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Designation: PGT (Mathematics)

GRADE X (Term-2 Sample Paper)
SUBJECT: STANDARD MATHEMATICS
SUBJECT CODE: 041(STANDARD)

Duration: 2 Hours **Max Marks: 40**
General Instructions: **No. of pages:4**

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 one question.
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. It contains two case study-based questions.

SECTION A

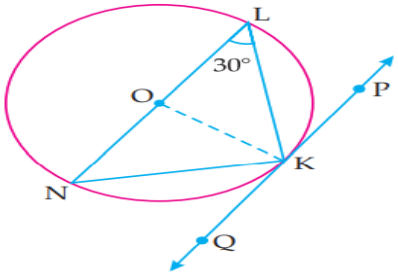
Q1. Find the 12^{th} term from the end of the AP: -2, -4, -6,……, -100.

Q2. Find the value of k, for which the quadratic equation $x^2 + k(2x + k - 1) + 2 = 0$ has equal roots.

Or

For what value(s) of 'a' quadratic equation $3ax^2 - 6x + 1 = 0$ has no real roots?

Q3. In given figure, O is the centre of the circle and LN is a diameter. If PQ is a tangent to the circle at K and ∠KLN = 30°, find $\angle PKL$.



Q4. The diagonal of a cube is $11\sqrt{3}$ cm. Find its volume and total surface area.

Q5. In a certain distribution, mean and median are 9.5 and 10, respectively. Find the mode of the distribution, using the empirical relation.

Q6. Solve the quadratic equation for x:

$16x^2 - 8p^2x + (p^4 - q^4) = 0$

SECTION B

Q7. The mean of 1, 3, 4, 5, 7 and 4 is a. The numbers 3, 2, 2, 4, 3, 3 and b have mean a – 1 and the median c. Find the value of b + c.

Q8. Draw a line segment AB of length 9 cm. Taking A as Centre, draw a circle of radius 4 cm and taking B as Centre, another circle of radius 4 cm. Construct tangents to each circle from the Centre of the other circle.

Q9. The median of the distribution given below is 16. Find the value of x and y if the total frequency is 20.

Class Interval	0 – 6	6 – 12	12 – 18	18 – 24	24 – 30
Frequency	4	x	5	y	1

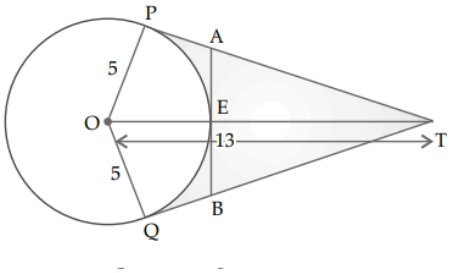
Q10. From the top of a lighthouse, the angles of depressions of two ships on the opposite sides of it are observed to be α and β. If the height of the lighthouse be h meters and the line joining the ships passes through the foot of the lighthouse, show that the distance between the ships is $\frac{h\,(\tan\propto + \tan\beta)}{\tan\propto\ \tan\beta}$ meters.

Or

At the foot of a mountain the elevation of its summit is 45^0. After ascending 1200 m towards the mountain up a slope of 30^0 inclination, the elevation is found to be 60^0. Find the height of the mountain.

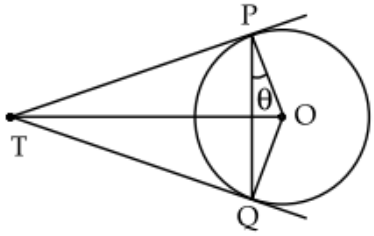
SECTION C

Q11. In figure, O is the centre of a circle of radius 5 cm. T is a point such that OT = 13 cm and OT intersects circle at E. If AB is a tangent to the circle at E, find the length of AB, where TP and TQ are two tangents to the circle

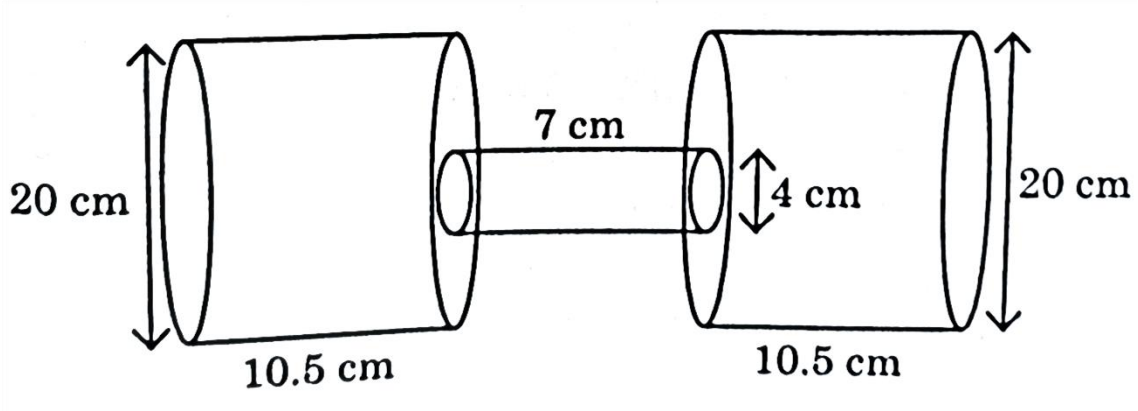


Or

In the given figure, two tangents TP and TQ are drawn to circle with centre O from an external point T. Prove that ∠PTQ = 2∠OPQ.



Q12. A pulley was made from two big equal cylinders stuck at the ends of a small cylinder to draw water from the well, as shown in the figure. Find its curved surface area.



Case Study-1

Q13. Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of 1,18,000 by paying every month starting with the first instalment of 1000. If he increases the instalment by 100 every month, then answer the following questions:

(a) Find the amount paid by him in 30th instalment.

(b) Find the ratio of the 1st installment to the last installment.

Case Study-2

Q14. A group of students of class-X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that India Gate, official name Delhi Memorial, originally called All-India War Memorial, Monumental Sandstone Arch in New Delhi is dedicated to the troops of British India who died in wars fought between 1914 and 1919. The teacher also said that India Gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway), is about 138 feet (42 metres) in height.

Read the above passage carefully and answer the following questions:

(a) What is the angle of elevation, if they are standing at a distance of $42\sqrt{3}$ m away from the monument?

(b) They want to see the tower (monument) at an angle of 60°. So, they want to know the distance where they should stand and hence find the distance.