

**Pre-Board Exam 2 (2023-24)**  
**Class X – Mathematics (Basic)**

**Max Marks: 80**

**Time: 3 Hours**

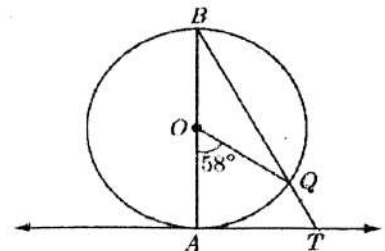
**General Instructions:**

1. This question paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section C has 3 case based integrated questions (4 marks each) with sub parts of the values of 1, 1 and 2 marks each respectively.
7. All questions are compulsory. However, an internal choice in 2 questions of 2 marks, 2 questions of 3 marks, 2 questions of 5 marks has been provided. An internal choice has been provided in 2 marks questions of Section E.
8. Draw neat figures wherever required. Take  $\pi = 22/7$  wherever required if not stated.

**Section A**

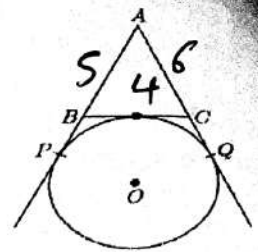
Section A consists of 20 questions of 1 mark each.

- Q1 ✓ The product of HCF and LCM of (32, 28) is  
A) 256      B) 840      C) 832      D) 896
- Q2 ✓ If the sum of zeros of the polynomial  $2x^2 + 3kx + 3$  is 6, the value of K is  
A) 5      B) 2      C) -4      D) 6
- Q3 ✓ If a pair of linear equations is consistent, then the lines will be  
A) Parallel      B) Always coincident  
C) Intersecting or coincident      D) Always intersecting
- Q4 ✓ Which of following is not a quadratic equation  
A)  $(x - 2)^2 + 1 = 2x - 3$       B)  $x(2x + 3) = x^2 + 1$   
C)  $(x + 2)^3 = x^3 - 4$       D)  $x(x + 1) + 8 = (x + 2)(x - 2)$
- Q5 ✓ The distance between the points (4, p) and (1, 0) is 5 units then the value of p is  
A) 3      B)  $\pm 4$       C) 5      ~~D) 5~~      **D = -5**
- Q6 ✓ Which of the following cannot be the probability of an event  
A) 0.01      B) 3%      C)  $16/17$       D)  $5/4$
- Q7 ✓ Given that  $\sec \theta = \sqrt{2}$  then the value of  $(1 + \tan \theta) / \sin \theta$  is  
A)  $2\sqrt{2}$       B)  $\sqrt{2}$       C)  $3\sqrt{2}$       D) 2
- Q8 ✓ The 2<sup>nd</sup> term of an A.P is 13 and 5<sup>th</sup> term is 25, what is the 7<sup>th</sup> term?  
A) 30      B) 33      C) 37      D) 39
- Q9 ✓ The ratio of the length of a rod and its shadow is  $1 : \sqrt{3}$  then the angle of elevation of the sun is  
A)  $30^\circ$       B)  $45^\circ$       C)  $60^\circ$       D)  $90^\circ$
- Q10 ✓ In given figure AB is the diameter of the circle with Centre O. Line segment BT intersect circle at Q. If  $\angle AOQ = 58^\circ$ , find  $\angle ATQ$   
A)  $41^\circ$       B)  $51^\circ$       C)  $61^\circ$       D)  $71^\circ$

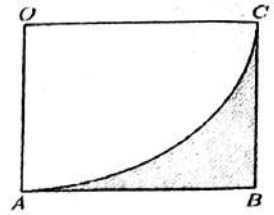


- Q41 ✓ Find the ratio in which the line segment joining (2, -3) and (5, 6) is divided by x-axis  
A) 5:2      B) 2:5      C) 2:1      D) 1:2

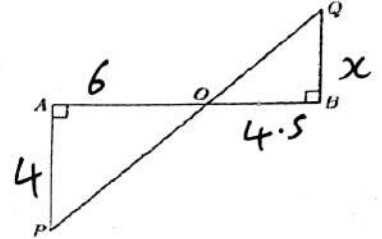
- Q12 In figure, AP, AQ and BC are tangents of the circle with centre O. If AB = 5 cm, AC = 6 cm and BC = 4 cm, then the length of AP (in cm) is  
 A) 15      B) 10      C) 9      D) 7.5



- Q13 In the adjoining figure, OABC is a square of side 7 cm. OAC is a quadrant of a circle with O as centre. The area of the shaded region is  
 A)  $10.5 \text{ cm}^2$       B)  $49 \text{ cm}^2$   
 C)  $38.5 \text{ cm}^2$       D)  $11.5 \text{ cm}^2$



- Q14 In given figure OA=6cm, AP=4cm and OB=4.5cm then QB =  
 A) 3 cm      B) 3.5 cm  
 C) 4.5 cm      D) 6 cm



- Q15 A solid cone of radius  $r$  and height  $h$  is placed over a solid cylinder having same base radius and height as that of a cone. The total surface area of the combined solid is  
 A)  $\pi r (2h + r h + r)$       B)  $\pi r (h + \sqrt{h^2 + r^2} + 2r)$   
 C)  $\pi r (2h + \sqrt{h^2 + r^2} + r)$       D)  $\pi r (2h + h^2 + r^2 + r)$

- Q16 Two dices are thrown together then the probability that sum of numbers on top is 6 is  
 A)  $1/36$       B)  $5/36$       C)  $7/36$       D)  $11/36$

- Q17 The value of  $\sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$   
 A) 1      B)  $3/4$       C)  $1/4$       D)  $1/2$

- Q18 A student noted the number of cars passing through a spot on a road for 100 periods each of 3 min and summarised in the table give below.

Number of cars	Frequency
0-10	7
10-20	14
20-30	13
30-40	12
40-50	20
50-60	11
60-70	15
70-80	08

Then, the mode of the data is

- A) 34.7      B) 44.7      C) 54.7      D) 64.7

**DIRECTION:** In the question number 19 and 20, a statement of assertion (A) is followed by a statement of reason (R). Choose the correct option

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).  
 (c) Assertion (A) is true but reason (R) is false.  
 (d) Assertion (A) is false but reason (R) is true.

X



Q19 **Assertion:** If the height of a cone is 24 cm and diameter of the base is 14 cm, then the slant height of the cone is 15 cm.

**Reason:** If  $r$  be the radius and  $h$  be the slant height of the cone, then slant height is  $\sqrt{h^2 + r^2}$

Q20 **Assertion:** If sum of the first  $n$  terms of an AP is given by  $S_n = 3n^2 - 4n$ . Then its  $n$ th term is  $a_n = 6n - 7$ .

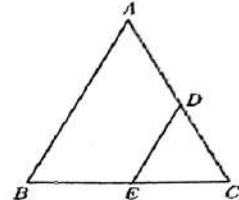
**Reason:**  $n$ th term of an AP, whose sum to  $n$  terms is  $S_n$ , is given by  $a_n = S_n - S_{n-1}$ .

### Section B

Section B consists of 5 questions of 2 marks each.

Q21 Given that  $\sqrt{2}$  is irrational, prove that  $5 + \sqrt{2}$  is irrational.

Q22 In the figure of  $\Delta ABC$ ,  $DE \parallel AB$ .  
If  $AD = 2x$ ,  $DC = x + 3$ ,  $BE = 2x - 1$  and  $CE = x$ , then find the value of  $x$ .



Q23 Two tangents PA and PB are drawn from an external point P to a circle inclined to each other at an angle of  $70^\circ$ , then what is the value of  $\angle PAB$ ?

Q24 Express trigonometric ratios  $\sin A$  and  $\sec A$  in terms of  $\cot A$ .

OR

✓ Prove that  $(\operatorname{cosec} \theta - \cot \theta)^2 = \frac{1 - \cos \theta}{1 + \cos \theta}$

Q25 A 3.5 cm chord subtends an angle of  $60^\circ$  at the centre of a circle. What is the arc length of the minor sector? Draw a rough figure and show your steps.

OR

✓ The length of the minute hand of clock is 14 cm. Find the area swept by the minute hand in 5 minutes? Draw a rough figure and show your steps

### Section C

Section C contains 6 questions of 3 marks each.

Q26 Three bells ring at intervals of 12 minutes, 15 minutes and 18 minutes respectively. If they start ringing together, after what time will next, they ring together?

Q27 Quadratic polynomial  $2x^2 - 3x + 1$  has zeroes as  $\alpha$  and  $\beta$ . Now form a quadratic polynomial whose zeroes are  $3\alpha$  and  $3\beta$ .

Q28 A part of monthly hostel charge is fixed and the remaining depends on the number of days one has taken food in the mess. When Swati takes food for 20 days, she has to pay ₹3,000 as hostel charges whereas Mansi who takes food for 25 days ₹3,500 as hostel charges. Find the fixed charges and the cost of food per day.

OR

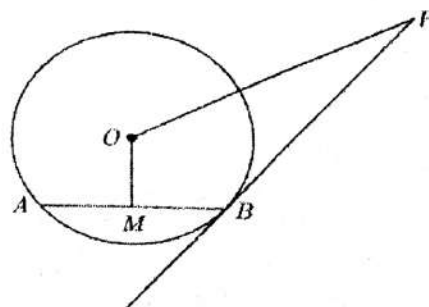
For what value of  $k$  does the system of linear equations

$2x + 3y = 7$  and  $(k - 1)x + (k + 2)y = 3k$  have infinite number of solutions

Q29 PB is a tangent to the circle with centre O.  
AB is a chord of length 24 cm at a distance of 5 cm from the centre. If the tangent is length 20 cm, find the length of PO.

OR

✓ Prove that the parallelogram circumscribing a circle is a rhombus





Q30

Evaluate:  $\frac{5 \cos^2 60^\circ + 4 \cos^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 60^\circ}$

Q31

The marks obtained by 110 students in an examination are given below

Marks	30-35	35-40	40-45	45-50	50-55	55-60	60-65
Number of Students	14	16	28	23	18	8	3

Find the mean marks of the students.

### Section D

Section D contains 4 questions of 5 marks each

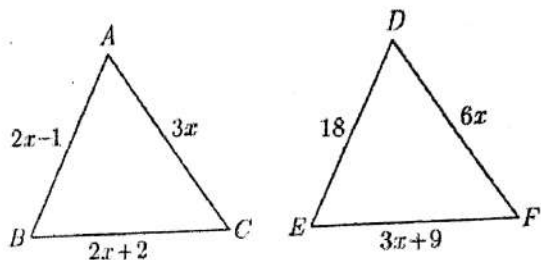
Q32 Write all the values of  $p$  for which the quadratic equation  $x^2 + px + 16 = 0$  has equal roots. Find the roots of the equation so obtained.

Or

In a flight of 600 km, an aircraft was slowed down due to bad weather. The average speed of the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. Find the duration of flight.

Q33

In Figure, if  $\triangle ABC \sim \triangle DEF$  and their sides of lengths (in cm) are marked along with them, then find the lengths of sides of each triangle.



Q34

From a solid cylinder whose height is 15 cm and the diameter is 16 cm, a conical cavity of the same height and same diameter is hollowed out, Find the total surface area of remaining solid. (Given your answer in terms of  $\pi$ ).

OR

A solid right-circular cone of height 60 cm and radius 30 cm is dropped in a right-circular cylinder full of water of height 180 cm and radius 60 cm. Find the volume of water left in the cylinder in cubic metre.

Q35 A child's game has 8 triangles of which 3 are blue and rest are red, and 10 squares of which 6 are blue and rest are red. One piece is lost at random. Find the probability that it is (i) triangle (ii) square (iii) square of blue colour (iv) red triangle

### Section E

This section comprises 3 case study-based questions of 4 marks (1+1+2) each

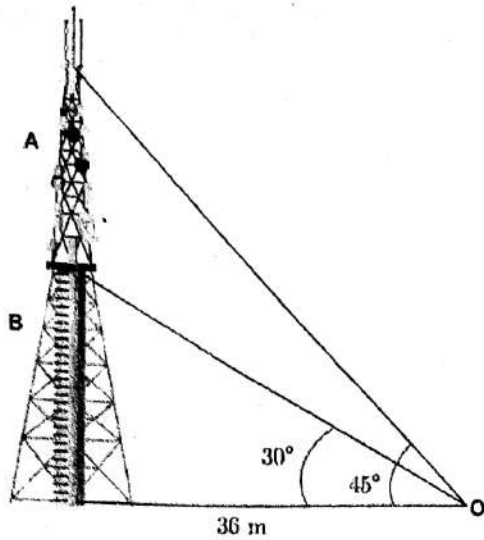
Q36 India is competitive manufacturing location due to the low cost of manpower and strong technical and engineering capabilities contributing to higher quality production runs. The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16000 sets in 6<sup>th</sup> year and 22600 in 9<sup>th</sup> year.

Based on the above information, answer the following questions:

- Find the production during first year.
- In which year, the production is ₹29,200.
- Find the difference of the production during 7<sup>th</sup> year and 4<sup>th</sup> year.

Q37 Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure, including microwave dishes. They are among the tallest human-made structures. There are 2 main types: guyed and self-supporting structures. On a similar concept, a radio station tower was built in two sections A and B. Tower is supported by wires from a point O. Distance between the base of the tower and point O is 36m. From point O, the angle of elevation of the top of section B is 30° and the angle of elevation of the top of section, A is 45°.

X

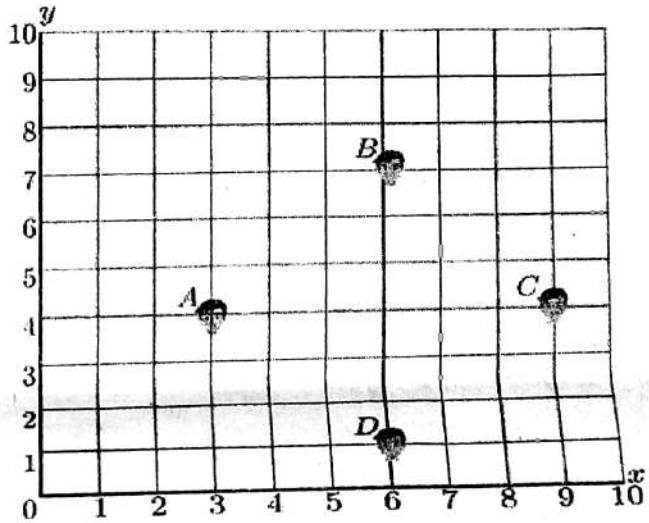


- (i) What is the height of the section B?
- (ii) What is the height of the tower?
- (iii) What is the length of the wire structure from the point O to the top of section A?

OR

- What is the length of the wire structure from the point O to the top of section B?

**Q38** Morning assembly is an integral part of the school's schedule. Almost all the schools conduct morning assemblies which include prayers, information of latest happenings, inspiring thoughts, speech, national anthem, etc. Morning assembly is important for a child's development. It is essential to understand that morning assembly is not just about standing in long queues and singing prayers or national anthem, but it's something beyond just prayers. All the activities carried out in morning assembly by the school staff and students have a great influence in every point of life. The positive effects of attending school assemblies can be felt throughout life. Have you noticed that in school assembly you always stand in row and column and this make a coordinate system. Suppose a school have 100 students and they all assemble in prayer in 10 rows as given below. Here A, B, C and D are four friends Amar, Bharat, Colin and David.



- (i) Write the position of Amar and Colin?
- (ii) What is the distance between A and C?
- (iii) Find perimeter of ABCD?

OR

Identify what type of quadrilateral ABCD is formed. (Justify)