

**(General Instructions)**

- ❖ Please check that this question paper contains 7 printed pages.
- ❖ Please check that this question paper contains 38 questions.
- ❖ Please write down the serial number of the question before attempting it.
- ❖ Reading time of 15 minutes is given to read the question paper alone. No writing during this time.
- ❖ This question paper has 5 sections A, B, C, D and E.
- ❖ Section A has 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
- ❖ Section B has 5 short answer – I (SA-I) type questions carrying 2 marks each.
- ❖ Section C has 6 short answer – II (SA-II) type questions carrying 3 marks each.
- ❖ Section D has 4 long answer (LA) type questions carrying 5 marks each.
- ❖ In Section E, Question no. 36 to 38 are case study based questions, carrying 4 marks each. Internal choice is provided in 2 marks questions in each case-study.
- ❖ All questions are compulsory. However, an internal choice in 2 questions of 2 marks, 2 questions of 3 marks and 2 questions of 5 marks has been provided in the 2 marks questions of Section E.
- ❖ Draw neat figures wherever required. Take  $\pi = 22/7$  wherever required if not stated)

**COMMON EXAMINATION**  
**Class-10**  
**MATHEMATICS STANDARD (041)**

**Roll No.:**

**Maximum Marks: 80**

**Date:**

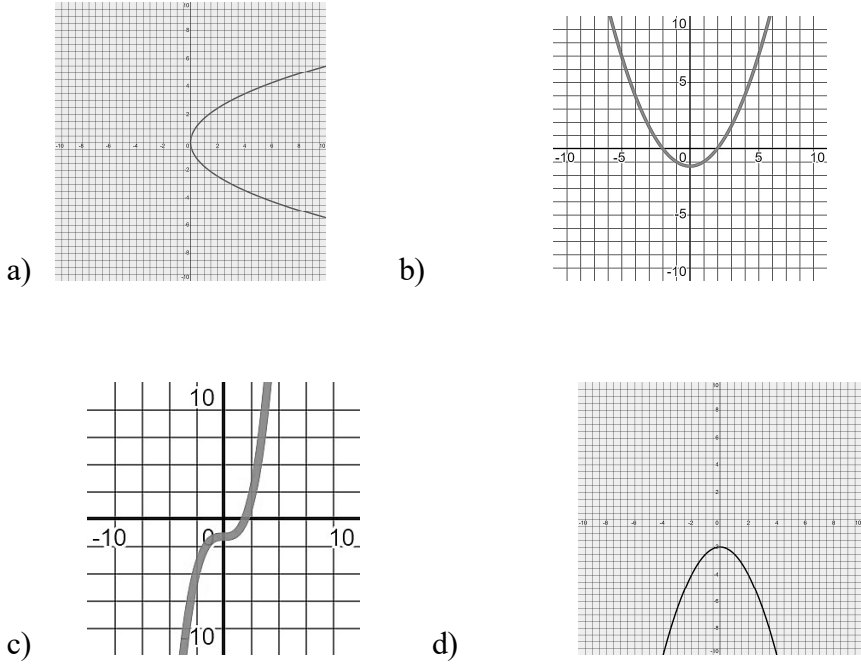
**Time allowed: 3 hours**

**SECTION – A**

**20 x 1 = 20**

1. If the zeroes of quadratic polynomial are 1, 1; then the polynomial can be
  - a)  $x^2 + x + 1$
  - b)  $x^2 - 2x + 1$
  - c)  $x^2 + 3x + 2$
  - d)  $x^2 + 2x + 2$
2. Which of the following experiments have equally likely outcomes ?
  - a) A driver attempts to start a car. The car starts or does not start
  - b) A baby is born, it is a boy or a girl
  - c) A player attempts to shoot a basketball. He shoots or misses the shot
  - d) A chef attempts to prepare a dish. It turns out to be tasty or does not taste good
3. A three digit number is chosen. Find the probability that all three digits are same
  - a)  $\frac{1}{100}$
  - b)  $\frac{99}{100}$
  - c)  $\frac{11}{900}$
  - d) 0
4. For what value of  $k$  the following pair of linear equation  $2x+3y+5 = 0$  ;  $kx +4y = 10$  has a unique solution ?
  - a)  $k = \frac{8}{3}$
  - b)  $k \neq \frac{8}{3}$
  - c)  $k = 3$
  - d)  $k \neq 3$
5. Which of the following equations has no real roots ?
  - a)  $x^2 - 4x + 4 = 0$
  - b)  $x^2 - 4x = 0$
  - c)  $3x^2 - 1 = 0$
  - d)  $x^2 + 1 = 0$

6. Which of the following is not the graph of a quadratic polynomial ?



7. If  $p-1$ ,  $p+3$ ,  $3p-1$  are in AP, then  $p$  is equal to

- a) 4                      b) -4                      c) 2                      d) -2

8. The perimeter of a triangle with vertices  $(0,4)$ ,  $(0,0)$  and  $(3,0)$  is

- a) 5                      b) 12                      c) 11                      d)  $7 + \sqrt{5}$

9. If  $(1,1)$   $(-1,-1)$  are two vertices of an equilateral triangle, then the third vertex is

- a)  $(-\sqrt{3}, \sqrt{3})$       b)  $(0, 0)$               c)  $(-1, 0)$               d)  $(0, 1)$

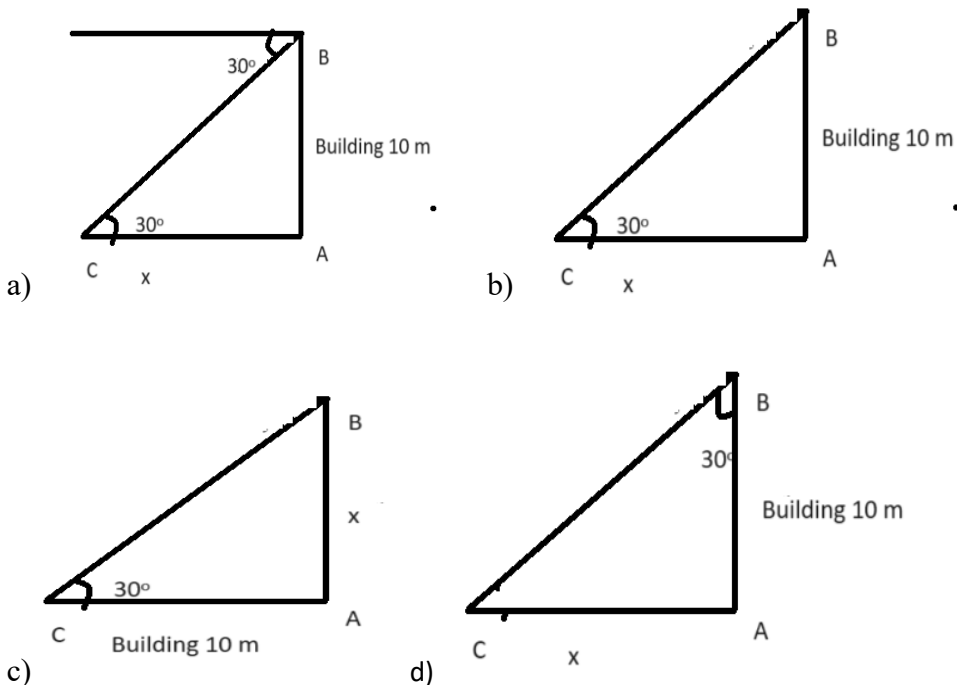
10. If  $\cos A = \frac{3}{5}$ , then  $\sec A - \tan A$  is equal to

- a) 3                      b)  $\frac{11}{12}$                       c)  $\frac{1}{3}$                       d)  $\frac{12}{11}$

11.  $8\cot^2 A - 8\operatorname{cosec}^2 A =$

- a) 1                      b) 8                      c) -1                      d) -8

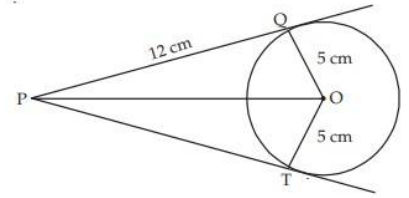
12. Which of the following figure is correct for the question “ From the top of a building of height 10 m , the angle of depression of an object on the ground is  $30^\circ$  . If the distance of the object from the building is  $x$  , then find  $x$  “



13. A kite is flying at a height of 80 m. above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is  $30^\circ$ , then the length of the string is \_\_\_\_\_.

- a) 160 m.                      b) 40 m.                      c) 100 m.                      d) 115 m.

14. If PQ and PT are tangents from an external point P to a circle with centre O and radius 5cm. If PQ = 12cm, then the perimeter of quadrilateral PQOT is



- a) 24 cm                      b) 34 cm                      c) 17 cm                      d) 20 cm

15. Which of the following is correct? Area of a sector of angle  $\theta$  of a circle with radius r is

- a)  $\frac{\theta}{180^\circ} \times 2\pi r$                       b)  $\frac{\theta}{360^\circ} \times 2\pi r$                       c)  $\frac{\theta}{720^\circ} \times 2\pi r^2$                       d)  $\frac{\theta}{180^\circ} \times \pi r^2$

16. The radius(in cm) of the largest right circular cone that can be cut out from a cube of edge 4.2 cm is

- a) 8.4                      b) 4.2                      c)  $(4.2)^2$                       d) 2.1

17. In  $\Delta ABC$ , D and E are points on sides AB and AC respectively such that  $DE \parallel BC$  and  $AD : DB = 3 : 1$ . If  $EA = 6.6$  cm, then  $AC =$

- a) 6.6 cm                      b) 2.2 cm                      c) 3.3 cm                      d) 8.8 cm

18. Mode and mean of a data are 24 and 30. Median of the data is

- a) 14                      b) 20                      c) 28                      d) 26

**19. Directions:**

- (a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.  
 (b) Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.  
 (c) Assertion is correct but Reason is incorrect.  
 (d) Assertion is incorrect but Reason is correct

P (-2, 5) and Q (2, -1) are two points on the coordinate plane. Two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements (A) and (R).

Assertion (A): The midpoint (0, 2) is the only point equidistant from P and Q.

Reason (R): There are many points (x, y) where  $(x + 2)^2 + (y - 5)^2 = (x - 2)^2 + (y + 1)^2$  are equidistant from P and Q.

**20. Directions:**

- (a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.  
 (b) Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.  
 (c) Assertion is correct but Reason is incorrect.  
 (d) Assertion is incorrect but Reason is correct

A number q is prime factorised as  $3^2 \times 7^2 \times b$ , where b is a prime number other than 3 and 7. Based on the above information, two statements are given below - one labelled Assertion (A) and the other labelled Reason (R). Read the statements carefully and choose the option that correctly describes statements (A) and (R).

Assertion (A): q is definitely an odd number.

Reason (R):  $3^2 \times 7^2$  is an odd number.

## SECTION – B

5 x 2 = 10

21. A juice seller had three types of juice. 403 litres of 1st kind, 434 litres of 2nd kind and 465 litres of 3rd kind. Find the least possible number of containers of equal size in which different types of juice can be filled without mixing.

[OR]

Check whether the statement below is true or false. “The square root of every composite number is rational.” Justify your answer by proving rationality or irrationality as applicable.

22. Find the sum of the even numbers between 0 and 50.

[OR]

If the  $n$ th term of an AP is given by  $a_n = 5 - 6n$ , then find the sum of its first 20 terms

23. Three cubes each of side 4 cm are joined end to end. Find the surface area of the resulting cuboid

24. Find the values of  $k$  for which roots of the equation  $2x^2 - kx + k = 0$  are equal.

25. Wasim made a model of Pac-Man, after playing the famous video game of the same name. The area of the model is  $120\pi \text{ cm}^2$ . Pac-Man's mouth forms an angle of  $60^\circ$  at the centre of the circle. A picture of the model is shown.

Wasim wants to decorate the model by attaching a coloured ribbon to the entire boundary of the shape. What is the minimum length of the ribbon required in terms of  $\pi$ ? Show your work.



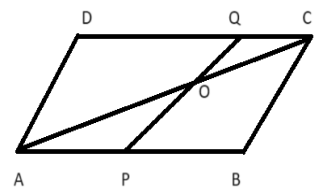
## SECTION – C

6 x 3 = 18

26. Find the zeros of the quadratic polynomial  $6x^2 - 3 - 7x$  and verify the relationship between the zeros and the coefficients of the polynomial

27. Prove that  $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$

28. ABCD is a parallelogram. Point P divides AB in the ratio 2:3 and point Q divides DC in the ratio 4:1. Prove that OC is half of OA.



[OR]

In  $\triangle ABC$ ,  $AB = AC$  and  $D$  is a point on side  $AC$ , such that  $BC^2 = AC \times CD$ .

Prove that  $BD = BC$

29. Given that  $\sqrt{3}$  is irrational. Prove that  $5 + 2\sqrt{3}$  is irrational.

30. Anny is playing a game and has two identical 6-sided dice. The faces of the dice have 3 even numbers and 3 odd numbers. She has to roll the two dice simultaneously and has two options to choose from before rolling the dice.

She wins a prize if:

Option 1: the sum of the two numbers appearing on the top of the two dice is odd.

Option 2: the product of the two numbers appearing on top of the two dice is odd.

Which option should Anny choose so that her chances of winning a prize is higher? Show your work.

# CHENNAI SAHODAYA SCHOOLS COMPLEX

31. The sum of the numerator and denominator of a fraction is 4 more than twice the numerator. If the numerator and denominator are increased by 3, they are in the ratio 2: 3. Find the fraction

[OR]

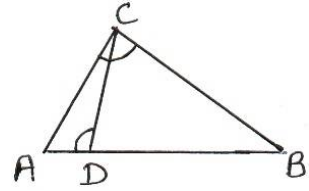
The present age of father is 3 years more than three times the age of his son. Three years later, the father's age will be 10 years more than twice the age of the son. Determine their present ages.

## SECTION – D

**4 x 5 = 20**

32. In the given figure  $\angle ADC = \angle BCA$ . Prove that  $\Delta ACB \sim \Delta ABC$ .

Hence, find BD if AC = 8 cm and AD = 3 cm.



33. The angles of depression of the top and bottom of a building 50 metres high as observed from the top of a tower are  $30^\circ$  and  $60^\circ$  respectively. Find the height of the tower and also the horizontal distance between the building and the tower (use  $\sqrt{3} = 1.732$ )

[OR]

The angle of elevation of an aeroplane from a point on the ground is  $60^\circ$ . After a flight of 30 seconds, the angle of elevation changes to  $30^\circ$ . If the plane is flying at a constant height of  $3600\sqrt{3}$  m, find the speed in km/hr of the plane

34. The following distribution gives the daily income of 35 workers of a factory :

Daily income	Less than 120	Less than 140	Less than 160	Less than 180	Less than 200
Number of workers	5	16	24	31	35

Find the mode and median for the above distribution

[OR]

If the mean of the following frequency distribution is 54, find the value of p. Hence find the median for the distribution

Class	Frequency (fi)
0 - 20	7
20 - 40	p
40 - 60	10
60 - 80	9
80 - 100	13

35. Prove that the lengths of tangents drawn from an external point of a circle are equal. Hence prove the following: A circle touches all the four sides of a quadrilateral ABCD, then  $AB+CD=BC+DA$

## SECTION – E

4 x 5 = 20

(Case Study)

36. An interior designer, Sana, hired two painters, Manan and Bhima to make paintings for her buildings. Both painters were asked to make 50 different paintings each. The prices quoted by both the painters are given below:

◆ Manan asked for Rs 6000 for the first painting, and an increment of Rs 200 for each following painting.

◆ Bhima asked for Rs 4000 for the first painting, and an increment of Rs 400 for each following painting.

(i) How much money did Manan get for his 25th painting? Show your work. (1 mark)

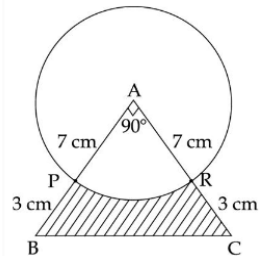
(ii) How much money did Bhima get in all? Show your work. (1 mark)

(iii) If both Manan and Bhima make paintings at the same pace, find the first painting for which Bhima will get more money than Manan. Show your steps. (2 marks)

[OR]

(iii) Sana's friend, Aarti hired Manan and Bhima to make paintings for her at the same rates as for Sana. Aarti had both painters make the same number of paintings, and paid them the exact same amount in total. How many paintings did Aarti get each painter to make? Show your work. (2marks)

37. To honour teachers on teachers day, mementos are purchased. A memento is made as shown in the figure. Its base PBCR is silver plated from the front side at the rate of rupees 500 .



Answer the questions based on above information:

[i] Find the area of the sector APR (1 mark)

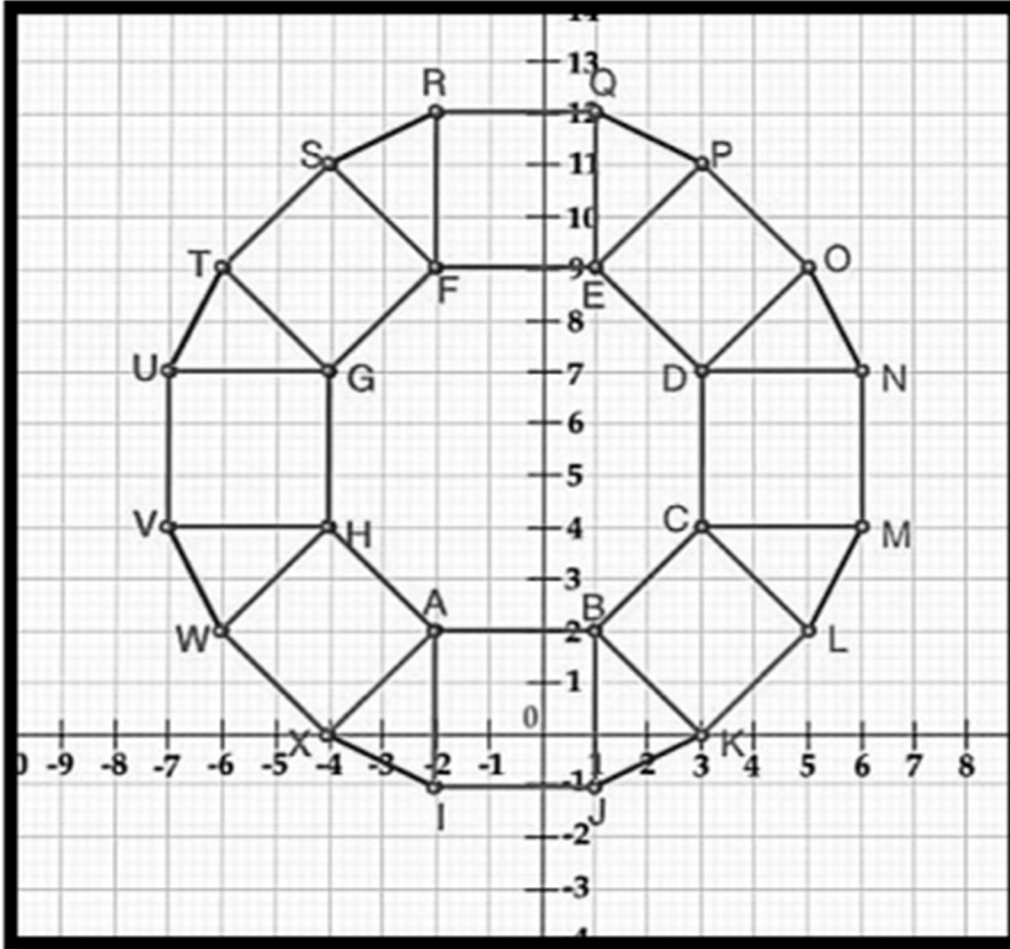
[ii] Find the area which is silver plated (2 marks)

[OR]

[ii] Find the perimeter of PRCB (2 marks)

[iii] Find the cost of silver plating (1 mark)

38. A tiling or tessellation of a flat surface is the covering of a plane using one or more geometric shapes, called tiles, with no overlaps and no gaps. You may find tessellation patterns on floors, walls, paintings etc. Shown below is a tiled floor in the archaeological Museum of Seville, made using squares, triangles and hexagons.



Answer the following questions:

- [i] What is the length of the line segment joining points C and F? ( 1 mark)
- [ii] Find the midpoint of the line joining the points A and F using midpoint formula ( 1 mark)
- [iii] If F divides the line joining A and R in the ratio  $k : 1$ , find the value of  $k$  using section formula ( 2 marks)

[OR]

If a point  $(x, y)$  is equidistant from F and C, find a relation in terms of  $x$  and  $y$  ( 2marks)

**End of paper**