

# SAHODAYA PRE BOARD EXAMINATION-2021-22

## CLASS - X

**Maximum Marks : 40**

**Time Allowed: 2 Hours**

**General Instructions:**

1. The question paper consists of 14 questions divided into 3 sections A, B, C.
2. All questions are compulsory.
3. Section A comprises of 6 questions of 2 marks each. Internal choice has been provided in two questions.
4. Section B comprises of 4 questions of 3 marks each. Internal choice has been provided in one question.
5. Section C comprises of 4 questions of 4 marks each. An internal choice has been provided in one question. It contains two case study-based questions.

**MATHEMATICS - BASIC (241)**

**SECTION - A**

1. Find the roots of the quadratic equation  $3x^2 - 5x + 2 = 0$  by factorisation method. [2]

**OR**

Find the value(s) of  $k$  so that the quadratic equation  $x^2 - 4kx + k = 0$  has equal roots.

2. A metallic sphere of radius 21 cm is melted and recast in to the shape of a cylinder of radius 14 cm. Find the height of the cylinder. [2]
3. Find the median for the following frequency distribution table : [2]

Class interval	20-40	40-60	60-80	80-100
Frequency	10	12	20	22

4. If  $k$ ,  $2k - 1$  and  $2k + 1$  are three consecutive terms of an AP, then find the value of  $k$ . [2]

5. The marks obtained by 50 students in a class test are as follows. Find the modal mark.

[2]

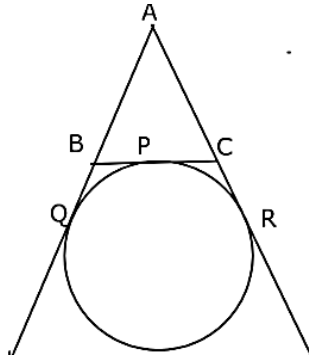
Marks	0-20	20-40	40-60	60-80	80-100
Number of students	4	6	25	10	5

6. Prove that a parallelogram circumscribing a circle is a rhombus.

[2]

**OR**

In the given figure, AQ, AR and BC are the tangents to the circle. Find perimeter of  $\Delta ABC$ , if  $AQ = 12$  cm.



**SECTION - B**

7. Find the sum of all two-digit natural numbers which are divisible by 3. [3]

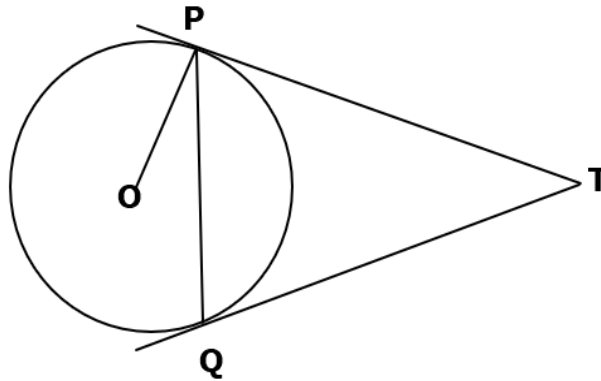
8. A pole 10m high is fixed on the top of a tower. The angle of elevation of the top of the pole as observed from the point A on the ground is  $60^\circ$  and the angle of depression of point A from the top of the tower is  $45^\circ$ . Find the height of the tower. (use  $\sqrt{3}=1.73$ )

[3]

**OR**

From the top of a 7 m high building, the angle of elevation of the top of a tower is  $60^\circ$  and the angle of depression of its foot is  $45^\circ$ . Find the height of the tower.

9. In the given figure, two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that  $\angle PTQ = 2\angle OPQ$ . [3]



10. In a class test, the sum of Kamal's marks in Maths and English is 40. Had he got 3 marks more in Maths and 4 marks less in English, the product of their marks would have been 360. Find his marks in the two subjects. [3]

### SECTION - C

11. Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle of  $60^\circ$ . Also find the length of each tangent. [4]

**OR**

Construct a pair of tangents to a circle of radius 3 cm from a point which is at a distance of 7 cm from its centre. Also find the length of each tangent.

12. The mean of the distribution given below is 13.8. Find the values of  $x$  and  $y$ , if the sum of the frequencies is 20. [4]

Class-interval	0-6	6-12	12-18	18-24	24-30
Frequency	4	$x$	5	$y$	1

### CASE STUDY - 1

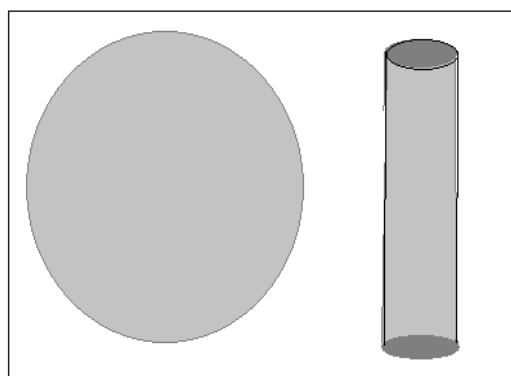
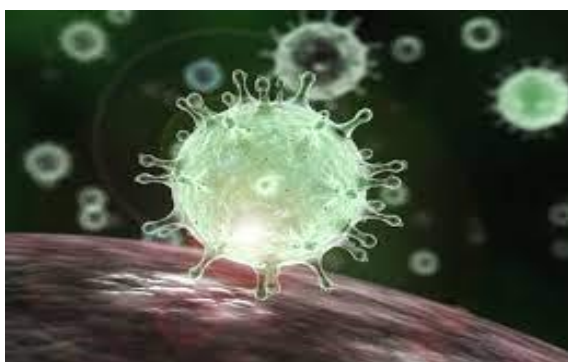
13. The 73<sup>rd</sup> Republic Day was celebrated with great pomp throughout the country this year. Students of Odisha Vidyalaya participated in many events to celebrate the day maintaining the social distancing. National flag was hoisted at the top of the Vidyalaya building which is 10 m high. Rohit a student of the Vidyalaya was observing the flag from a point P. The angle of elevation of the top of the building from the point P is  $30^\circ$  and the angle of elevation of the top of the flagstaff is  $45^\circ$ .



- (i) Make a labelled figure on the basis of above information and find the distance of the building from the point P. [2]
- (ii) Find the length of the flagstaff. [2]

### CASE STUDY -2

14. Arun a 10th standard student makes a project on corona virus for science exhibition in his school. In this project, he used a spherical ball which has volume  $38808 \text{ cm}^3$  and 11 cylindrical pipes, each of volume  $1540 \text{ cm}^3$  with length 10 cm.



- (i) Find the diameter of the spherical ball. [2]
- (ii) Find the curved surface area of the one cylindrical pipe. [2]