

**(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**

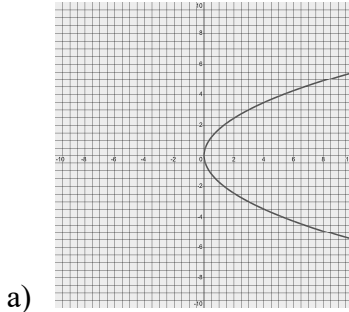
1. Which of the following is correct ? Area of a sector of angle  $\theta$  of a circle with radius  $r$  is  
 a)  $\frac{\theta}{180^\circ} \times 2\pi r$       b)  $\frac{\theta}{360^\circ} \times 2\pi r$       c)  $\frac{\theta}{720^\circ} \times 2\pi r^2$       d)  $\frac{\theta}{180^\circ} \times \pi r^2$
2. 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
3. Mode and mean of a data are 24 and 30 . Median of the data is  
 a) 14      b) 20      c) 28      d) 26
4. 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
5. 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

# CHENNAI SAHODAYA SCHOOLS COMPLEX

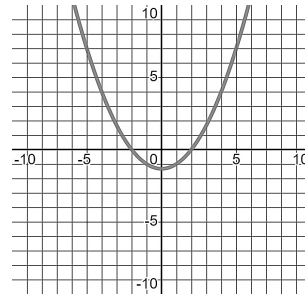
6. A kite is flying at a height of 80 m. above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is  $30^\circ$ , then the length of the string is \_\_\_\_\_.

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

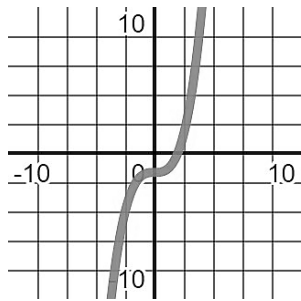
7. Which of the following is not the graph of a quadratic polynomial ?



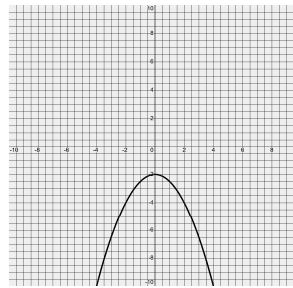
a)



b)



c)



d)

8. 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)  $k \neq 3$

9. Which of the following equations has no real roots ?

- a)  $x^2 - 4x + 3\sqrt{2} = 0$     b)  $x^2 - 4x = 0$                       c)  $3x^2 - 1 = 0$                       d)  $x^2 - 4x - 3\sqrt{2} = 0$

10. In an AP , if  $a = 3.5$  ,  $d = 0$  ,  $n = 101$ , then  $a_n$  will be

- a) 0                      b) 3.5                      c) 103.5                      d) 104.5

11. 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

12. 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)  $x^2 + 2x + 2$

13. If P(1,2) Q(4,6) R(5,7) S (m,n) are the vertices of a parallelogram PQRS , then

- a)  $m = 2$  ,  $n = 4$                       b)  $m = 3$  ,  $n = 4$                       c)  $m = 2$  ,  $n = 3$                       d)  $m = 3$  ,  $n = 5$

14.  $\sin 2A = 2\sin A$  is true when  $A =$

- a)  $0^\circ$                       b)  $30^\circ$                       c)  $45^\circ$                       d)  $60^\circ$

15.  $8\cot^2 A - 8\operatorname{cosec}^2 A =$

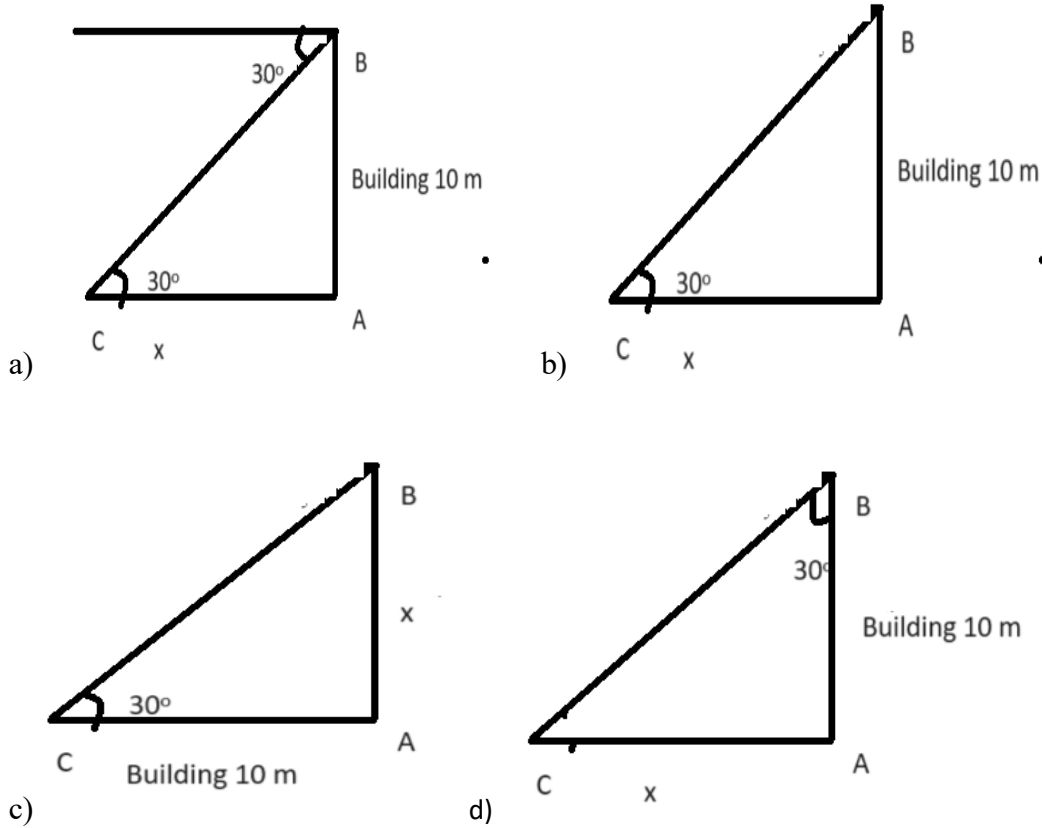
- a) 1                      b) 8                      c) - 1                      d) - 8

16. Which term of the A.P. 20,  $19\frac{1}{4}$  ,  $18\frac{1}{2}$  ,  $17\frac{3}{4}$  is the first negative term?

- a) 27th                      b) 28th                      c) 26th                      d) 25<sup>th</sup>

# CHENNAI SAHODAYA SCHOOLS COMPLEX

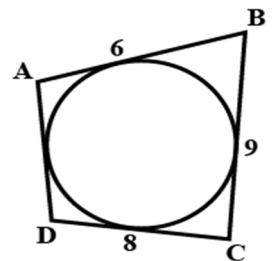
17. Which of the following figure is correct for the question “ From the top of a building of height 10 m , the angle of depression of an object on the ground is  $30^\circ$  . If the distance of the object from the building is x , then find x “



18. A circle touches all the four sides of a quadrilateral ABCD .

If AB = 6 cm, BC = 9 cm and CD = 8 cm, then the length of side AD is

- a) 9 cm                      b) 3 cm                      c) 7 cm                      d) 5 cm



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. 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 below



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.

22. Find two consecutive positive integers, sum of whose squares is 365  
 23. Find the sum of the odd numbers between 0 and 50

[OR]

If the sum of first  $n$  terms of an AP is  $4n - n^2$ , find its  $n^{\text{th}}$  term

24. Three cubes each of side 4 cm are joined end to end. Find the surface area of the resulting cuboid  
 25. An army contingent of 1000 members is to march behind an army band of 56 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march ?

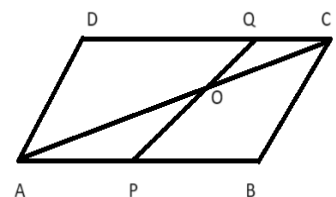
[OR]

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.

## SECTION – C

6 x 3 = 18

26. 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  $BD = BC$

27. Given that  $\sqrt{3}$  is irrational. Prove that  $5 + 2\sqrt{3}$  is irrational.
28. Find the zeros of the quadratic polynomial  $6x^2 - 3 - 7x$  and verify the relationship between the zeros and the coefficients of the polynomial
29. (6, 0) and (0, 2) are two of the points of intersections of two lines represented by a pair of linear equations.
- How many points of intersections does the pair of linear equations have in total? Justify your answer.
  - Find the equation that represents one of the lines of the above pair. Show your work.
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.
31. Prove that  $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$

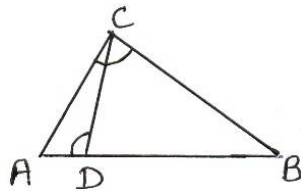
[OR]

Prove that  $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \tan \theta + \cos \theta$ .

## SECTION - D

4 x 5 = 20

32. Prove that the radius of a circle is perpendicular to the tangent at the point of contact. Hence prove the following: The tangents drawn at the end points of a chord of a circle make equal angles with the chord
33. 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.



34. The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is  $60^\circ$ . At a point Y, 40 m vertically above X, the angle of elevation is  $45^\circ$ . Find the height of the tower PQ (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

# CHENNAI SAHODAYA SCHOOLS COMPLEX

35. The following distribution gives the daily income of 50 workers of a factory :

Daily income	Less than 120	Less than 140	Less than 160	Less than 180	Less than 200
Number of workers	12	26	34	40	50

Find the median and mean for the distribution

[OR]

If the median of the following frequency distribution is 32.5, find the values of  $f_1$  and  $f_2$

C.I	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
Frequency	$f_1$	5	9	12	$f_2$	3	2	40

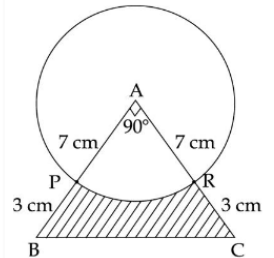
**SECTION – E**  
(Case Study)

**4 x 5 = 20**

36. 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)

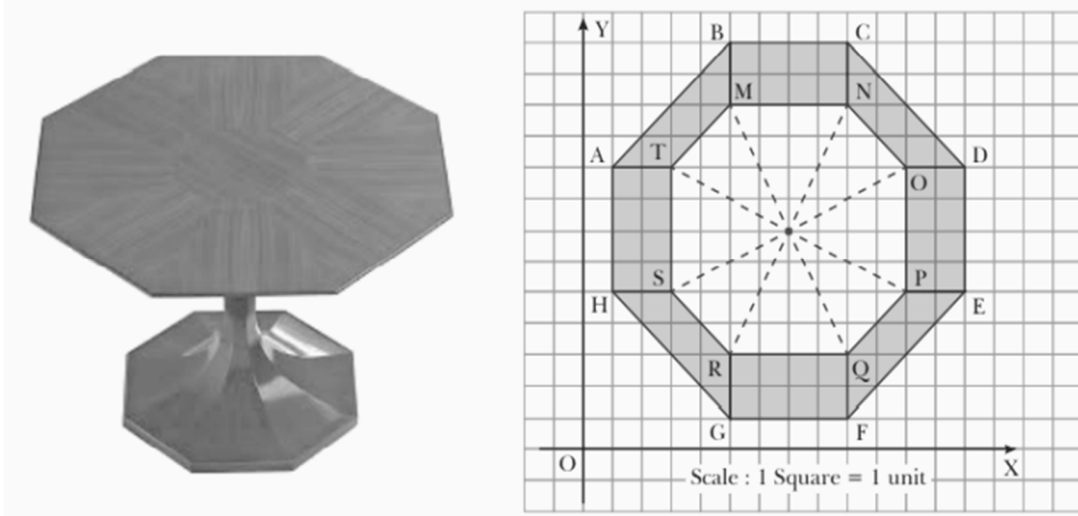
37. An interior designer, Sana, hired two painters, Manan and Bhima to make paintings for her buildings. Both painters were asked to make 50 different paintings each. The prices quoted by both the painters are given below:

- ◆ 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)

38. Tables are arranged in a party. The top of a table is shown in the figure given below:



Answer the following questions:

- [i] If a vase is placed exactly in the midpoint of H and E, find the coordinates of the position of the vase using midpoint formula ( 1 mark)
- [ii] Find the distance between A and C ( 1 mark)
- [iii] If R divides the line joining G and M in the ratio  $k : 1$ , find the value of  $k$  using section formula ( 2 marks)

**[OR]**

- [iii] If a point  $(x, y)$  is equidistant from S and P, find a relation in terms of  $x$  and  $y$  ( 2marks)

**End of paper**