PRE BOARD 2 (2023–2024)

CLASS 10 – MATHEMATICS (STANDARD)

TIME ALLOWED: 3 HOURS **MAXIMUM MARKS: 80**

GENERAL INSTRUCTIONS:

Read the following instructions carefully:

1) This question paper contains 38 questions.
2) Question paper is divided into FIVE sections - A, B, C, D and E.
3) In section A, Q1 to Q18 are MCQs and Q19 and Q20 are Assertion-Reason based questions of 1 mark each.
4) In section B, Q21 to Q25 are Very Short Answer type questions of 2 marks each.
5) In section C, Q26 to Q31 are Short answer type questions carrying 3 marks each.
6) In section D, Q32 to Q35 are Long Answer type questions of 5 marks each.
7) In section E, Q36 to Q38 are **case based integrated units** of assessment questions carrying 4 marks each (1+1+2). Internal choice is provided in 2 marks question in each case-study.
8) There is no overall choice. However, an internal choice has been provided in 2 questions in section B, 2 questions of section C, 2 questions of section D and 3 questions in section E.
9) Draw neat diagrams wherever required. Take $\pi = 22/7$ wherever required, if not stated.

Section – A

Multiple choice questions of 1 mark each.

Q1 The HCF of two numbers 54 and 81 is 27. The LCM of these two given numbers is:

(a) 45 (b) 9 (c) 36 (d) 162

Q2 Which of the following equations has 2 as a root?

(a) $x^2-4x+5=0$ (b) $x^2+3x-12=0$ (c) $2x^2-7x+6=0$ (d) $3x^2-6x-2=0$

Q3 The next term of A.P. $\sqrt{5}$, $\sqrt{20}$, $\sqrt{45}$.... is:

(a) $\sqrt{55}$ (b) $\sqrt{60}$ (c) $\sqrt{75}$ (d) $\sqrt{80}$

Q4 Graphically, the pair of equations $6x-3y+10=0$, $2x-y+9=0$ represents two lines which are:

(a) Intersecting lines (b) coincident lines (c) parallel lines (d) none of these

Q5 The roots of the quadratic equation $x^2+4x+5=0$ are:

(a) Real (b) not real (c) real and distinct (d) real and equal

Q6 A die is thrown once. The probability of getting a number less than 6 is:

(a) 3/6 (b) 1/6 (c) 2/3 (d) 1/5

Q7 The sum of the distances of a point A(-3,4) from both the axes is:

(a) 3 (b) 4 (c) 7 (d) 1

Q8 If the angle of depression of an object from a 75m high tower is 30°, then the distance of the object from the tower is:

(a) 25 $\sqrt{3}$m (b) 50 $\sqrt{3}$m (c) 75 $\sqrt{3}$m (d) 150m

Q9 If 2 Tan A=3, then the value of $\frac{4\,SinA+3CosA}{4\,SinA-3CosA}$ is:

(a) $\frac{7}{\sqrt{13}}$ (b) $\frac{1}{\sqrt{13}}$ (c) 3 (d) does not exist

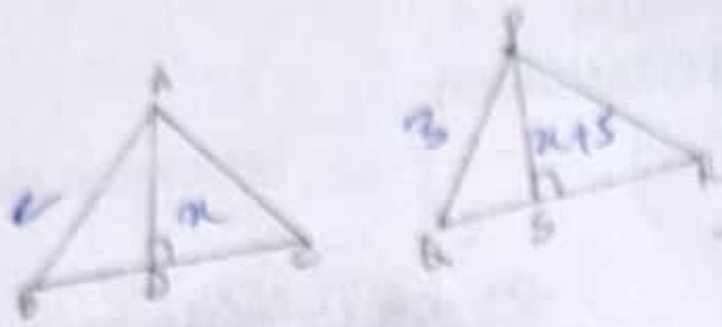
Q10 Two concentric circles of radii a and b, where a > b, are given, the length of a chord of the larger circle which touches the other circle is:

(a) $\sqrt{a^2-b^2}$ (b) $2\sqrt{a^2-b^2}$ (c) $\sqrt{a^2+b^2}$ (d) $2\sqrt{a^2+b^2}$

Q11 In an A.P., the 4^{th} term is 11 and the 10^{th} term is 23. What is the common difference?

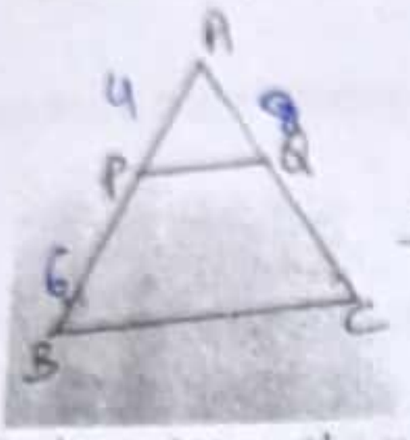
(a) 2 (b) 3 (c) 4 (d) 5

Q12 If $\Delta ABC \sim \Delta PQR$, AB: PQ = 2:3, AD ⊥ BC, PS ⊥ QR and AD= x and PS=x+5, then 'x' equals to:



(a) 5 (b) 7 (c) 10 (d) 3

Q13 In ΔABC, PQ ∥ BC. If PB = 6 cm, AP = 4 cm, AQ = 8cm, find the length of AC.

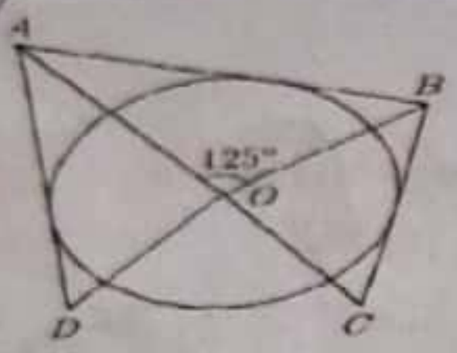


(a) 12 cm (b) 8 cm (c) 20 cm (d) 10 cm

Q14 Find a point on the y-axis which is equidistant from the points A(6,5) and B(-4,3)

(a) (0,9) (b) (9,0) (c) (1,4) (d) (4,1)

Q15 In given figure if $\angle AOB = 125^0$ then $\angle COD$ is



(a) 40° (b) 45° (c) 50° (d) 55°

Q16 2 cards of hearts and 4 cards of spades are missing from a pack of 52 cards. A card is drawn at random from the remaining pack. What is the probability of getting a black card?

(a) 22/52 (b) 22/46 (c) 24/52 (d) 24/56

Q17 Find the area of a sector of a circle with radius 42cm and of angle 30°

(a) 441cm² (b) 462cm² (c) 22cm² (d) 220cm²

Q18 Two cones have their heights in the ratio 1:3 and radii in the ratio 3:1. The ratio of their volumes is:

(a) 1:9 (b) 9:1 (c) 1:3 (d) 3:1

In question number 19 and 20, A statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option out of the following:

Q19 (A) A box contains cards numbered from 1 to 17 and one card is then drawn at random. Then the probability of drawing a prime number card is 8/17.

(R) For any event E, $0 \leq P(E) \leq 1$.

(a) Both Assertion (A) and Reason(R) are true and (R) is correct explanation of (A).

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

(c) Assertion (A) is true but (R) is false.

(d) Assertion (A) is false but (R) is true.

Q20 (A) If n^{th} term of an A.P. is (2n+1), then the sum of it's first three terms is 15.

(R) The sum of first 16 terms of the A.P. is 10,6,2..... is 320.

(a) Both Assertion (A) and Reason(R) are true and (R) is correct explanation of (A).

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

(c) Assertion (A) is true but (R) is false.

(d) Assertion (A) is false but (R) is true.

SECTION - B

Very short answer type questions from 21 to 25 carrying 2 marks each.

Q21 In a right angled triangle PQR, $\angle Q = 90°$. Find the value of tan P - cot R.

OR

Evaluate: $\tan^2 30° . \sin 30° + \cos 60° . \sin^2 90° . \tan^2 60° - 2 \tan 45° . \cos^2 0° . \sin 90°$

Q22 An integer is chosen between 70 and 100. Find the probability that it is:

(I) A prime number (II) Divisible by 7

Q23 Write whether $\frac{2\sqrt{45} + 3\sqrt{20}}{2\sqrt{5}}$ on simplification gives an irrational or rational number.

Q24 Find the value of 'k' for which the quadratic equation $2kx^2 - 40x + 25 = 0$ has real and equal roots.

OR

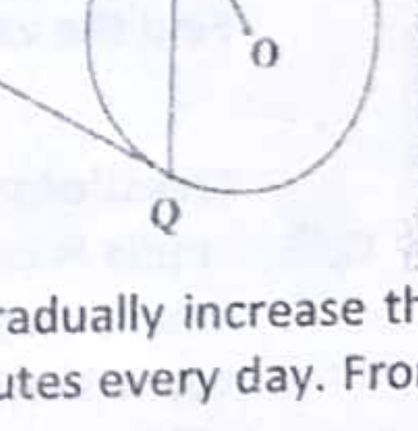
Find the nature of the roots of the quadratic equation $(x+5)^2 = 2(5x-3)$

Q25 'p' and 'q' are the zeroes of the polynomial $2x^2 + 5x - 4$. Without finding the actual values of 'p' a 'q', evaluate (1-p)(1-q). Show your steps.

SECTION - C

Questions 26 to 31 carrying 3 marks each.

Q26 In the given figure, PA is a tangent to the circle with center O and PCB is a straight line. Find the measure of $\angle OBC$. Give valid reasons.



Q27 A train covers a distance of 480 km at a uniform speed. If the speed had been 8km/hr less, then it would have taken 3 hours more to cover the same distance. Find the original speed of the train.

Q28 Two tangents TP and TQ are drawn to a circle with centre 'O' from an external point T. Prove that $\angle PTQ = 2\angle OPQ$

Q29 Sana decided to start practicing for an upcoming marathon. She decided to gradually increase the duration. She ran for 10 minutes on day 1 and increased the duration by 5 minutes every day. From which day onwards will she be running for 2½ hours or more? Show steps.

OR

In an A.P., the sum of first 'n' terms is $\frac{n}{2}(3n+5)$. Find the 25^{th} term of the A.P.

Q30 Prove that $\sqrt{5}$ is an irrational number.

Q31 Prove that: $\frac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$, using identity $\sec^2\theta = 1 + \tan^2\theta$

OR

Prove that: $\frac{\tan^3\theta}{1+\tan^2\theta} + \frac{\cot^3\theta}{1+\cot^2\theta} = \sec\theta . \operatorname{cosec}\theta - 2 \sin\theta . \cos\theta$

SECTION - D

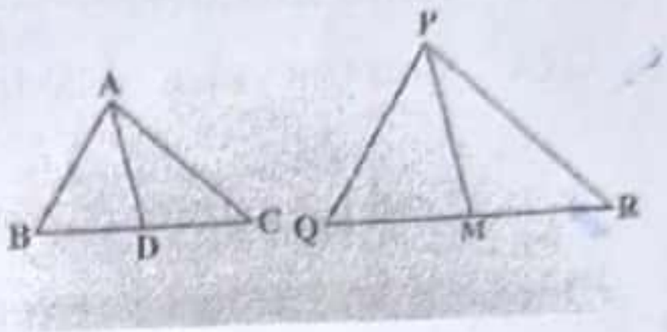
Questions 32 to 35 carries 5 marks each.

Q32 A man in a boat rowing away from a lighthouse 100m high takes 2 minutes to change the angle of elevation of the top of the lighthouse from 60° to 30°. Find the speed of the boat in metres per minute. (use $\sqrt{3} = 1.732$)

OR

From the top of a tower 150m high, a man observes two cars on the opposite sides of the tower with angles of depression 30° and 45° respectively. Find the distance between the two cars. (use $\sqrt{3} = 1.73$)

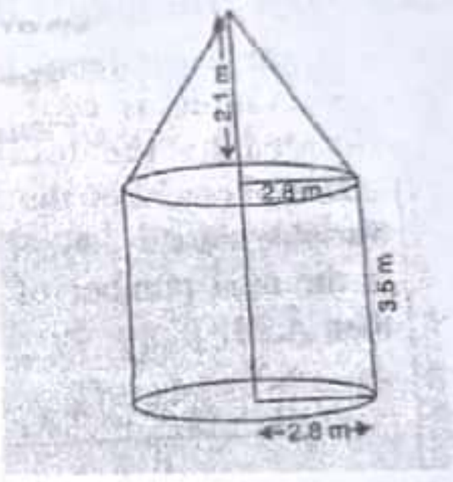
Q33 In two triangles ABC and PQR, if AB, AC and median AD are respectively proportional to PQ, PR and median PM, prove that $\Delta ABC \sim \Delta PQR$



OR

AD and PM are medians of triangles ABC and PQR respectively, where $\Delta ABC \sim \Delta PQR$. Prove that $\frac{AB}{PQ} = \frac{AD}{PM}$. Using the above result, find the value of 'x' if AB = 4, AD = x+1, PQ = 4x-2 and PM = 2x+4.

Q34 Due to heavy floods in a state, thousands were rendered homeless. 50 schools collectively offered to the state government to provide place and the canvas for 1500 tents to be fixed by the government and decided to share the whole expenditure equally. The lower part of each tent is cylindrical of base radius 2.8m and height3.5m, with conical upper part of same base radius but of height 2.1m. If the canvas used to make the tents cost ₹120/- per sq m, find the amount shared by each school to set up the tents.



Q35 The monthly expenditure on milk in 200 families of a Housing Society is given below:

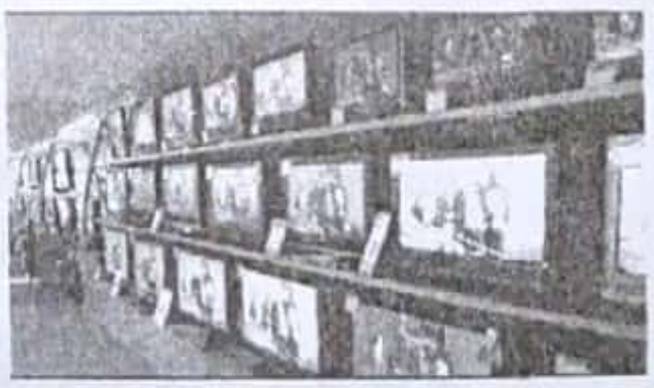
Monthly expenditure (₹)	1000-1500	1500-2000	2000-2500	2500-3000	3000-3500	3500-4000	4000-4500	4500-5000
Number of families	24	40	33	x	30	22	16	7

Find the value of x, find the median and mean expenditure on milk.

SECTION- E

Questions 36 to 38 carries 4 marks 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 6th year and 22600 in 9th year.



Based on the above information, answer the following:

A) Find the production during the first year.

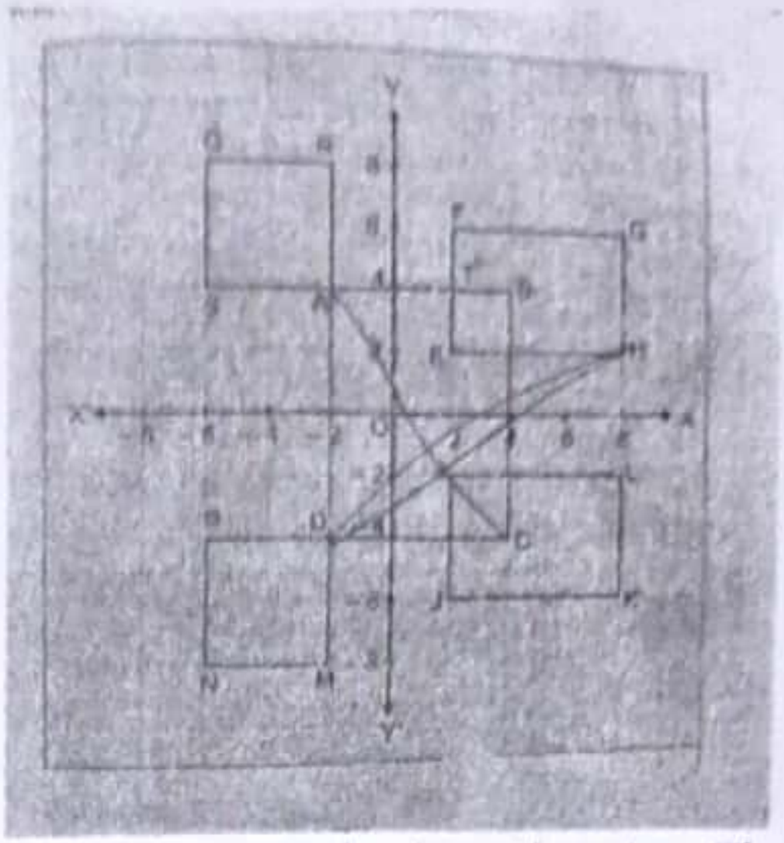
B) Find the production during 8th year.

C) In which year, the production is ₹29,200/-

OR

Find the difference of the production during 7th and 4th year.

Q37 Shalini is an interior designer. To design her own living room, she designed wall shelves. The graph of the intersecting wall shelves is given here:



A) Find the co-ordinates of the mid-point of the line segment joining D and H.

B) Find the ratio in which the x-axis divides the line segment joining the points A and C.

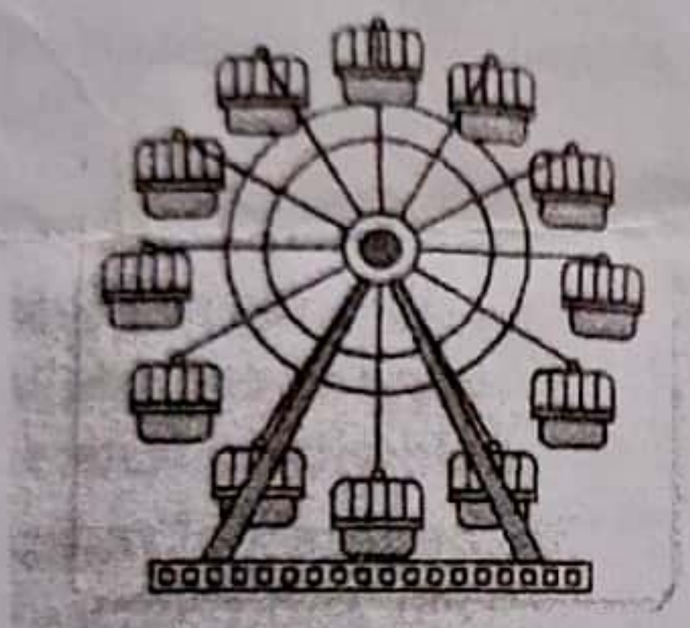
C) Check if the points B and Q are equidistant from D.

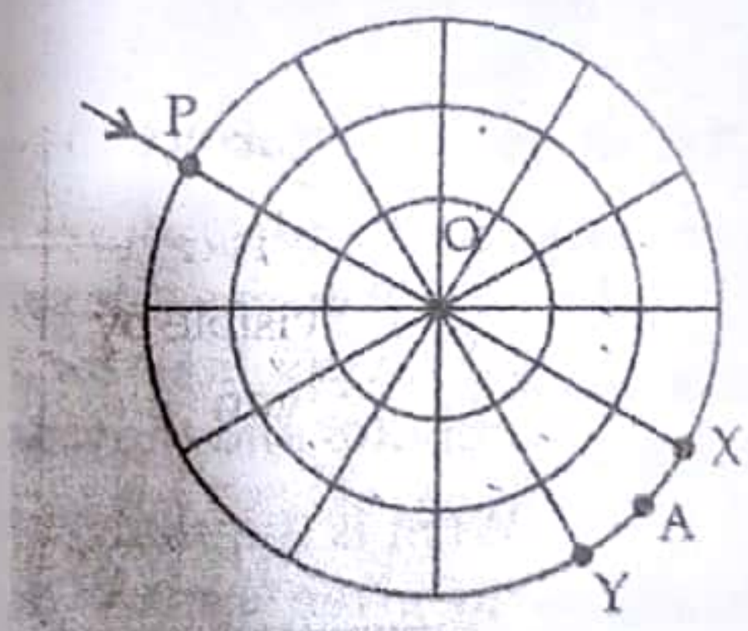
OR

What is the area of trapezium APCB?

Q38 A ferris wheel is a rotating upright wheel with multiple passenger cars attached to the rim. The passenger cars are installed at equal distance from each other. Neeraj takes a picture of a ferris wheel. He, then makes a drawing of the picture and labels some points to make some calculations as under:

Point X and Y show the position of the two consecutive passenger cars. The centre of the wheel is labelled O. The radius of the wheel is 16m.





A) What is the measure of angle XOY?

B) What is the measure of angle XOP?

C) Each sector of the Ferris wheel is to be decorated with lights of different colours.
What is the area decorated by each light?

OR

What number should the area of sector OYAX be multiplied with to get the area of major sector OYPX?