	Mark Scored
1	2	
2	4	
3	4	
4	4	
5	3	
6	3	
7	3	
8	3	
9	4	
10	3	
11	3	
12	3	
13	4	
14	3	
15	3	
16	3	
17	3	
18	3	
19	4	
20	3	
21	4	
22	3	
23	3	
24	3	
25	3	
Total	80	

This question paper consists of 16 printed pages

List Of Mathematics Formulae

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

ALGEBRA

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

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

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

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

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

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

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

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

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

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

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

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

CALCULUS

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

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

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

$$4 \quad \text{Area under the curve} = \int_a^b y dx \quad \text{or} \quad = \int_a^b x dy$$

$$5 \quad \text{Volume generated} = \int_a^b \pi y^2 dx \quad \text{or} \quad = \int_a^b \pi x^2 dy$$

GEOMETRY

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

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

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 a triangle =

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

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

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

STATISTICS

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 = np

13 $\sigma = \sqrt{npq}$

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

TRIGONOMETRY

1 Arc length, $s = r\theta$

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

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

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

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

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 a $\Delta = \frac{1}{2} ab \sin \theta$

1. Diagram 1 shows the relation between set X and set Y in the graph form

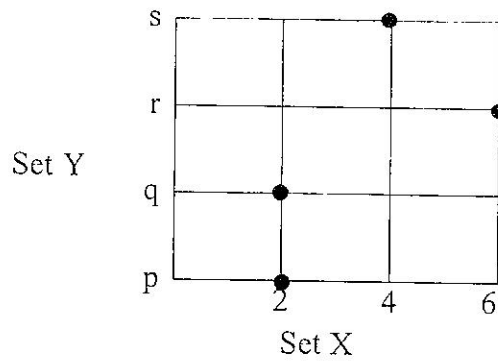


Diagram 1

State

- (a) the object of q
- (b) the codomain of the relation.

[2 marks]

Answer: a)

b)

2 Given that $f : x \rightarrow x + 5$ and $gf : x \rightarrow \frac{x + 4}{2}$, find

- (a) $g(x)$
- (b) the value of $fg(-3)$

[4 marks]

Answer: a)

b)

- 3 Given that the function $f : x \rightarrow k - mx$
Find
(a) $f^{-1}(x)$ in terms of k and m
(b) The value of k and m , if $f^{-1}(14) = -4$ and $f(5) = -13$

[4 marks]

Answer: a)
b)

- 4 One of the roots of the equation $2x^2 + 6x = 2k - 1$ is twice the other and k is a constant.
Find
(a) the values of the roots
(b) the value of k

[4 marks]

Answer: a)
b)

5 Find the range of the values of p if $x^2 - (p+1)x + 1 - p^2 = 0$ has no real roots
[3 marks]

Answer:

6 The equation of a curve is $f(x) = 3(x + p)^2 + 4$, where p is a constant.
The curve has a minimum point $(-2, q)$ where q is a constant.

State

- (a) the value of p
- (b) the value of q
- (c) the equation of the axis of symmetry

[3 marks]

Answer: (a)

(b)

(c)

7 Solve the equation $\log_5(8x - 4) = 2\log_5 3 + \log_5 4$

[3 marks]

Answer:

8 Solve the equation $\sqrt{8^{x+4}} = \frac{1}{4^x 2^{x+3}}$

[3 marks]

Answer:

- 9 Given that the first three terms of an arithmetic progression are y , $2y-2$ and $2y+1$.
Find
(a) The value of y
(b) the sum of the next 8 terms.

[4 marks]

Answer: a)
b)

- 10 In a geometric progression, the first term is 64 and the fourth term is 27. Calculate
(a) the common ratio
(b) the sum to infinity of the geometric progression

[3 marks]

Answer: a)
b)

- 11 x and y are related by the equation $y = px^2 + qx$, where p and q are constants.
 A straight line is obtained by plotting $\frac{y}{x}$ against x , as shown in Diagram 1.

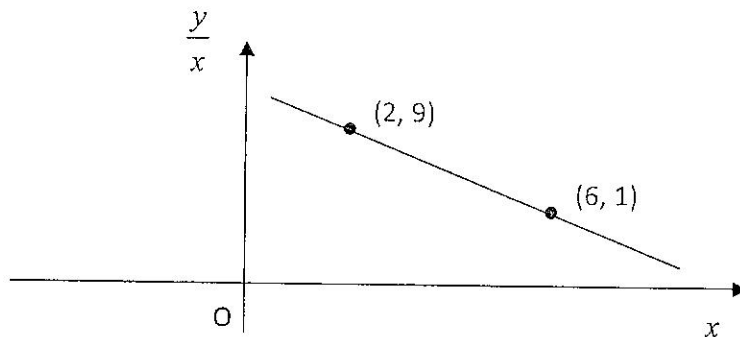


Diagram 1

Calculate the value of p and of q .

[3 marks]

Answer: $p = \dots\dots\dots$

$q = \dots\dots\dots$

- 12 Given that the points $A(2, 2)$, $B(5, 3)$, $C(4, -1)$ and $D(p, q)$ are vertex of a parallelogram $ABCD$.
 Find,
 (a) the value of p and of q .
 (b) The area of $ABCD$

[3 marks]

Answer: a) $\dots\dots\dots$

b) $\dots\dots\dots$

- 13 It is given that $OABC$ is a parallelogram with $\overrightarrow{OA} = i + 2j$ and $\overrightarrow{OC} = -3i - 3j$
 Find
 (a) \overrightarrow{AC}
 (b) unit vector in the direction of \overrightarrow{AC}

[3 marks]

Answer: a)
 b)

- 14 Diagram 2 shows the vectors OP , OQ , PQ and QS on a square grid.

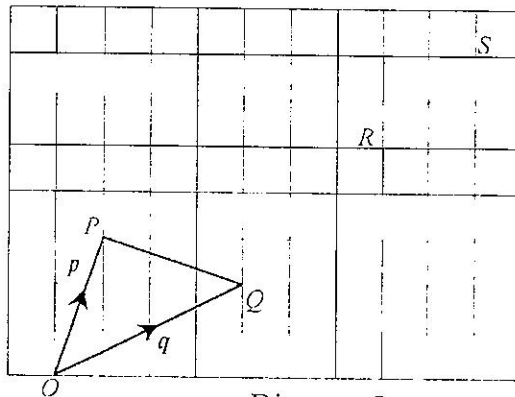


Diagram 2

Given that $\overrightarrow{OP} = p$ and $\overrightarrow{OQ} = q$, express in terms of p and q .

- (a) \overrightarrow{PQ}
 (b) \overrightarrow{RS}

[3 marks]

Answer: a)
 b)

- 15 Diagram 3 shows a right angled triangle OPQ and sectors of the circle SOT and PQS, centers O and Q respectively.

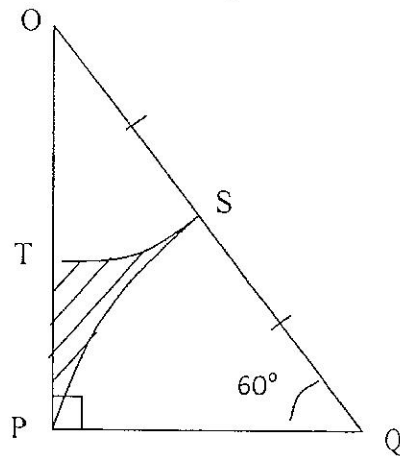


DIAGRAM 3

Given that $OS = SQ$ and the perimeter of the shaded region is 21 cm, calculate the radius of the sector.

[3 marks]

Answer:

- 16 Solve the equation $6\sec^2 \theta - 13 \tan \theta = 0$ for $0^\circ \leq \theta \leq 360^\circ$

[3 marks]

Answer:

17 Given that $\sin A = \frac{\sqrt{5}}{3}$ and A is an obtuse angle. Without using calculator, find the value of

(a) $\cos A$

(b) $\sin \frac{A}{2}$

[3 marks]

Answer: a)

b)

18 Find the coordinates of the turning point of the curve $y = 2x + \frac{1}{x}$

[3 marks]

Answer :

19 Given that $y = \frac{9}{x^3}$. The small change, u , causes an increase in x from 2 to $2 + u$.

Estimate the approximate value of $\frac{9}{(2+u)^3}$ in terms of u .

[4 marks]

Answer:

20 Given that $\int_2^3 f(x)dx = -4$, find the value of $\int_3^2 [5f(x) + 3x]dx$

[3 marks]

Answer:

21 Diagram 4 shows the graph of $y = x^2 - 4x + 7$ and $y = 7 - x$.

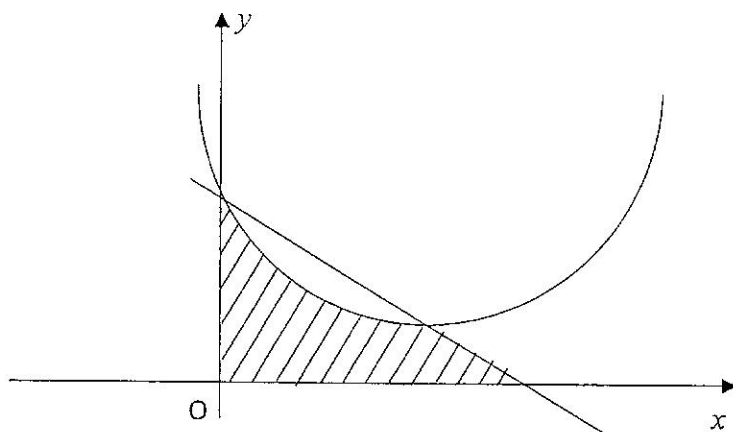


Diagram 4

Find the area of the shaded region.

[4 marks]

Answer:

22 A rescue team of 6 is to be chosen from 7 firemen and 5 medical personnel.
Find the number of ways of forming the rescue team if

- (a) the number of firemen and medical personnel are the same,
- (b) the number of medical personnel is more than the number of firemen.

[3 marks]

Answer: a)

b)

23 Diagram 5 shows nine letter cards to be arranged in a row.

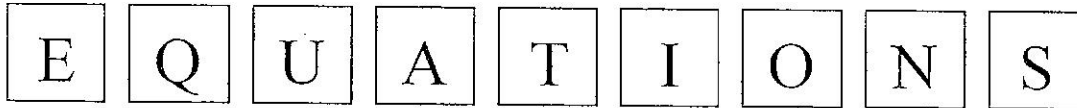


DIAGRAM 5

Calculate the number of different arrangements of all the letter cards if

- (a) the arrangement start with vowel,
- (b) all the consonants must be together.

[3 marks]

Answer: a)
b)

24. It is known that 2% of the number of pens produced from a factory are defective. For samples of 5000 pens, calculate

- (a) the mean,
- (b) the standard deviation

for the number of pens that are defective.

[3 marks]

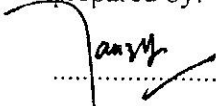
Answer: a)
b)

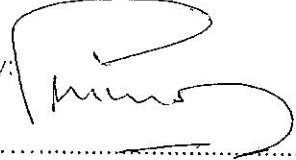
25 If z is the score for the standard normal distribution and $P(k < z < 0.5) = 0.148$, find the value of k . [3 marks]

Answer:

END OF QUESTION PAPER

This question paper is:

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