

Name.....Stream.....House.....



DEPARTMENT OF MATHEMATICS

S.4 MATHEMATICS–2020

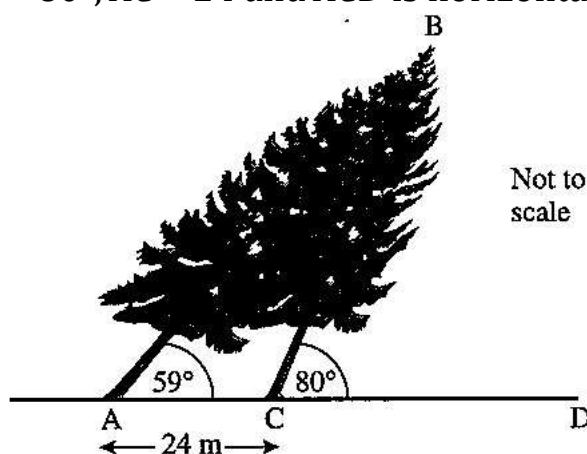
PAPER 1 TEST 2

2 HOURS : 30 MINUTES

- Answer all the ten questions in section A and any five from section B.
- Any additional question(s) answered will not be marked.

SECTION A: (40 MARKS)

1. One solution of the equation $x^2 - 7x + k = 0$ is $x = -\frac{1}{2}$. Find the value of k .
(04 marks)
2. During a storm, a tree, AB , is blown over and rests on another tree CB .
 $\angle BAC = 59^\circ$, $\angle BCD = 80^\circ$, $AC = 24$ and ACD is horizontal.



Calculate the length AB .

(04 marks)

3. The height of a small box is 2 cm and its volume is 10 cm^3 . If the height of a similar box is 6 cm, what is its volume? (04 marks)
4. A bag contains blue, green and red pens of the same type in the ratio 8:2:5 respectively. A pen is picked at random without replacement and its colour noted. Determine the probability that the first pen picked is

- (a) blue.
- (b) either green or red. (04 marks)

5. Make t the subject of the formula $p = \sqrt[3]{\frac{t+q^2}{2t}}$. (04 marks)

6. A point $A(0,3)$ is reflected in the line $y + x = 0$. Find the coordinate of its image A^0 . (04 marks)

7. Find M if $\begin{pmatrix} 1 & 1 \\ -2 & 1 \end{pmatrix} M = 2 \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$. (04 marks)

8. The total marks scored in a test by 6 pupils was 420. If the mean mark for the first 5 pupils was 68 find the marks scored by the sixth pupil. (04 marks)

9. Simplify $\frac{t^2 - 5t}{t^2 - 25}$. (04 marks)

10. A triangle PQR has a height of x cm and a base of $(x + 3)$ cm. if its area is 5 cm^2 , calculate the height of its base. (04 marks)

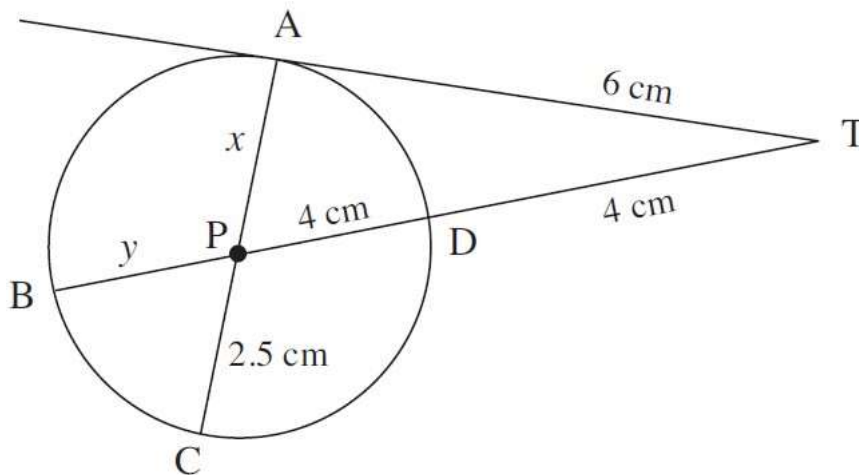
SECTION B: (60 MARKS)

11. A triangle with vertices $A(2,4)$, $B(6,4)$ and $C(1,6)$, undergoes two successive transformations \mathbf{P}_1 followed by \mathbf{P}_2 . The transformation \mathbf{P}_1 is represented by

the $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ matrix and \mathbf{P}_2 by the $\begin{pmatrix} 0.5 & 0 \\ 0 & 0.5 \end{pmatrix}$ matrix.

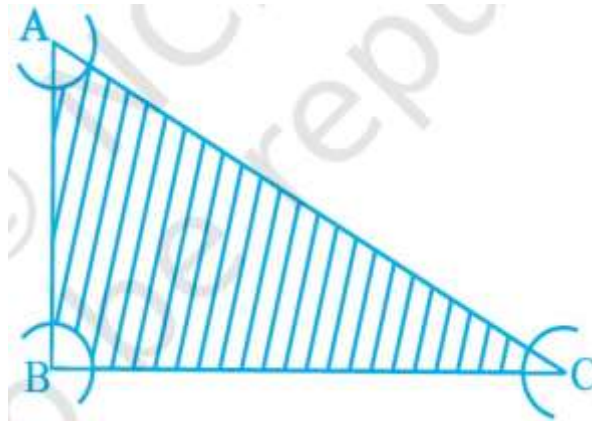
- (a) Find the coordinates of the vertices of triangle:
- (i) $A^0B^0C^0$ the image of ABC under P_1 .
 - (ii) $A^{00}B^{00}C^{00}$ the image of $A^0B^0C^0$ under P_2 .
- (b) Show on the same axes the three triangles ABC , $A^0B^0C^0$ and $A^{00}B^{00}C^{00}$.
- (c) Use your graph in (b), to describe fully the transformations represented by
- (i) P_1 ,
 - (ii) P_2 . (12 marks)

12. (a) Determine x and y .



(06 marks)

- (b) With the vertices A , B and C of a triangle ABC as centres, arcs are drawn with radii 5 cm each as shown below. If $AB = 14$ cm, $BC = 48$ cm and $CA = 50$ cm, then find the area of the shaded region. (Use $\pi = 3.14$).



13. (a) $A = \begin{pmatrix} 1 & -1 \\ 2 & -1 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 1 \\ 4 & -1 \end{pmatrix}$, show that $(A+B)^2 = A^2+B^2$.
 If and (06 marks)

- (b) Given $D = \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$ that and I is a 2×2 identity matrix, obtain the value of p and q such that $D^2 = pD + qI$. (12 marks)

14. The length of certain plants in cm, were recorded as follows

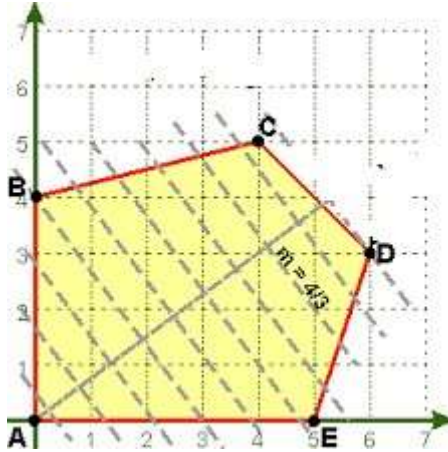
Length(cm)	11 – 20	21 – 30	31 – 40	41 – 50	51 – 60
Frequency(f)					
Cummulative frequency	4	12	28	48	58

- (a) Complete the table.
 (b) Calculate the mean and madian.
 (c) Plot a histogram and use it to estimate the modal length. (12 marks)
15. (a) James' present age is $\frac{1}{3}$ of his father's age. In ten years' time, he will be $\frac{1}{2}$ of his father's age then. How old is his father?

- (b) Make x the subject of the formula $t^2 = \frac{ax}{a+x}$ and hence calculate x if $t = 2$ and $a = 6$. (12 marks)

16. (a) List the integer values of x which satisfy the inequality $2x - 1 < 20 < 3x - 5$

- (b) Write down five inequalities defined by the shaded region below.



(12 marks)

17. (a) Solve the simultaneous equations:

$$4y - x = 6$$

$$5x - 2y^2 = 12.$$

- (b) The equal angles of an isosceles triangle are $(2x + y)^\circ$ and $(3y - x)^\circ$.

The third angle is $(2y - x)^\circ$. Find x and y .

(12 marks)

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