CLASS X - MATHEMATICS

✤ General Instruction

1. *This Question Paper has 5 Sections A-E. Total number of pages is 5*
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, internal choices have been provided.*
8. *Draw neat figures wherever required. Take π = 22/7 wherever required if not stated. is question paper consists of 39 questions in 3 sections. Section A is Biology; Section B is Chemistry and Section C is Physics.*

(ii) All questions are compulsory. However, an Internal choice is provided in some questions. A student is expected to attempt only one of these questions.

(iii) Q8, Q9, Q24 and Q32 are Assertion-Reason based questions. The questions consist of two statements-Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below:

Option A - Both A and R are true, and R is the correct explanation of A.
Option B - Both A and R are true, and R is not the correct explanation of A.
Option C - A is true but R is false.
Option D - A is false but R is true.

SECTION-A

1. If the LCM of 12 and 42 is 10m + 4 then the value of m is
   (a) 50 (b) 8 (c) 15 (d) 1
2. A quadratic polynomial, whose zeroes are -4 and -5, is
   (a) x^2 - 9x + 20 (b) x^2 + 9x + 20
   (c) x^2 - 9x - 20 (d) x^2 + 9x - 20
3. The value of c for which the pair of equations cx - y = 2 and 6x - 2y = 3 will have infinitely many solutions is
   (a) 3 (b) -3 (c) -12 (d) no value
4. The graph of a polynomial p(x) cuts the X - axis at three points and touches it at two other points. The number of zeros of p(x) is
   (a) 1 (b) 2 (c) 3 (d) 5
5. The median of a set of 9 distinct observations is 20.5. If each of the largest 4 observations of the set is increased by 2, then the median of the new

set

(a) is increased by 2 (b) is decreased by 2

(c) is two times the original number

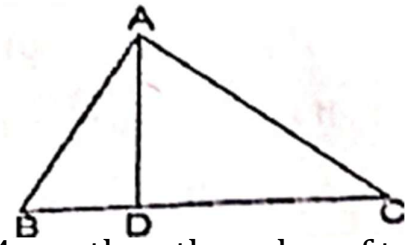
(d) Remains same as that of original observations

6. What is the greatest possible speed at which a girl can walk 95m and 171m in an exact number of minutes?

(a) 17 m/min (b) 19 m/min

(c) 23 m/min (d) 13 m/min

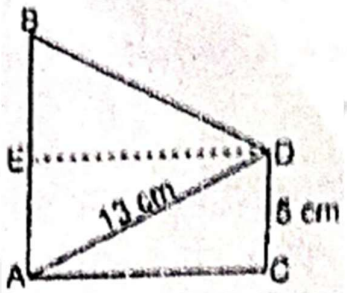
7. In $\angle BAC = 90°$ and $AD \perp BC$. Then



(a) $BD.CD = BC^2$ (b) $AB.AC = BC^2$

(c) $BD.CD = AD^2$ (d) $AB.AC = AD^2$

8. In the given figure, if $BA \perp AC$, $DC \perp AC$, $AB = 14$ cm, then the value of tan B is:



(a) 4/3 (b) 14/3 (c) 5/3 (d) 13/3

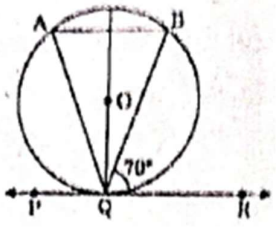
9. If (1, 2), (4, 3), (x, 6) and (3, 5) are the vertices of a parallelogram taken in order, then value of x is:

(a) 3 (b) 4 (c) 5 (d) 6

10. The (n-1)th term of an A.P. is given by 7,12,17, 22,... is

(a) 5n+2 (b) 5n + 3 (c) 5n-5 (d) 5n-3

11. In given figure, if PQR is the tangent to a circle at O, AB is a chord parallel to PR and $\angle BQR = 70°$ then $\angle AQB$ is equal to



(a) 20° (b) 40° (c) 35° (d) 45°

12. If $\tan (3x - 15)° = 1$ then find the value of x will be

(a) 30° (b) 45° (c) 20° (d) 0°

13. If the roots of $px^2 + qx + 2 = 0$ are reciprocal of each other, then

(a) $p = 0$ (b) $p = -2$ (c) $p = \pm 2$ (d) $p = 2$

14. If the mean of first n natural numbers is , then n = ?
(a) 6 (b) 7 (c) 9 (d) 10

15. If the angle between two radii of a circle is 110°, then the angle between the tangents at the ends of the radii is:
(a) 90° (b) 50° (c) 70° (d) 40°

16. For the distribution given below, the modal class is

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
Frequency	3	12	27	57	75	80

(a) 20 – 30 (b) 60 – 70 (c) 30 – 40 (d) 40 - 50

17. The probability of guessing the correct answer to a certain question is p/12 If the probability of not guessing the correct answer to the same question is 3/4, the value of p is
(a) 1 (b) 3 (c) 0 (d) 4

18. If $p\cos\theta$, then the value of $\sin\theta$ is (θ being an acute angle)
(a) q/3p (b) q/2p (c) p/q (d) 0

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

(a) Both assertion and reason are correct and reason is correct explanation for assertion.
(b) Both assertion and reason are correct but reason is not correct explanation for assertion.
(c) Assertion is correct but reason is false.
(d) Assertion is false and reason is correct.

19. Assertion (A): The point (-1, 6) divides the line segment joining the points (-3, 10) and (6. -8) in the ratio 2: 7 internally.
Reason (R): Given three points, i.e. A, B, C form an equilateral triangle, then AB = BC = AC.

20. Assertion(A): $\sqrt{3}\ (2+\sqrt{3})$ is an irrational number.
Reason(R): Product of two irrational numbers is always irrational.

SECTION B

21. The students of a class are made to stand in (complete) rows. If one student is extra in a row, there would be 2 rows less, and if one student

is less in a row, there would be 3 rows more. Find the number of students in the class.

OR

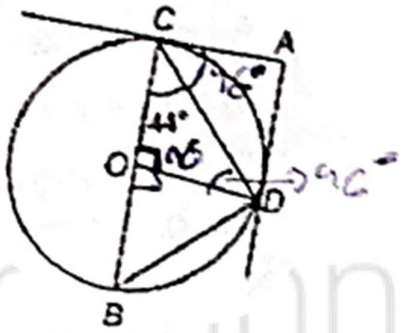
Two pens and one eraser cost Rs. 35 and 3 pencil and four erasers cost Rs. 65. Find the cost of pencil and eraser separately.

22. Prove that a parallelogram circumscribing a circle (with center O) is a rhombus.
23. Evaluate $2 \sin 30° \tan 60° - 3 \cos^2 60° \sec 30°$

OR

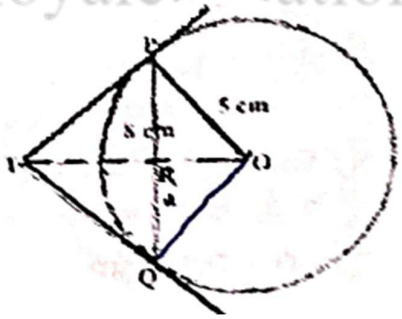
If $\sin x = 7/25$, where x is an acute angle, then find the value of $\sin x$. $\cos x (\tan x + \cot x)$.

24. If $\sqrt{3}$ is an irrational number, prove that $\sqrt{3}/2 + 5$ is an irrational number.
25. AC and AD are tangents at C and D, respectively. If $\angle BCD = 44°$, then find $\angle CAD$, $\angle ADC$, $\angle CBD$ and $\angle ACD$.



SECTION C

26. In the figure, PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length TP.

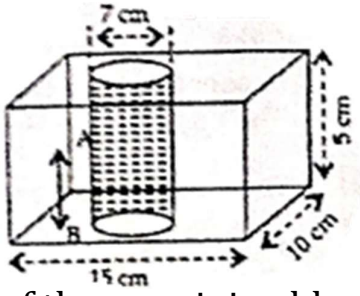


27. If the roots of the equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ are equal, then prove that either $a = 0$ or $a^3 + b^3 + c^3 = 3abc$

OR

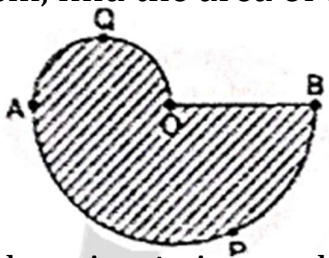
If the zeroes of the polynomial $x^2 + px + q$ are double that of the polynomial $2x^2 - 5x - 3$, find the values of p and q.

28. In Figure, from a cuboidal solid metallaic block, of dimensions 15 cm x 10 cm x 5 cm, a cylindrical hole of diameter 7 cm is drilled out.



Find the surface area of the remaining block.

29. In figure, APB and AQO are semicircle, and AO = OB. If the penmeter of the given figure is 40 cm, find the area of the shaded region.



30. If $\tan A + \sin A = m$ and $\tan A - \sin A = n$, show that $m^2 - n^2 = 4\sqrt{mn}$

OR

If θ is an acute angle and find

31. A bag contains 12 balls out of which x are white.
    (i) If one ball is drawn at random, what is the probability that it will be a white ball?
    (ii) If 6 more white balls are put in the bag, the probability of drawing a white ball will be double than that in part (i) Find x.

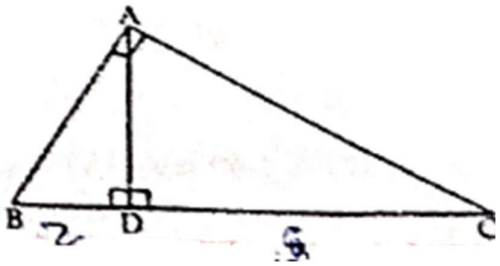
SECTION-D

32. A train travels 360 km at a uniform speed. If the speed has been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

OR

A two-digit number is such that the product of its digits is 18. When 63 is subtracted from the number, the digits interchange their places. Find the number.

33. (a) Two triangles ΔBAC and ΔBDC, right angled at A and D respectively are drawn on the same base BC and on the same side of BC. If AC and DB intersect at P, then prove that AP x PC = DP × PB.



(b) In the given figure, $\angle A = 90°$, AD $\perp$ BC. If BD = 2 cm and CD = 8 cm, find AD.

34. A solid composed of a right circular cone mounted on a hemisphere is placed upright inside a right circular cylinder completely filled with water, such that the solid touches the bottom of the cylinder. Determine the volume of water remaining in the cylinder if: the cylinder has a radius of 60 cm and a height of 180 cm, the hemisphere has a radius of 60 cm, and the cone (sharing the same base as the hemisphere) has a height of 120 cm. 5.

35. Find the missing frequencies f_1 and f_2 in the following frequency distribution table, if N= 100 and median is 32.

Class	Frequency
0-10	10
10-20	f_1
20-30	25
30-40	30
40-50	f_2
50-60	10

OR

A medical camp was held in a school to impart health education and the importance of exercise to children. During this camp, a medical check of 35 students was done and their weights were recorded as follows: Compute the modal weight.

Weight (in kg)	No. of Students
below 40	3
below 42	5
below 44	9
below 46	14
below 48	28
below 50	31
below 52	35

SECTION-E

36. The School Auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10

seats more than the previous one.

a) If the first circular row has 30 seats, how many seats will be there in the tenth row?

b) For 1500 seats, how many rows need to be there?

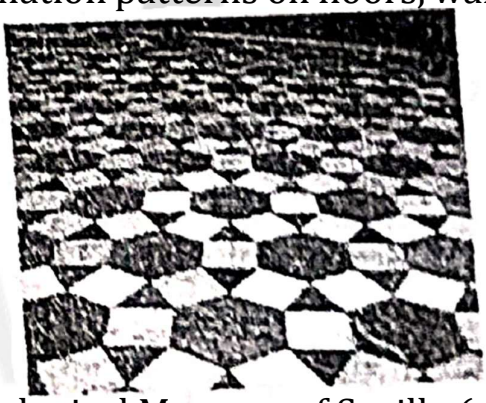
OR

If 1500 seats are to be placed in the auditorium, how many seats are still left to be put after the 10th row?

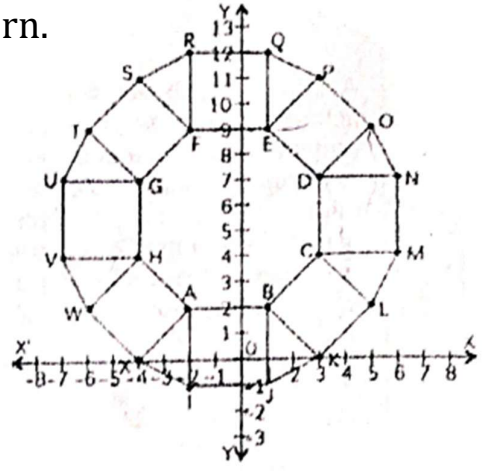
c) If there were 17 rows in the auditorium, how many seats will be there in the middle row?

37. Tiling or tessellation of a flat surface is the covering of a plane using one or more geometric shapes, called tiles, with no overlaps and no gaps.

Historically, tessellations were used in ancient Rome and in Islamic art. You may find tessellation patterns on floors, walls, paintings etc. A tiled



floor in the archaeological Museum of Seville (shown in figure) has been made using squares, triangles and hexagons A craftsman thought of making a floor pattern after being inspired by the above design. To ensure accuracy in his work, he made the pattern on the Cartesian plane. He used regular octagons, squares and triangles for his floor tessellation pattern.



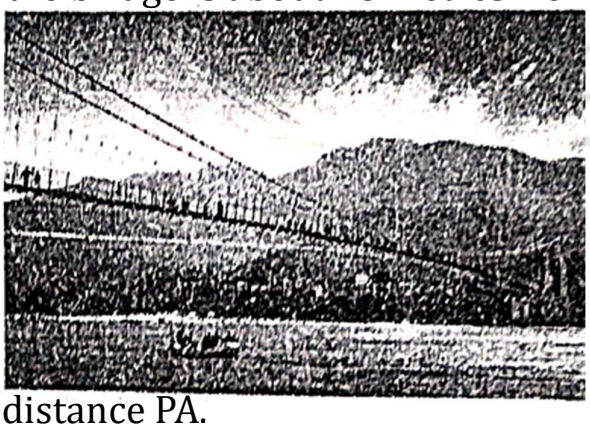
a) What is the length of the line segment joining points B and F?
b) The centre 'Z' in the figure will be the point of intersection of the diagonals of quadrilateral WXOP. Then what are the coordinates of Z?
c) What are the coordinates of the point on y-axis equidistant from A and G?

OR

What is the area of trapezium AFGH?

38. Lakshaman Jhula is located 5 kilometres north-east of the city of Rishikesh in the Indian state of Uttarakhand. The bridge connects the villages of Tapovan to Jonk. Tapovan is in Tehri Garhwal district, on the west bank of the river,

38. While Jonk is in Pauri Garhwal district, on the east bank. Lakshman Jhula is a pedestrian bridge also used by motorbikes. It is a landmark of Rishikesh.
A group of Class X students visited Rishikesh in Uttarakhand on a trip. They observed from a point (P) on a river bridge that the angles of depression of opposite banks of the river are 60° and 30° respectively. The height of the bridge is about 18 metres from the river.



a) Find the distance PA.
b) Find the distance PB.
c) Find the width AB of the river.

OR

Find the height BQ if the angle of the elevation from P to Q be 30°.

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