# Sample Paper 11

## Class – X Exam 2021-22 (TERM – II)

## Mathematics Standard (041)

**Time Allowed: 120 minutes** **Maximum Marks: 40**

**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.

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# SECTION A

**1.** In a certain AP $32^{th}$ term is twice the $12^{th}$ term. Prove that $70^{th}$ term is twice the $31^{st}$ term.

**2.** Construct a tangent to a circle of radius 4 cm from a point on the concentric circle of radius 6 cm.

**3.** A cubical block of side 7 cm is surmounted by a hemisphere. What is the greatest diameter the hemisphere can have ? Find the surface area of the solid.

**4.** Find the nature of roots of the quadratic equation $x^2 + 4x - 3\sqrt{2} = 0$.

**5.** Find the mean of the following data :

| Class | 0- 20 | 20-40 | 40-60 | 60-80 | 80-100 | 100- 120 |
|---|---|---|---|---|---|---|
| Frequency | 20 | 35 | 52 | 44 | 38 | 31 |

**OR**

What is the model class for the following distribution?

| **Marks** | **Number of Students** | **Marks** | **Number of students** |
|---|---|---|---|
| Below 10 | 3 | Below 40 | 57 |
| Below 20 | 12 | Below 50 | 75 |
| Below 30 | 28 | Below 60 | 80 |

**6.** The $8^{th}$ term of an AP is zero. Prove that its $38^{th}$ term is triple of its $18^{th}$ term.

# Section B

**7.** Draw a circle of radius 5 cm. Marks a point $A$ which is 8 cm away from its centre $O$, construct the tangents $AB$ and $AC$. Measure the lengths of $AB$ and $AC$.

**8.** An aeroplane, when flying at a height of 4000 m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are $60^o$ and $45^o$ respectively. Find the vertical distance between the aeroplanes at that instant. (Use $\sqrt{3} = 1.73$)

**9.** Find the mean of the following data :

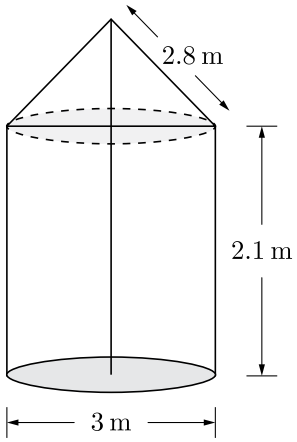
| Classes | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 | 100-120 |
|---|---|---|---|---|---|---|
| Frequency | 6 | 8 | 10 | 12 | 8 | 6 |

**OR**

Find the mode of following data :

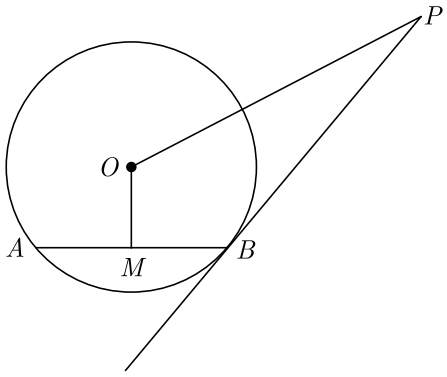
| Marks | Below 10 | Below 20 | Below 30 | Below 40 | Below 50 |
|---|---|---|---|---|---|
| Number of students | 8 | 20 | 45 | 58 | 70 |

**10.** A tent is in the shape of cylinder surmounted by a conical top of same diameter. If the height and diameter of cylindrical part are 2.1 m and 3 m respectively and the slant height of conical part is 2.8 m, find the cost of canvas needed to make the tent if the canvas is available at the rate of Rs.500 per square meter. Use $\pi = \frac{22}{7}$.



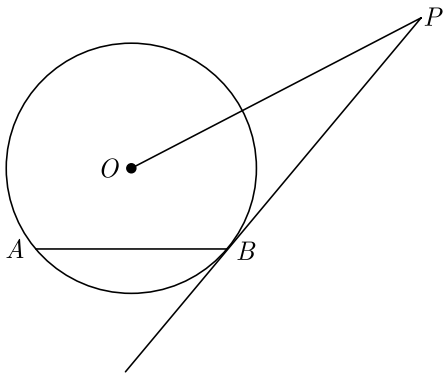

# Section C

**11.** $PB$ is a tangent to the circle with centre $O$ to $B.AB$ is a chord of length 24 cm at a distance of 5 cm from the centre. It the tangent is length 20 cm, find the length of $PO$.



**OR**

$AB$ is a chord of circle with centre $O$. At $B$, a tangent $PB$ is drawn such that its length is 24 cm. The distance of $P$ from the centre is 26 cm. If the chord $AB$ is 16 cm, find its distance from the centre.




**12.** A 7 m long flagstaff is fixed on the top of a tower standing on the horizontal plane. From point on the ground, the angles of elevation of the top and bottom of the flagstaff are $60^\circ$ and $45^\circ$ respectively. Find the height of the tower correct to one place of decimal. (Use $\sqrt{3} = 1.73$)

**13.** Traffic Management : A traffic enforcement camera is a camera which may be mounted beside or over a road or installed in an enforcement vehicle to detect motoring offenses, including speeding, vehicles going through a red traffic light. A worldwide review of studies found that speed cameras led to a reduction of 11% to 44% for fatal and serious injury crashes. The British Medical Journal recently reported that speed cameras were effective at reducing accidents and injuries in their vicinity and recommended wider deployment.

In order to monitor reckless driving on Mumbai road, special cameras have been installed at many traffic light. The following table shows a frequency distribution table for the speed of 100 vehicles passing through a particular spot on a day.

| Speed (in km/h) | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
|---|---|---|---|---|---|---|---|---|
| Number of Vehicles | 1 | 3 | 7 | 16 | 35 | 29 | 7 | 2 |

Based on the above information, answer the following questions.

(i) What is the mode value of speed ?

(ii) What is the median value of speed ?

**14.** Model Teachers' Earnings : According to the National Teachers Association, teachers in the India earned an average of Rs 30,532 in 2000. This amount has increased by approximately Rs 1472 per year.

(i) Write a formula for the $n$ th term of the arithmetic sequence that models teachers' average earnings $n$ years after 1999.

(ii) How much will India teachers earn, on average, by the year 2030?

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