Board Paper of Class 10 2023 Maths (Standard) Delhi(Set 1)

Total Time: 180

Total Marks: 80.0

Section A

Q.No.1: The ratio of HCF to LCM of the least composite number and the least prime number is :
(a) 1 : 2
(b) 2 : 1
(c) 1 : 1
(d) 1 : 3

Marks:[1.00]

Q.No.2: The roots of the equation $x^2 + 3x - 10 = 0$ are :
(a) 2, −5
(b) −2, 5
(c) 2, 5
(d) −2, −5

Marks:[1.00]

Q.No.3: The next term of the A.P. : $\sqrt{6},\ \sqrt{24},\ \sqrt{54}$ is :
(a) $\sqrt{60}$
(b) $\sqrt{96}$
(c) $\sqrt{72}$
(d) $\sqrt{216}$

Marks:[1.00]

Q.No.4: The distance of the point (−1, 7) from *x*-axis is :
(a) −1
(b) 7
(c) 6

(d) $\sqrt{50}$ **Marks:[1.00]**

Q.No.5: What is the area of a semi-circle of diameter 'd'?
(a) $\frac{1}{16}\pi d^2$
(b) $\frac{1}{4}\pi d^2$
(c) $\frac{1}{8}\pi d^2$
(d) $\frac{1}{2}\pi d^2$ **Marks:[1.00]**

Q.No.6: The empirical relation between the mode, median and mean of a distribution is :
(a) Mode = 3 Median − 2 Mean
(b) Mode = 3 Mean − 2 Median
(c) Mode = 2 Median − 3 Mean
(d) Mode = 2 Mean − 3 Median **Marks:[1.00]**

Q.No.7: The pair of linear equations $2x = 5y + 6$ and $15y = 6x - 18$ represents two lines which are :
(a) intersecting
(b) parallel
(c) coincident
(d) either intersecting or parallel **Marks:[1.00]**

Q.No.8: If α, β are zeroes of the polynomial $x^2 - 1$, then value of (α + β) is :
(a) 2
(b) 1
(c) −1
(d) 0 **Marks:[1.00]**

Q.No.9: If a pole 6 m high casts a shadow $2\sqrt{3}\text{m}$ long on the ground, then sun's elevation is :
(a) 60°
(b) 45°
(c) 30°
(d) 90° **Marks:[1.00]**

Q.No.10: Sec θ when expressed in terms of cot θ, is equal to :

(a) $\frac{1+\cot^2\theta}{\cot\ \theta}$

(b) $\sqrt{1+\cot^2\theta}$

(c) $\sqrt{\frac{1+\cot^2\theta}{\cot\ \theta}}$

(d) $\sqrt{\frac{1-\cot^2\theta}{\cot\ \theta}}$

Marks:[1.00]

Q.No.11: Two dice are thrown together. The probability of getting the difference of numbers on their upper faces equals to 3 is:

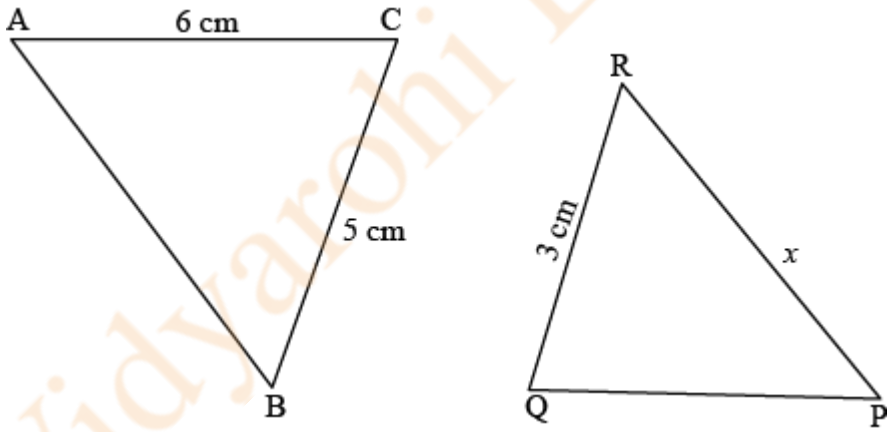
(a) $\frac{1}{9}$

(b) $\frac{2}{9}$

(c) $\frac{1}{6}$

(d) $\frac{1}{12}$

Marks:[1.00]



Q.No.12:

In the given figure, ΔABC ~ ΔQPR. If AC = 6 cm, BC = 5 cm, QR = 3 cm and PR = *x*; then the value of *x* is:

(a) 3.6 cm

(b) 2.5 cm

(c) 10 cm

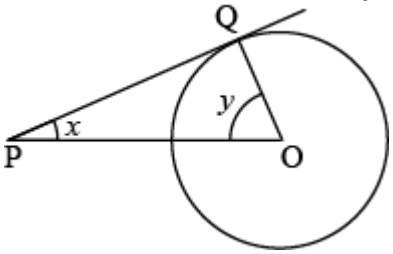
(d) 3.2 cm

Marks:[1.00]

Q.No.13: The distance of the point (−6, 8) from origin is:
(a) 6
(b) −6
(c) 8
(d) 10

Marks:[1.00]

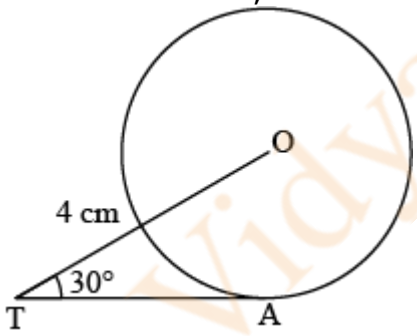
Q.No.14: In the given figure, PQ is a tangent to the circle with centre O. If ∠OPQ = x, ∠POQ = y, then $x + y$ is:



(a) 45°
(b) 90°
(c) 60°
(d) 180°

Marks:[1.00]

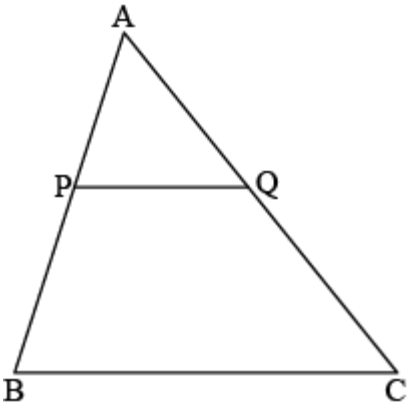
Q.No.15: In the given figure, TA is a tangent to the circle with centre O such that OT = 4 cm, ∠OTA = 30°, then length of TA is:



(a) $2\sqrt{3}$ cm
(b) 2 cm
(c) $2\sqrt{2}$ cm
(d) $\sqrt{3}$ cm

Marks:[1.00]

Q.No.16: In ΔABC, PQ || BC. If PB = 6 cm, AP = 4 cm, AQ = 8 cm, find the length of AC.



(a) 12 cm
(b) 20 cm
(c) 6 cm
(d) 14 cm **Marks:[1.00]**

Q.No.17: If α, β are the zeroes of the polynomial $p(x) = 4x^2 - 3x - 7$, then $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$ is equal to:

(a) $\frac{7}{3}$
(b) $\frac{-7}{3}$
(c) $\frac{3}{7}$
(d) $\frac{-3}{7}$ **Marks:[1.00]**

Q.No.18: A card is drawn at random from a well-shuffled pack of 52 cards. The probability that the card drawn is not an ace is:

(a) $\frac{1}{13}$
(b) $\frac{9}{13}$
(c) $\frac{4}{13}$
(d) $\frac{12}{13}$ **Marks:[1.00]**

Q.No.19: Assertion (A) : The probability that a leap year has 53 Sundays is $\frac{2}{7}$.

Reason (R) : The probability that a non-leap year has 53 Sundays is $\frac{5}{7}$.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.
(d) Assertion (A) is false, but Reason (R) is true. **Marks:[1.00]**

Q.No.20: Assertion (A) : a, b, c are in A.P. if and only if $2b = a + c$.
Reason (R) : The sum of first n odd natural numbers is n^2.
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
(c) Assertion (A) is true, but Reason (R) is false.
(d) Assertion (A) is false, but Reason (R) is true. **Marks:[1.00]**

Section B

Q.No.21: Two numbers are in the ratio 2 : 3 and their LCM is 180. What is the HCF of these numbers? **Marks:[2.00]**

Q.No.22: If one zero of the polynomial $p(x) = 6x^2 + 37x - (k - 2)$ is reciprocal of the other, then find the value of k. **Marks:[2.00]**

Q.No.23: Find the sum and product of the roots of the quadratic equation $2x^2 - 9x + 4 = 0$.

OR

Find the discriminant of the quadratic equation $4x^2 - 5 = 0$ and hence comment on the nature of roots of the equation. **Marks:[2.00]**

Q.No.24: If a fair coin is tossed twice, find the probability of getting 'atmost one head'. **Marks:[2.00]**

Q.No.25: Evaluate
$\frac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$

OR

If A and B are acute angles such that sin (A − B) = 0 and 2 cos (A + B) − 1 = 0, then find angles A and B. **Marks:[2.00]**

Section C

Q.No.26: How many terms are there in an A.P. whose first and fifth terms are −14 and 2, respectively and the last term is 62.

OR

Which terms of the A.P. : 65, 61, 57, 53, ... is the first negative term? **Marks:[3.00]**

Q.No.27: Prove that $\sqrt{5}$ is an irrational number. **Marks:[3.00]**

Q.No.28: Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the centre. **Marks:[3.00]**

Q.No.29: $\text{Prove that } \frac{\text{sinA} - 2\sin^3 \text{A}}{2\cos^3 \text{A} - \text{cosA}} = \text{tanA}$

OR

Prove that sec A(1 − sin A)(sec A + tan A) = 1. **Marks:[3.00]**

Q.No.30: Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle. **Marks:[3.00]**

Q.No.31: Find the value of '*p*' for which the quadratic equation $px(x - 2) + 6 = 0$ has two equal real roots. **Marks:[3.00]**

Section D

Q.No.32: A straight highway leads to the foot of a tower. A man standing on the top of the 75 m high tower observes two cars at angles of depression of 30º and 60º, which are approaching the foot of the tower. If one car is exactly behind the other on the same side of the tower, find the distance between the two cars. (use $\sqrt{3}$= 1.73)

OR

From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60º and the angle of depression of its foot is 30º. Determine the height of the tower. **Marks:[5.00]**

Q.No.33: D is a point on the side BC of a triangle ABC such that ∠ADC = ∠BAC, prove that CA^2 = CB.CD

OR

If AD and PM are medians of triangles ABC and PQR, respectively when ΔABC ~ ΔPQR, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$. **Marks:[5.00]**

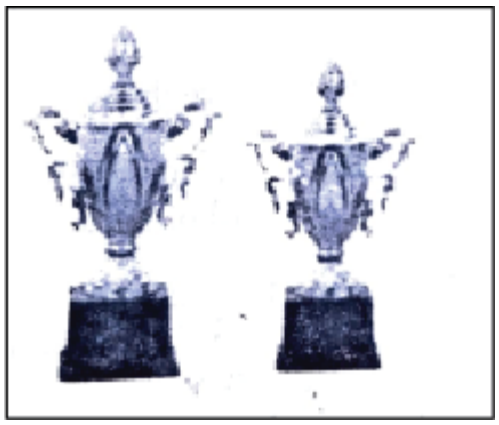
Q.No.34: A student was asked to make a model shaped like a cylinder with two cones attached to its ends by using a thin aluminium sheet. The diameter of the model is 3 cm and its total length is 12 cm. If each cone has a height of 2 cm, find the volume of air contained in the model. **Marks:[5.00]**

Q.No.35: The monthly expenditure on milk in 200 families of a Housing Society is given below:

Monthly Expenditure (in ₹)	1000-1500	1500-2000	2000-2500	2500-3000	3000-3500	3500-4000	400
Number of families	24	40	33	*x*	30	22	

Find the value of *x* and also, find the median and mean expenditure on milk.
Marks:[5.00]

Q.No.36: Two schools 'P' and 'Q' decided to award prizes to their students for two games of Hockey ₹*x* per student and Cricket ₹*y* per student. School 'P' decided to award a total of ₹9,500 for the two games to 5 and 4 students respectively; while school 'Q' decided to award ₹7,370 for the two games to 4 and 3 students respectively.

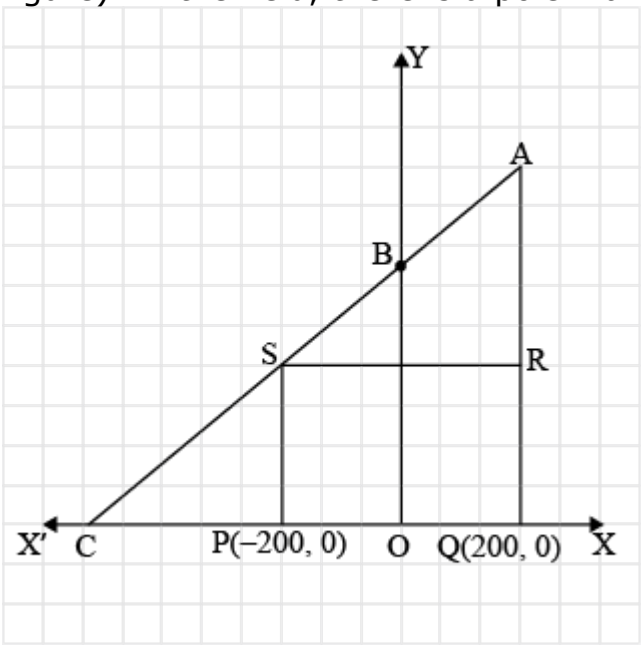


Based on the above information, answer the following questions:
(i) Represent the following information algebraically (in terms of x and y).
(ii) (a) What is the prize amount for hockey?

OR

(b) Prize amount on which game is more and by how much?
(iii) What will be the total prize amount if there are 2 students each from two games? **Marks:[4.00]**

Q.No.37: Jagdish has a field which is in the shape of a right angled triangle AQC. He wants to leave a space in the form of a square PQRS inside the field for growing wheat and the remaining for growing vegetables (as shown in the figure). In the field, there is a pole marked as O.

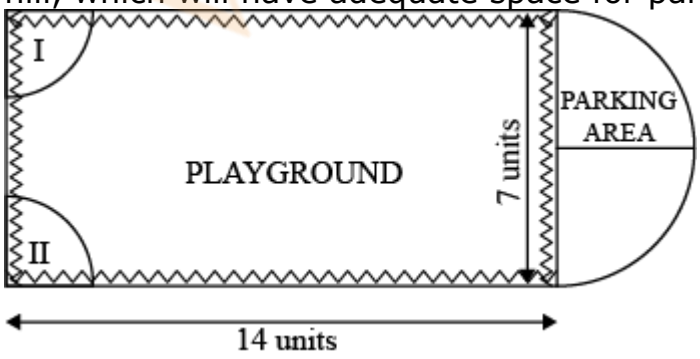


Based on the above information, answer the following questions:
(i) Taking O as origin, coordinates of P are (–200, 0) and of Q are (200, 0). PQRS being a square, what are the coordinates of R and S?
(ii) (a) What is the area of square PQRS?

OR

(b) What is the length of diagonal PR in square PQRS?
(iii) If S divides CA in the ratio K : 1, what is the value of K, where point A is (200, 800)? **Marks:[4.00]**

Q.No.38: Governing council of a local public development authority of Dehradun decided to build an adventurous playground on the top of a hill, which will have adequate space for parking.



After survey, it was decided to build rectangular playground, with a semi-circular area allotted for parking at one end of the playground. The length and breadth of the rectangular playground are 14 units and 7 units, respectively. There are two quadrants of radius 2 units on one side for special seats.

Based on the above information, answer the following questions:
(i) What is the total perimeter of the parking area?
(ii) (a) What is the total area of parking and the two quadrants?

OR

(b) What is the ratio of area of playground to the area of parking area?
(iii) Find the cost of fencing the playground and parking area at the rate of ₹2 per unit. **Marks:[4.00]**