Answer **all** *questions.*

1.

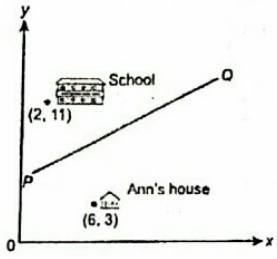

Diagram 1

Diagram 1 shows the locations of school and Ann' house on a Cartesian plane. PQ is a straight road between the school and Ann'house such that both locations are equidistant from PQ. Find the equation of the straight line PQ. [3marks]

Answer :

1 | 3

2. The variables x and y are related by the equation $qx^4 - 3 = px^4y$, where p and q are constants. When a graph of y is plotted against $\frac{1}{x^4}$, a straight line with gradient $\frac{3}{2}$ and y-intercept 5 is obtained. Find the value of p and of q. [3 marks]

Answer :

2 | 3

3. (a) Determine whether the following sequence is an Arithmetic progression or a Geometric progression.

$4^x, 4^{x+1}, 4^{x+2}, 4^{x+3}, \ldots$

(b) Find the sum of the first five terms, in terms of x, of the sequence. [3 marks]

Answer :

(a)

(b)

3 | 3

4. Diagram 2 shows the vectors $\overrightarrow{OA}$, $\overrightarrow{OB}$ and $\overrightarrow{OP}$ drawn on grid of equal squares with sides of 1 unit.

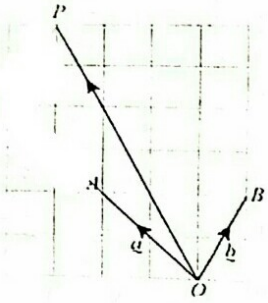

Diagram 2

Determine
(a) $|\overrightarrow{OP}|$,
(b) $\overrightarrow{OP}$ in terms of $\boldsymbol{a}$ and $\boldsymbol{b}$. [2 marks]

Answer :

(a)

(b)

5.

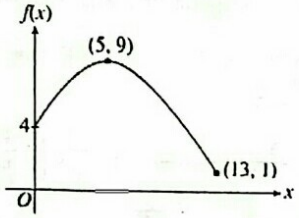

Diagram 3

Diagram 3 shows the relation of function $f(x)$ in the graph form. State
(a) the type of the relation.
(b) the range of the codomain for the domain $0 \leq x \leq 13$. [2 marks]

Answer :

(a)

(b)

5

6. (a) Show that $\dfrac{\sec x}{\cot x + \tan x} = \sin x$. [2 marks]

(b) Hence, solve $\dfrac{\sec 2x}{\cot 2x + \tan 2x} = -\dfrac{1}{2}$ for $0 \leq x \leq 360°$. [2 marks]

6

4

Answer :

(a)

(b)

7.

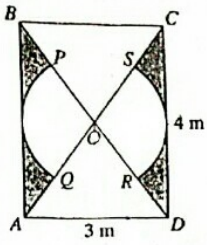

Diagram 4

Diagram 4 shows a logo drawn on a rectangular advertisement board $ABCD$. The diagonals AC and BD intersect at O. PQ and RS are the arcs of a circle with centre O. Sarah intends to paint the shaded region with green colour. Calculate the area, in m^2, of the region. [4 marks]

Answer :

7

4

8. Given $y = 5(25^x) - 126(5^x)$, find the values of x when $y = -25$. [3 marks]

Answer :

3

9. The tangent at the point $P(a,\ b)$ on the curve $y = \frac{ab}{x}$ meets the x-axis and y-axis at A and B respectively. Show that $PA = PB$. [4 marks]

Answer :

4

10. Diagram 5 shows Wei Xing kicking a ball which flies over his brother, Chee Boon. The motion of the ball can be expressed as $y = -\frac{1}{63}x(2x - 25)$ where x is the horizontal distance, in m, from Wei Xing and y is the height, in m, from the ground.

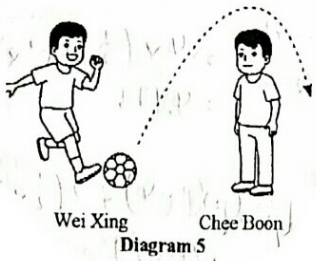

Diagram 5

Given that Chee Boon is 1 m tall and he stood still while Wei Xing kicked the ball. Find the range of distance, in m, between Wei Xing and Chee Boon so that Chee Boon will not hit by the incoming ball. [3 marks]

Answer .

10

3

11.

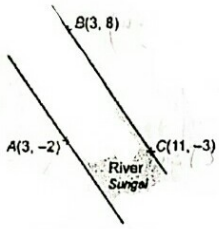

Diagram 6

An engineer needs to construct a bridge across the river joining point A to river bank of BC as shown in Diagram 6. If the area of the triangle ABC is 40 km^2, calculate the shortest distance, in km, of the bridge. [3 marks]

Answer :

11

3

12. It is given $\overrightarrow{OA} = \begin{pmatrix} k \\ 3 \end{pmatrix}$, $\overrightarrow{OB} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$ *and* $\overrightarrow{OC} = \begin{pmatrix} h-1 \\ 1 \end{pmatrix}$, where h and k are constants. Express h in terms of k, if points A, B and C lie on a straight line. [3 marks]

Answer :

12

3

13. Find the values of x in the quadratic equation $px^2 + (p+q)x + q = 0$ in terms of p and q. [3 marks]

Answer :

13 | 3

14. The probability that Jessica is able to complete her homework and sleep early is $\frac{3}{5}$. If Jessica sleeps early, the probability that she will wake up early on the next day is $\frac{6}{7}$. If Jessica sleeps late, the probability that she will wake up early on the next day is $\frac{4}{7}$. If Jessica wake up early, the probability that she will be late for school is $\frac{1}{8}$. If Jessica wake up late, the probability that she will be late for school is $\frac{1}{3}$. Find the probability that Jessica will be late for school on a particular day. [4 marks]

Answer :

14 | 4

15. The mean score for two classes of students taking an oral test is 73. The mean score for Bestari class and Murni class are 65.2 and 75.6 respectively. Find the ratio of the number of students in Bestari class and Murni class. [3 marks]

Answer :

15 | 3

16.

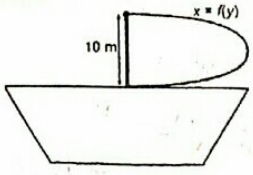

Diagram 7

Diagram 7 shows a yacht with the sailcloth in a curve $x = f(y)$. The sailcloth can be raised up to a height of 10 m and occupies an area of $166\frac{2}{3}m^2$ between the rod and the sailcloth. Find

(a) $\int_{10}^{0} 2f(y)dy$,

(b) the value of k if $\int_{0}^{10} \left(\frac{k}{3}f(y) + k\right) dy = 590$.

[3 marks]

Answer :

(a)

(b)

16

3

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17. Diagram 8 shows the graph of the function $y = |f(x)|$ where $f(x)$ is a straight line. Find the two possible

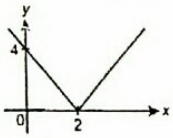

Diagram 8

(a) gradient of $f(x)$,

(b) function of $f(x)$. [2 marks]

Answer :

(a)

(b)

17

2

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18. Given that $\frac{(\log_x y)^2}{\log_y x} + 8 = 0$, express y in terms of x. [3 marks]

Answer :

18

3

19. Puan Aini makes curry puffs for sale in school canteen. She started making x curry puffs in week 1 and increased the amount of curry puffs by 5 each week until week 13. After week 13, she continued making the same amount of curry puffs as week 13 until week 43. Given the total amount of curry puffs made by PuanAini for the first 13 weeks is 1690. Find

(a) the value of x, the amount of curry puffs made by Puan Aini in week 1.

(b) the total amount of curry puffs made by Puan Aini for the first 43 weeks.

[4 marks]

Answer :

19

4

(a)

(b)

20. The diagram 9 shows the graph of quadratic function $y = f(x)$. B is the turning point of the curve. Given $AB = 5$ units, find

(a) the coordinates of point B.

(b) the equation of the axis of symmetry.

(c) the equation of the curve $f(x)$.

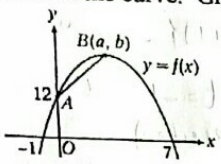

Diagram 9

[3 marks]

Answer :

20

3

(a)

(b)

(c)

21. The continuous random variable X measures the Additional Mathematics marks of 180 Form Five students in a test. These marks are scaled and the continuous random variable Y measured the scaled marks. The original marks of two students Ting Zhe and Chun Hong are 32 marks and 50 marks respectively. The respective scaled marks of Ting Zhe and Chun Hong are 50 and 71. If $X \sim N(28.6,\ 4^2)$ and $Y \sim N(\mu,\ \sigma^2)$, find the numerical values of μ and σ. [4 marks]

Answer :

21

4

22. In a village, it is found that the mean of the number of females is 4620 and the variance is 2079. Find the percentage of the number of females in the village.
[3 marks]

Answer :

22

3

23. The height, h, of a tennis ball being thrown vertically upwards can be represented by a quadratic function $h(t) = -4.9t^2 + 14.7t + 19.6$, where t is the time of the motion of the ball in seconds and h is the height in m measured from the ground.

(a) Find the maximum height of the ball from the ground and the time for the ball to reach the maximum height without using differentiation.

(b) Find the time taken for the ball to hit the ground. [4 marks]

Answer :

(a)

(b)

23

4

24. The diagram 10 shows two rows of chairs. The first row has 2 chairs and the second row has 4 chairs. In how many ways can 6 people be seated if a couple from the group

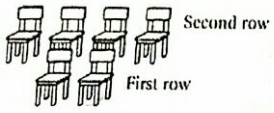

Diagram 10

(a) must sit in the same row ?

(b) must sit in the different rows ? [4 marks]

Answer :

(a)

(b)

24

4

25. Diagram 11 shows the graphs of the function of wave P and wave Q, for a continuous angle x. Given the function of wave P is $y = \cos 2x$ and wave Q is $y = \cos x$. Find the values of x for $0° \leq x \leq 360°$ when both the waves meet.

Diagram 11

[3 marks]

Answer :

END OF THE QUESTION PAPER