PREBOARD-1 EXAMINATION
SESSION 2024-25
CLASS X
MATHEMATICS STANDARD (Code No.041)

TIME: 3hrs
MAX.MARKS: 80

General Instructions:

Read the following instructions carefully and follow them:

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 36-38 are case study based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice in 2 Question of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take $\pi = 22/7$, $\sqrt{2} = 1.41$ and $\sqrt{3} = 1.73$ wherever required if not stated.
11. Use of calculators is not allowed.
12. There are 8 pages in the paper.

SECTION A

1. The graph of a quadratic polynomial p(x) passes through the points (-5,0), (0, -25), (4,-20) and (5,0). The zeroes of the polynomial are **(1)**

   a) -5, 25   b) 4, -5   c) -5, 5   d) 5, 4

2. The common difference of an AP whose first term is 5 and the sum of its first four terms is half the sum of next four terms is equal to **(1)**

   a) 2   b) 5   c) -2   d) -8

3. If the chord of a circle of radius 14 cm makes an angle of 90° at the centre, then the area of the major segment is **(1)**

   a) 616 cm^2 b) 560 cm^2 c) 462 cm^2 d) 308 cm^2

4. If three coins are tossed simultaneously then the probability of getting at least two heads **(1)**

   a) $\frac{1}{2}$ b) $\frac{3}{8}$ c) $\frac{1}{6}$ d) $\frac{7}{8}$

5. If $\triangle ABC \sim \triangle RPQ$, AB = 3 cm, BC = 5 cm, AC = 6 cm, RP = 6 cm and PQ = 10, then QR is equal to (1)
   a) 12   b) 10   c) 30   d) 4

6. If the sum of the zeros of the quadratic polynomial $kx^2 + 2x + 3k$ is equal to their product, then k equals: (1)
   a) $\frac{1}{3}$ b) $\frac{-1}{3}$ c) $\frac{2}{3}$ d) $\frac{-2}{3}$

7. If the equations $kx + 2y = 3$ and $3x + y = 5$ represent two intersecting lines at unique point then the value of k is (1)
   a) k = -6   b) k ≠ -6   c) k = 4   d) k ≠ -4

8. A solid cylinder of radius r and height h is placed over another cylinder of same height and radius. The total surface area of the shape so formed is (1)
   a) $4\pi rh + 4\pi r^2$ b) $2\pi rh + 2\pi r^2$ c) $4\pi rh + 2\pi r^2$ d) $2\pi rh + 4\pi r^2$

9. Find the ratio in which the line joining the points (6, 4) and (1, −7) is divided by x-axis. (1)
   a) 1:3   b) 2:7   c) 4:7   d) 6:7

10. If P(2,4), Q(0,3), R(3,6) and S(5,y) are the vertices of a parallelogram PQRS, value of y is (1)
    a) 7   b) -7   c) 5   d) -5

11. In figure, PA and PB are tangents to the circle with centre O such that $\angle APB = 50°$. Write the measure of $\angle OAB$. (1)

    a) 25°   b) 30°   c) 50°   d) 100°

12. The value of $(Sin\ 30° + Cos 60°) - (Cos 30° + Sin\ 60°)$ is (1)
    a) 0   b) $1 + \sqrt{3}$ c) $2 + \sqrt{3}$ d) $1 - \sqrt{3}$

13. A plane is observed to be approaching the airport. It is at a distance of 12 km from the point of observation and makes an angle of elevation of 60°. The height above the ground of the plane is (1)
    a) $6\sqrt{3}\ km$ b) $4\sqrt{3}km$ c) $2\sqrt{3}km$ d) $3\sqrt{3}\ km$

14. The median class of the following data is: (1)

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No. of students	8	10	12	22	30	18

    a) 20 − 30   b) 30 − 40   c) 40 − 50   d) 50 − 60

15. From a point P which is at a distance of 17 cm from the point O of a circle of radius 8 **(1)** cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the quadrilateral PQOR is

    a) $130 m^2$ b) $160 m^2$ c) $125 m^2$ d) $120 m^2$

16. If the difference of Mode and Median of a data is 24, then the difference of median and **(1)** mean is

    a) 8   b) 12   c) 24   d) 36

17. If the quadratic equation $x^2 - kx + 1 = 0$ has no real roots, then the values of k are **(1)**

    a) $-3 < k < 3$ b) $-2 < k < 2$ c) $k < -2$ d) $k > 2$

18 The largest number that divides 70 and 125, which leaves the remainders 5 and 8, is: **(1)**

    a) 65   b) 15   c) 13   d) 25

DIRECTION: In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.
Choose the correct option
a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
c) Assertion (A) is true but reason (R) is false.
d) Assertion (A) is false but reason (R) is true.

19. **Assertion (A):** If product of two numbers is 5780 and their HCF is 17, then their LCM **(1)** is 340.
    Reason (R): HCF is always a factor of LCM.

20. **Assertion (A):** D and E are the points on the sides AB and AC respectively of triangle **(1)** ABC such that AD=5.7cm, DB = 9.5cm, AB= 4.8cm and EC = 8cm then DE is not parallel to BC.

    Reason (R): If a line divides any two sides of a triangle in the same ratio then it is parallel to the third side.

SECTION-B

21. If P (2, 2) is equidistant from A(-2, k) and B(-2k, -3), find k.   **(2)**

22 Find the value of k for which the following system of equations $2x + 3y = 7$ and **(2)** $8x + (k+4)y - 28 = 0$ has infinitely many solutions.

23. In the given figure, CB || QR and CA || PR. If AQ — 12 cm, AR — 20 cm, PB — CQ — 15 cm, calculate PC and BR.

P

15 cm

C   B

15 cm

Q   12 cm   A   20 cm   R

(2)

24. If $\sec\theta - \tan\theta = \sqrt{2}\tan\theta$, than show that $\sec\theta + \tan\theta = \sqrt{2}\sec\theta$

OR
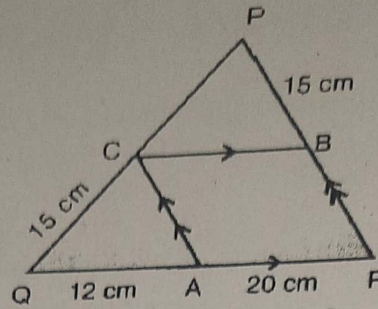
If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$.

25. If α and β are the zeroes of quadratic polynomial $x^2 - 6x + y$, Find the value of y if $3\alpha + 2\beta = 20$ (2)

OR

Find the zeroes of the quadratic polynomial $x^2 + 8x + 16$ and verify the relationship between the zeroes and the coefficients of the polynomial.

SECTION-C

26. Red queens and black jacks are removed from a pack of 52 playing cards. A card is (3)
drawn at random from the remaining cards, after reshuffling them. Find the probability that the drawn card is

(i) a king,

(ii) of red colour

(iii) a face card

27. Three sets of Science, History and Drawing books have to be stacked in such a way (3)
that all the books are stored topic wise and the height of each stack is the same. The number of Science books is 192, the number of History books is 480 and the number of Drawing books is 672. Assuming that the books are of the same thickness, determine the number of stacks of Science, History and Drawing books.

OR

Prove that $2\sqrt{5} - 3$ is an irrational number.

28. Two poles of height a metres and b metres are p metres apart. Find the height of the (3)
point of intersection of the lines joining the top of each pole to the foot of the opposite pole in terms of a and b.

29. A and B are two points 150 km apart on a highway. Two cars start A and B at the same (3)
time. If they move in the same direction, they meet in 15 hours. But if they move in the opposite direction, they meet in 1 hours. Find their speeds.

30. At six corners of a regular hexagonal field of side 7m, six animals two cows, two (3) buffaloes and two horses are tied separately with ropes of 3.5m each to graze in the field. Find the area of the field that can not be grazed by these animals.

OR

An elastic belt is placed around the rim of a pulley of radius 5 cm. From one point C On the belt, the elastic belt is pulled directly away from the centre O of the pulley until it is at P, 10 cm from the point O. Find the length of the belt that is still in contact with the pulley. Also, find the shaded area. [use $\pi = 3.14$]
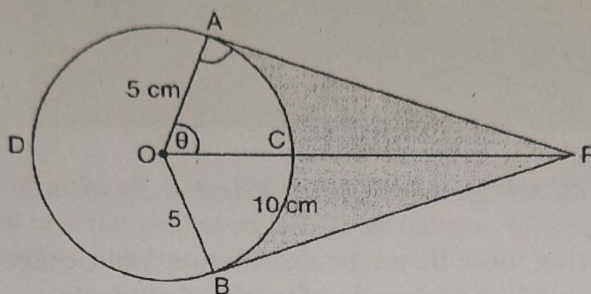
31. A solid is in the form of a right circular cylinder, with a hemisphere at one end and a (3) cone at the other end. The radius of the common base is 3.5 cm, and the height of the cylindrical and conical portions are 10 cm and 6 cm, respectively. Find the total surface area of the solid. (Use $\pi = 22/7$)

SECTION – D

32. Two water taps together can fill a tank in 6 hours. The tap of larger diameter takes 9 (5) hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

OR

In a flight of 2800 km, an aircraft was slowed down due to bad weather. Its average speed is reduced by 100 km/h and time increased by 30 minutes. Find the original duration of the flight.

33. In figure, a triangle PQR is drawn to circumscribe a circle of radius 6 cm such that the segments QT and TR into which QR is divided by the point of contact T, are of lengths (5) 12 cm and 9 cm respectively. If the area of $\triangle PQR = 189\ cm^2$, then find the lengths of sides PQ and PR.

34. a) Prove that:

   $$2Sec^2\theta - Sec^4\theta - 2Cosec^2\theta + Cosec^4\theta = Cot^4\theta - tan^4\theta$$ (3 + 2)

   b) If $Sin\theta + 2Cos\theta = 1$, prove that $2Sin\theta - Cos\theta = 2$

35. For the following more than type distribution table, make a frequency distribution table (5) then calculate median and mode of marks of students.

Marks	≥ 0	≥ 10	≥ 20	≥ 30	≥ 40	≥ 50	≥ 60	≥ 70	≥ 80	≥ 90
No. of students	100	93	88	70	59	42	34	20	11	4

OR

The following age wise chart of 300 passengers flying from Delhi to Pune is prepared by the airline staff.

Age (in years)	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60	Less than 70	Less than 80
No. of passengers	14	44	82	134	184	245	287	300

Obtain the median and mean age for the above distribution.

36. **CASE STUDY-1:**

Stadium seating surrounds the centre pitch. Each row in the seating is positioned at a slightly higher level than the one in front of it. A safe seating-standing section of a stadium is shown in the figure.
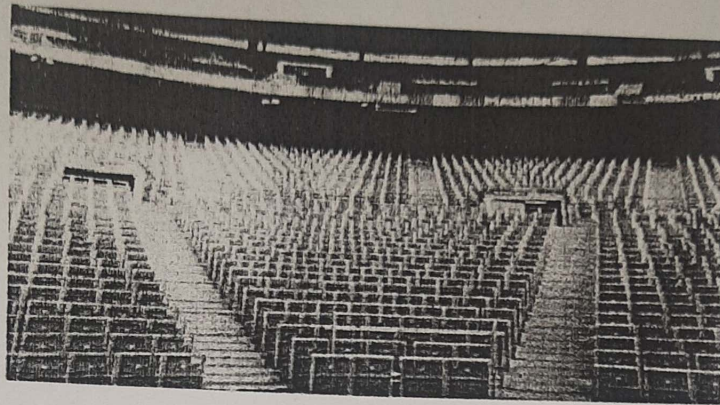
There are 20 rows in the section. Each row in the section is 700 mm in height, excluding the seat and has one more seat than the previous row starting from the second row. The first row has 4 seats.

Based on above information answer the following questions:

i) Sidharth is sitting in the centre seat of Row 12 in the section. How many seats are on his left? **(1)**

ii) What is the seating capacity of the section?

(2)

iii) Sam is standing in Row 15 and Ronit is standing in Row 1. How much higher is Sam's row than Ronit's? **(1)**

OR

How many seats in 15th row are more than the number of seats in 6th row.

37. **CASE STUDY-2:**

Conical Tank : The advantages of cone bottom tanks are found in nearly every industry, especially where getting every last drop from the tank is important. This type of tank has excellent geometry for draining, especially with high solids content slurries as these cone tanks provide a better full-drain solution. The conical tank eliminates many of the problems that flat base tanks have as the base of the tank is sloped towards the centre giving the greatest possible full-drain system in vertical tank design.

Rajesh has been given the task of designing a conical bottom tank for his client. Height of conical part is equal to its radius. Length of cylindrical part is the 3 times of its radius. Tank is closed from top. The cross section of conical tank is given below.

Based on the above information answer the following questions:

i) If radius of cylindrical part is taken as 3 meter, what is the volume of above conical tank ? (1)

ii) What is the slant height of the conical part if the radius of cylindrical part is 3 meter? (1)

iii) What is the area of metal sheet used to make this conical tank ? Assume that tank is covered (2) from top and radius is 3meter.

OR

What is the ratio of volume of cylindrical part to the volume of conical part?

38. **CASE STUDY-3:**

When an eagle looks at a rat on the ground, eagle does not attack the rat at its initial position. It takes into account the speed of the rat and the direction in which rat is moving. After analysing the situation (how? it may be God's gift) eagle attacks the rat in such a way that it may successful in catching the rat.
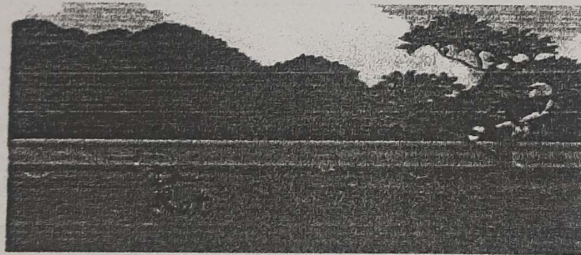
Suppose an eagle sitting on the tree of height 90 m, observes a rat with angle of depression 45°, and moving away from the tree with some speed. Eagle starts flying with 30° downward and catch rat in 10 seconds.

i) What is the horizontal distance between tree and initial position of rat ? (1)

ii) What is the distance travelled by eagle to catch rat? (1)

iii) What is the speed of rat ? (2)
        OR
What is the speed of Eagle ?

Time: 3 hrs.   Max. Marks: 80

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has **5 questions carrying 02 marks** each.
4. Section C has **6 questions carrying 03 marks each.**
5. Section D has **4 questions carrying 05 marks each.**
6. Section E **has 3 case based integrated units of assessment (04 marks each)**
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided.
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.
9. Total no. of pages are 5.

SECTION A (1 mark each)

1. If the length of the shadow of a tower is $\sqrt{3}$ times the height of the tower, then the angle of elevation of the sun is _
   a) 45°   b) 30°   c) 60°   d) 90°

2. $(Sec^2 A-1)$ is equal to
   a) $sin^2 A$ b) $- Cos^2 A$ c) $tan^2 A$ d) $sec^2 A$

3. The area of a sector of a circle with radius 14 cm if angle of the sector is 30°.
   a) 6π sq.cm   b) $\dfrac{49}{6} \pi$ sq.cm   c) 5π sq.cm   d) $\dfrac{49}{3} \pi$ sq.cm

4. The radius of the circle is equal to the chord AB of the circle. Then angle subtended by AB at the center is
   a) 30°   b) 45°   c) 90°   d) 60°

5. When a dice is thrown once, the probability of getting a multiple of 5 is
   a) 0   b) $\dfrac{1}{6}$ c) $\dfrac{1}{2}$ d) $\dfrac{1}{3}$

6. For the following distribution, the sum of upper limit of median class and lower limit of modal class is:

Class	0-5	5-10	10-15	15-20	20-25
Frequency	6	3	7	2	2

   a) 25   b) 20   c) 10   d) 15

7. If two positive integers a and b are written as $a = x^2yz$ and $b = x^3y^3$ where x, y, z are prime numbers, then HCF(a,b) is:
   a) x^2y b) xy^2 c) x^3y^3z d) xyz

8. The LCM of smallest odd prime number and smallest 2-digit composite number is:
   a) 30   b) 10   c) 20   d) 2

9. The discriminant of the equation $3x^2 - 3x + 3 = 0$ is
   a) -25   b) -27   c) 25   d) 27

10. The pair of equations x = 3 and x = 5 has:

a) no solution   b) 2 solutions   c) infinite solutions   d) one solution

11. Value(s) of k for which the quadratic equation $3x^2 + kx + 5 = 0$ has equal roots is:

a) 0 only   b) $2\sqrt{15}$ c) $-2\sqrt{15}$ d) $-2\sqrt{15}, 2\sqrt{15}$

12. The distance of the point (-3, 5) from y axis is k units, then k equals:

a) −3units   b) 3units   c) 5 units   d) −5 units

13. If $\triangle ABC \sim \triangle EFD$ and AB = 4 cm, FE = 6 cm, the ratio of perimeter ABC and perimeter DEF is

a) 1:3   b) 2:3   c) 3:1   d) 1:4

14. If in two triangles ABC and DEF $\dfrac{AB}{DF} = \dfrac{BC}{FE} = \dfrac{CA}{ED}$ then

a) $\triangle ABC \sim \triangle EFD$ b) $\triangle ABC \sim \triangle FED$ c) $\triangle ABC \sim \triangle EDF$ d) $\triangle ABC \sim \triangle DFE$

15. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the center O at a point Q so that OQ = 11 cm. Length PQ is:

a) 12 cm   b) 13 cm   c) $\sqrt{119}$ cm   d) $\sqrt{96}$ cm

16. If $\sin A = \dfrac{4}{5}$ then Tan A is equal to

a) $\dfrac{3}{\sqrt{7}}$ b) $\dfrac{3}{4}$ c) $\dfrac{4}{3}$ d) $\dfrac{4}{\sqrt{7}}$

17. The ratio between the volume of two spheres is 8:64. The ratio of their surface areas is:

a) 2 : 3   b) 4 : 5   c) 4 : 9   d) 1 : 2

18. Consider the following frequency distribution: The mode of the data is:

Class	0-5	5-10	10-15	15-20	20-25
Frequency	6	4	3	7	2

a) 15   b) 17.5   c) 17.2   d) 16.5

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

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

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

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

19. **Assertion (A):** Mid-point of a line segment divides line segment in the ratio 1 : 1.

Reason (R): The ratio in which the point (−3, k) divides the line segment joining the points (−5, 4) and (−2, 3) is 2:1.

20. **Assertion:** For any two positive integers p and q, HCF (p, q) × LCM (p, q) = p × q

Reason: If the HCF of two numbers is 5 and their product is 150, then their LCM is 40.

SECTION B

21. The ratio of incomes of two persons is 9 : 7 and the ratio of their expenditures is 4 : 3. If each of them manages to save ₹2000 per month. Form the pair of linear equations in the following problem.

22. S and T are points on sides PR and QR of △ PQR such that ∠ P = ∠ RTS. Show that △ RPQ ~ △ RTS.

OR

In Figure if PQ ∥ RS, prove that △ POQ ~ △ SOR.
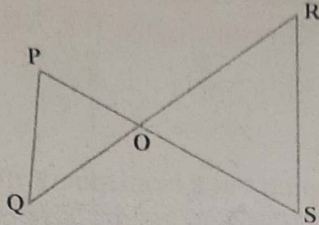
23. Prove that the lengths of tangents drawn from an external point to a circle are equal.

24. In △ PQR, right-angled at Q, PQ = 3 cm and PR = 6 cm. Determine ∠ QPR and ∠ PRQ.

25. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

OR

Find the area of the quadrant of a circle whose circumference is 66cm.

SECTION C

26. Prove that $5 - \sqrt{3}$ is an irrational number.

27. Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$, and verify the relationship between the zeroes and the coefficients.

28. The larger of two supplementary angles exceeds the smaller by 18 degrees. Find them.

OR

Champa went to a 'Sale' to purchase some pants and skirts. When her friends asked her how many of each she had bought, she answered, "The number of skirts is two less than twice the number of pants purchased. Also, the number of skirts is four less than four times the number of pants purchased". Find how many pants and skirts Champa bought.

29. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the center of the circle.

30. Express the ratios cos A, tan A and sec A in terms of sin A.

OR

Prove that $\dfrac{Sin\ A - Cos\ A + 1}{Sin\ A + Cos\ A - 1} = \dfrac{1}{Sec\ A - Tan\ A}$

31. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting (i) a king of spade (ii) a red face card (iii) a numbered card

SECTION D

32. In a competitive examination, 1 mark is awarded for each correct answer while ½ mark is deducted for each wrong answer. Jayanti answered 120 questions and got 90 marks. How many questions did she answer correctly?

OR

The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

33. CD and GH are respectively the bisectors of $\angle$ ACB and $\angle$ EGF such that D and H lie on sides AB and FE of $\triangle$ ABC and $\triangle$ EFG respectively. If $\triangle$ ABC ~ $\triangle$ FEG, show that:
(i) CD/GH = AC/FG
(ii) $\triangle$ DCB ~ $\triangle$ HGE
(iii) $\triangle$ DCA ~ $\triangle$ HGF

34. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, find the total surface area of the article.

OR

A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volumes of the cylinder and the toy. (Take $\pi = 3.14$)

35. Find the median marks from the given table.

Marks Obtained	Number of Students
More than or equal to 0	53
More than or equal to 10	48
More than or equal to 20	45
More than or equal to 30	41
More than or equal to 40	38
More than or equal to 50	35
More than or equal to 60	31
More than or equal to 70	24
More than or equal to 80	15
More than or equal to 90	8

SECTION E

36. **CASE STUDY 1**

Rohit is standing at the top of the building observes a car at an angle of 30°, which is approaching the foot of the building at a uniform speed. Six seconds later, the angle of depression of the car formed to be 60°, whose distance at that instant from the building is 25 m.

(i) Draw a labelled diagram of the given situation
(ii) Find the height of the building.
(iii) Find Total time taken by the car to reach the foot of the building from the starting point.

OR

Find The distance of the observer from the car when it makes an angle of 60°.

37. CASE STUDY 2

Alia and Shagun are friends living on the same street in Patel Nagar. Shaguns house is at the intersection of one street with another street on which there is a library. They both study in the same school and that is not far from Shagun's house. Suppose the school is situated at the point 0, i.e., the origin, Alia's house is at A. Shaguns house is at B and library is at C. Based on the above information, answer the following questions.
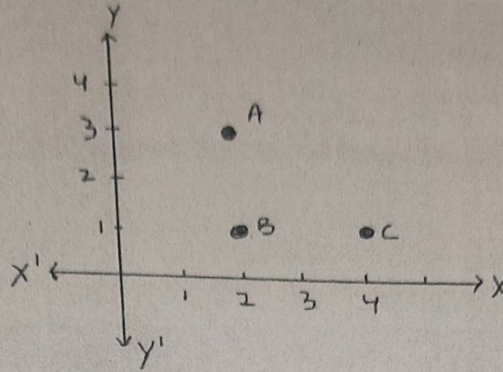
(i) How far is Alia's house from Shaguns house?

(ii) Find the ratio in which the line segment joining the points $(-3, 10)$ and $(6, -8)$ is divided by $(-1, 6)$.

OR

If $(1, 2), (4, y), (x, 6)$ and $(3, 5)$ are the vertices of a parallelogram taken in order, find x and y.

(iii) Find the coordinates of the mid-point of AC.

38. CASE STUDY 3

In a class the teacher asks every student to write an example of A.P. Two friends Geeta and Madhuri writes their progressions as -5, -2, 1,4, ... and 187, 184, 181, ... respectively. Now, the teacher asks various students of the class the following questions on these two progressions. Answer the following questions.

(i) Find the nth term of the progression written by Madhuri.

(ii) Find the sum of the first 15 multiples of 8.

OR

Which term will be the last positive term written by Madhuri?

(iii) Find the sum of first 10 terms of the progression written by Geeta.

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SESSION 2024-25
CLASS X
MATHEMATICS STANDARD (Code No.041)

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9. Draw neat and clean figures wherever required.
10. Take $\pi =22/7, \sqrt{2} =1.41$ and $\sqrt{3} = 1.73$ wherever required if not stated.
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SECTION A

1. The graph of a quadratic polynomial p(x) passes through the points (-6,0), (0, -25), (7,-20) and (6,0). The zeroes of the polynomial are **(1)**

   a) -5, 25   b) 7, -5   c) -6, 6   d) 5, 4

2. If the chord of a circle of radius 14 cm makes an angle of 90° at the centre, then the area of the major segment is **(1)**

   a) 616 cm²   b) 560 cm²   c) 462 cm²   d) 308 cm²

3. If three coins are tossed simultaneously then the probability of getting at least two heads **(1)**

   a) $\frac{1}{2}$ b) $\frac{3}{8}$ c) $\frac{1}{6}$ d) $\frac{7}{8}$

4. The common difference of an AP whose first term is 5 and the sum of its first four terms is half the sum of next four terms is equal to (1)

   a) -2   b) 5   c) 2   d) -8

5. If the sum of the zeros of the quadratic polynomial $kx^2 + 2x + 3k$ is equal to their product, then k equals: (1)

   a) $\frac{1}{3}$ b) $\frac{-1}{3}$ c) $\frac{2}{3}$ d) $\frac{-2}{3}$

6. If $\triangle ABC \sim \triangle RPQ$, AB = 3 cm, BC = 5 cm, AC = 6 cm, RP = 6 cm and PQ = 10, then QR is equal to (1)

   a) 12   b) 10   c) 30   d) 4

7. If the equations kx - 5y = 3 and 3x + y = 5 represent two intersecting lines at unique point then the value of k is (1)

   a) $k \neq -15$ b) $k \neq -6$ c) k =3   d) $k \neq -3$

8. If the HCF of 65 and 117 is expressible in the form 65m – 117, then the value of m is (1)

   a) 7   b) 2   c) 3   d) 1

9. If the quadratic equation $x^2 - kx + 1 = 0$ has no real roots, then the values of k are (1)

   a) $-3 < k < 3$ b) $-2 < k < 2$ c) $k < -2$ d) $k > 2$

10. The ratio in which the line segment joining the points $A(a_1, b_1)$ and $B(a_2, b_2)$ is divided by the y-axis is (1)

    a) $a_1 : b_1$ b) $a_2 : b_1$ c) $-a_1 : a_2$ d) $b_1 : b_2$

11. The value of $\sin 30° \cos 60° + \cos 30° \sin 60°$ is (1)

    a) 0   b) 1   c) 2   d) 4

12. The angle of elevation of the top of a building from a point on the ground, which is 30 m away from the foot of the building, is 30°. The height of the building is: (1)

    a) 10m   b) $\frac{30}{\sqrt{3}} m$ c) $\frac{\sqrt{3}}{10} m$ d) 30m

13. From a point P which is at a distance of 13 cm from the point O of a circle of radius 5 cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the quadrilateral PQOR is (1)

    a) $30m^2$ b) $60m^2$ c) $65m^2$ d) $40m^2$

14. The ratio in which the line $3x + y - 9 = 0$ divides the line-segment joining the points (1, 3) and (2, 7) is (1)

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

15. In figure, PA and PB are two tangents drawn from an external point P to a circle with **(1)** centre C and radius 4 cm. If $PA \perp PB$, then the length of each tangent is:
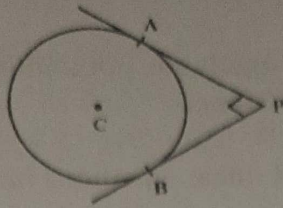
a) 3cm　　　　　b) 4cm　　　　　c) 6cm　　　　　d) 5cm

16. A solid cylinder of radius r and height h is placed over another cylinder of same height **(1)** and radius. The total surface area of the shape so formed is

a) $4\pi rh + 4\pi r^2$　　b) $2\pi rh + 2\pi r^2$　c) $4\pi rh + 2\pi r^2$　d) $2\pi rh + 4\pi r^2$

17. The mean and mode of a frequency distribution are 28 and 16 respectively. The **(1)** median is

a) 22　　　　　b) 23.5　　　　c) 24　　　　　d) 24.5

(1)

18. The runs scored by a batsman in 35 different matches are given below:

Runs Scored	0-15	15-30	30-45	45-60	60-75	75-90
Frequency	5	7	4	8	8	3

The lower limit of the median class is

a) 15　　　　　b) 30　　　　　c) 45　　　　　d) 60

DIRECTION: In the question number 9 and 10, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.
choose the correct option
a)Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
b)Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)
c) Assertion (A) is true but reason (R) is false.
d)Assertion (A) is false but reason (R) is true.

19. **Assertion(A):** The product of two consecutive positive integers is always divisible **(1)** by 2.
   Reason(R) : 1323334356733715 is a composite number.

20 **Assertion(A):** D and E are points on the sides AB and AC respectively of a triangle **(1)** ABC such that DE ∥ BC then the value of x is 4, when AD $= x$ cm, DB $= (x - 2)$cm, AE $= (x + 2)$cm and EC $= (x - 1)$cm.
   Reason (R): If a line parallel to one side of a triangle then it divides the other two sides in the same ratio.

SECTION B

21. If the square of difference of the zeroes of the quadratic polynomial $x^2 + px + 45$ is equal to 144, then find the value of p. (2)

OR

Find the zeroes of $p(x) = 4x^2 + 24x + 36$ quadratic polynomials and verify the relationship between the zeroes and their coefficients.
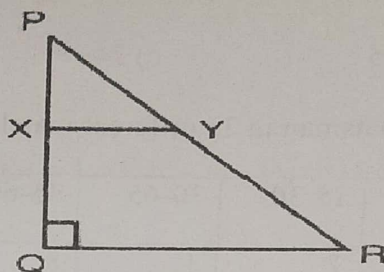
22. For what value or 'k' will the following pair of linear equations have infinitely many solutions $kx + 3y = k - 3$, $12x + ky = k$ (2)

23. If $\sec\theta - \tan\theta = \sqrt{2}\tan\theta$, than show that $\sec\theta + \tan\theta = \sqrt{2}\sec\theta$ (2)

OR

If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$.

24. In the given figure, PQR is a triangle right angled at Q and XY ∥ QR. If PQ = 6 cm, PY = 4 cm and PX: XQ = 1: 2. Calculate the length of PR and QR. (2)

25. Find the equation of the perpendicular bisector of the line segment joining (7, 1) and (3, 5). (2)

SECTION C

26. Two poles of height a metres and b metres are p metres apart. Find the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole in terms of a and b. (3)

27. Three sets of Science, History and Drawing books have to be stacked in such a way that all the books are stored topic wise and the height of each stack is the same. The number of Science books is 192, the number of History books is 480 and the number of Drawing books is 672. Assuming that the books are of the same thickness, determine the number of stacks of Science, History and Drawing books. (3)

OR

Prove that $2\sqrt{3} - 3$ is an irrational number.

28. Two different dice are thrown together. Find the probability that the number obtained (3)

(i) have a sum less than 7
(ii) have a product less than 16.
(iii) is a doublet of odd numbers.

29. Points A and B are 70 km apart on a highway. A car starts from A and another car starts **(3)** from B simultaneously. If they travel in the same direction, they meet in 7 hours. But, if they travel towards each other, they meet in 1 hour. Find the speed of each car.

30. A toy is in form of a cone of radius 3.5 cm mounted on a hemisphere of same radius **(3)** on its circular face. The total height of the toy is 15.5cm. Find the total surface area of the toy and the cost of painting it with orange colour at the rate of ₹ 4 per cm^2.

31. At six corners of a regular hexagonal field of side 7m, six animals two cows, two **(3)** buffaloes and two horses are tied separately with ropes of 3.5m each to graze in the field. Find the area of the field that can not be grazed by these animals.

OR

In Figure, PQRS is a square lawn with side PQ = 42 metres. Two circular flower beds are there on the sides PS and QR with centre at O, the inter- section of its diagonals. Find the total area of the two flower beds (shaded parts).
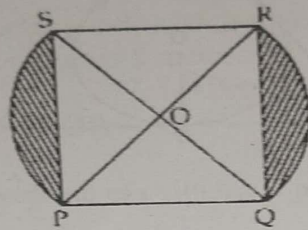
SECTION D

32. For the following more than type distribution table, make a frequency distribution **(5)** table then calculate median and mode of marks of students.

Marks	≥ 0	≥ 10	≥ 20	≥ 30	≥ 40	≥ 50	≥ 60	≥ 70	≥ 80	≥ 90
No. of students	100	93	88	70	59	42	34	20	11	4

OR

The following age wise chart of 300 passengers flying from Delhi to Pune is prepared by the airline staff.

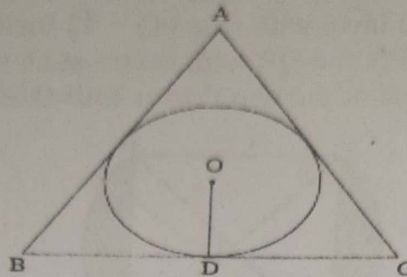| Age (in years)	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60	Less than 70	Less than 80
No. of passengers	14	44	82	134	184	245	287	300

Obtain the median and mean age for the above distribution.

33. A train, travelling at a uniform speed for 360 *km* would have taken 48 minutes less to travel the same distance, if its speed were 5 *km/h* more. Find the original speed of the train. **(5)**

OR

A trader bought a number of articles for Rs. 900. Five articles were found damaged. He sold each of the remaining articles at Rs. 2 more than what he paid for it. He got a profit of Rs. 80 on the whole transaction. Find the number of articles he bought.

34. In figure, a triangle *ABC* is drawn to circumscribe a circle of radius 10 *cm* such that the segments *BD* and *DC* into which *BC* is divided by the point of contact *D*, are of lengths 15 *cm* and 20 *cm* respectively. If the area of $\triangle ABC = 525 \ cm^2$, then find the lengths of sides *AB* and *AC*. **(5)**

35. a) Prove that:

$$2Sec^2\theta - Sec^4\theta - 2Cosec^2\theta + Cosec^4\theta = Cot^4\theta - tan^4\theta$$

b) If $Sin\theta + 2Cos\theta = 1$, prove that $2Sin\theta - Cos\theta = 2$

(3 + 2)

SECTION E

36. CASE STUDY-1:

Conical Tank : The advantages of cone bottom tanks are found in nearly every industry, especially where getting every last drop from the tank is important. This type of tank has excellent geometry for draining, especially with high solids content slurries as these cone tanks provide a better full-drain solution. The conical tank eliminates many of the problems that flat base tanks have as the base of the tank is sloped towards the centre giving the greatest possible full-drain system in vertical tank design.

Rajesh has been given the task of designing a conical bottom tank for his client. Height of conical part is equal to its radius. Length of cylindrical part is the 3 times of its radius. Tank is closed from top. The cross section of conical tank is given below.

Based on the above information answer the following questions:

i) If radius of cylindrical part is taken as 3 meter, what is the volume of above conical (1) tank ?

ii) What is the slant height of the conical part if the radius of cylindrical part is 3 meter? (1)

iii) What is the area of metal sheet used to make this conical tank ? Assume that tank is (2) covered from top and radius is 3 meter.

OR

What is the ratio of volume of cylindrical part to the volume of conical part?

37. **CASE STUDY-2:**
When an eagle looks at a rat on the ground, eagle does not attack the rat at its initial position. It takes into account the speed of the rat and the direction in which rat is moving. After analysing the situation (how? it may be God's gift) eagle attacks the rat in such a way that it may successful in catching the rat.
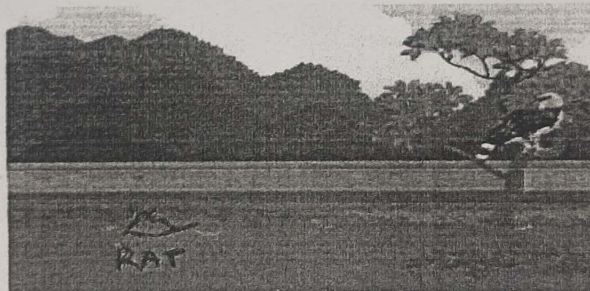
Suppose an eagle sitting on the tree of height 90 m, observes a rat with angle of depression 45°, and moving away from the tree with some speed. Eagle starts flying with 30° downward and catch rat in 10 seconds.

What is the horizontal distance between tree and initial position of rat ? (1)

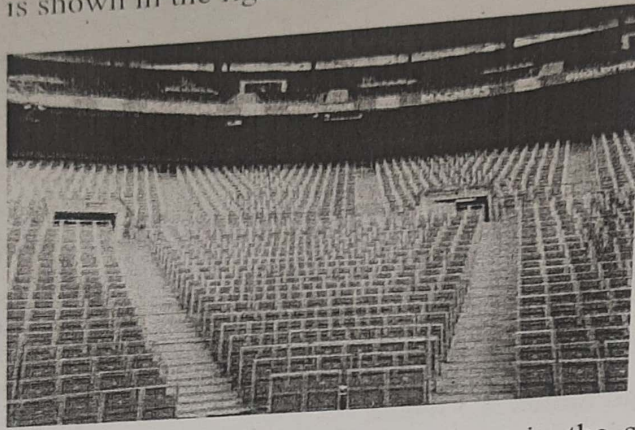What is the distance travelled by eagle to catch rat? (1)

What is the speed of rat ? (2)

OR
What is the speed of Eagle ?

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38. CASE STUDY-3:

Stadium seating surrounds the centre pitch. Each row in the seating is positioned at a slightly higher level than the one in front of it. A safe seating-standing section of a stadium is shown in the figure.

There are 20 rows in the section. Each row in the section is 700 mm in height, excluding the seat and has one more seat than the previous row starting from the second row. The first row has 4 seats.

i) Sidharth is sitting in the centre seat of Row 12 in the section. How many seats are on his left? **(1)**

ii) What is the seating capacity of the section? **(2)**

iii) Sam is standing in Row 15 and Ronit is standing in Row 1. How much higher is Sam's row than Ronit's? **(1)**

<div align="center">OR</div>

How many seats in 15th row are more than the 6th row.