

ABHINAV ACADEMY
TEST 04

SUBJECT: MATHEMATICS
CLASS : X

MAX. MARKS : 80
DURATION : 3 HRS

General Instruction:

1. This Question Paper has 5 Sections A-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) with sub-parts of the values of 1, 1 and 2 marks each respectively.
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. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION – A

Questions 1 to 20 carry 1 mark each.

1. The point on the x-axis which is equidistant from $(-4, 0)$ and $(10, 0)$ is:
(a) $(7, 0)$ (b) $(5, 0)$ (c) $(0, 0)$ (d) $(3, 0)$
2. If a cylinder is covered by two hemispheres shaped lid of equal shape, then the total curved surface area of the new object will be
(a) $4\pi rh + 2\pi r^2$ (b) $4\pi rh - 2\pi r^2$ (c) $2\pi rh + 4\pi r^2$ (d) $2\pi rh + 4\pi r$
3. If the LCM of a and 18 is 36 and the HCF of a and 18 is 2, then a =
(a) 1 (b) 2 (c) 3 (d) 4
4. The sum of exponents of prime factors in the prime-factorisation of 196 is:
(a) 3 (b) 4 (c) 5 (d) 6
5. The values of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is
(a) 0 only (b) 8 only (c) 0,8 (d) 4
6. A number x is chosen at random from the numbers -3, -2, -1, 0, 1, 2, 3 the probability that $|x| < 2$ is
(a) $1/7$ (b) $2/7$ (c) $3/7$ (d) $5/7$
7. If $x = 2\sin^2\theta$ and $y = 2\cos^2\theta + 1$ then $x + y$ is:
(a) 3 (b) 2 (c) 1 (d) $1/2$
8. If $\frac{1}{2}$ is a root of the equation $x^2 + kx - 5/4 = 0$, then the value of k is
(a) 2 (b) -2 (c) $1/4$ (d) $1/2$
9. The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ have
(a) a unique solution (b) exactly two solutions
(c) infinitely many solutions (d) no solution
10. The point which lies on the perpendicular bisector of the line segment joining point A $(-2, -5)$ and B $(2, 5)$ is:
(a) $(0, 0)$ (b) $(0, -1)$ (c) $(-1, 0)$ (d) $(1, 0)$

11. A card is selected at random from a well shuffled deck of 52 playing cards. The probability of its being a face card is
 (a) $\frac{3}{13}$ (b) $\frac{4}{13}$ (c) $\frac{6}{13}$ (d) $\frac{9}{13}$
12. The ratio in which the line segment joining the points P(-3, 10) and Q(6, -8) is divided by O(-1, 6) is:
 (a) 1:3 (b) 3:4 (c) 2:7 (d) 2:5
13. A box contains cards numbered 6 to 50. A card is drawn at random from the box. The probability that the drawn card has a number which is a perfect square is :
 (a) $\frac{1}{45}$ (b) $\frac{2}{15}$ (c) $\frac{4}{45}$ (d) $\frac{1}{9}$
14. In a circle of diameter 42cm, if an arc subtends an angle of 60° at the centre, then the length of the arc is:
 (a) $\frac{22}{7}$ cm (b) 11cm (c) 22 cm (d) 44 cm
15. If the lines $3x + 2ky - 2 = 0$ and $2x + 5y + 1 = 0$ are parallel, then what is the value of k?
 (a) $\frac{4}{15}$ (b) $\frac{15}{4}$ (c) $\frac{4}{5}$ (d) $\frac{5}{4}$

16. For the following distribution:

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
No. of students	3	12	27	57	75	80

the modal class is

- (a) 10-20 (b) 20-30 (c) 30-40 (d) 50-60
17. The distance of the point P (2, 3) from the x-axis is
 (a) 2 (b) 3 (c) 1 (d) 5
18. A circus artist is climbing a 30 m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. Find the distance of the pole to the peg in the ground, if the angle made by the rope with the ground level is 30° .
 (a) $20\sqrt{3}$ m (b) $15\sqrt{3}$ m (c) $10\sqrt{3}$ m (d) 20 m

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

19. **Assertion (A):** The largest number that divide 70 and 125 which leaves remainder 5 and 8 is 13
Reason (R): $HCF(65, 117) = 13$
 (a) Both A and R are true and R is the correct explanation of A
 (b) Both A and R are true but R is not the correct explanation of A
 (c) A is true and R is false
 (d) A is false and R is true
20. **Assertion (A):** In $\triangle ABC$, $DE \parallel BC$ such that $AD = (7x - 4)$ cm, $AE = (5x - 2)$ cm, $DB = (3x + 4)$ cm and $EC = 3x$ cm then x equal to 5.
Reason (R): If a line is drawn parallel to one side of a triangle to intersect the other two sides in distant point, then the other two sides are divided in the same ratio.
 (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 but 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.

SECTION-B

Questions 21 to 25 carry 2M each

21. Find the value of m for which the pair of linear equations:
 $2x + 3y - 7 = 0$ and $(m - 1)x + (m + 1)y = (3m - 1)$ has infinitely many solutions
22. Find the zeroes of the quadratic polynomials $p(t) = 5t^2 + 12t + 7$ and verify the relationship between the zeroes and the coefficients.
23. Two dice are thrown at the same time. Find the probability of getting (i) same number on both dice (ii) different numbers on both dice.

OR

Cards marked with number 3, 4, 5, ..., 50 are placed in a box and mixed thoroughly. A card is drawn at random from the box. Find the probability that the selected card bears (i) a perfect square number (ii) a single digit number

24. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$.
25. Find the points on the x -axis which are at a distance of $2\sqrt{5}$ from the point $(7, -4)$. How many such points are there?

OR

If A and B are $(-2, -2)$ and $(2, -4)$ respectively, find the coordinates of P such that $AP = \frac{3}{7}AB$ and P lies on the line segment AB.

SECTION-C

Questions 26 to 31 carry 3 marks each

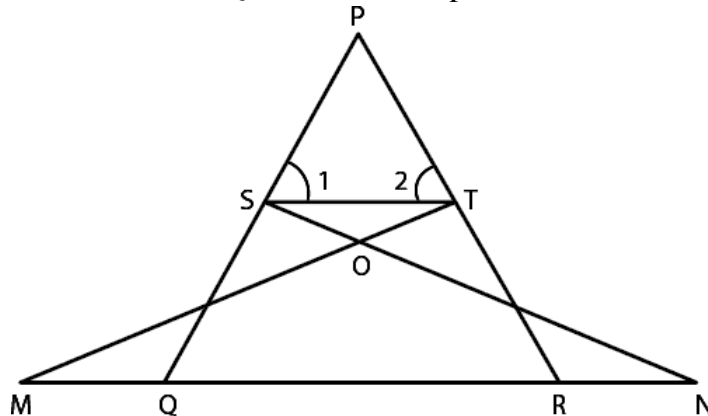
26. On a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm, respectively. Find the minimum distance each should walk so that each can cover the same distance in complete steps.

OR

Show that $5 + 2\sqrt{7}$ is an irrational number, where $\sqrt{7}$ is given to be an irrational number.

27. From a point on a ground, the angle of elevation of bottom and top of a transmission tower fixed on the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower.

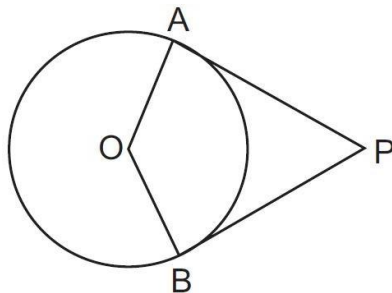
28. In the below figure, if $\angle 1 = \angle 2$ and $\triangle NSQ = \triangle MTR$, then prove that $\triangle PTS \sim \triangle PRQ$.



29. If $\operatorname{cosec}\theta + \cot\theta = p$, then prove that $\cos\theta = \frac{p^2 - 1}{p^2 + 1}$

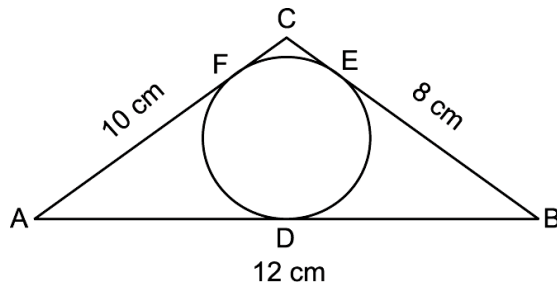
30. If $2x + y = 23$ and $4x - y = 19$, find the values of $5y - 2x$ and $y/x - 2$.

31. In the given figure, OP is equal to diameter of the circle. Prove that ABP is an equilateral triangle.



OR

A circle is inscribed in a $\triangle ABC$ having sides 8 cm, 10 cm and 12 cm as shown in the following figure. Find AD, BE and CF.



SECTION-D

Questions 32 to 35 carry 5M each

32. Two pipes running together can fill a cistern in $3\frac{1}{13}$ hours. If one pipe takes 3 hours more than the other to fill it, find the time in which each pipe would fill the cistern.

OR

If Zeba was younger by 5 years than what she really is, then the square of her age (in years) would have been 11 more than five times her actual age. What is her age now? [NCERT Exemplar]

33. State and prove Basic Proportional Theorem.

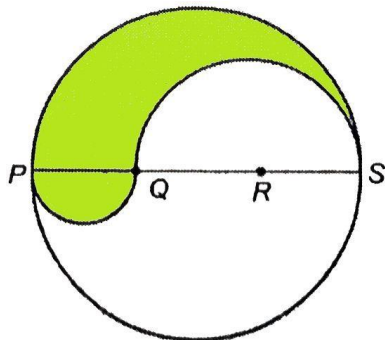
34. A survey regarding the heights (in cm) of 50 girls of class Xth of a school was conducted and the following data was obtained. Find the mean, median and mode of the given data.

Heights (in cm)	120 – 130	130 – 140	140 – 150	150 – 160	160 – 170
No. of Girls	2	8	12	20	8

35. A chord of a circle of radius 15 cm subtends an angle of 60° at the centre. Find the areas of the corresponding minor and major segments of the circle. (Use $\pi = 3.14$ and $\sqrt{3} = 1.73$)

OR

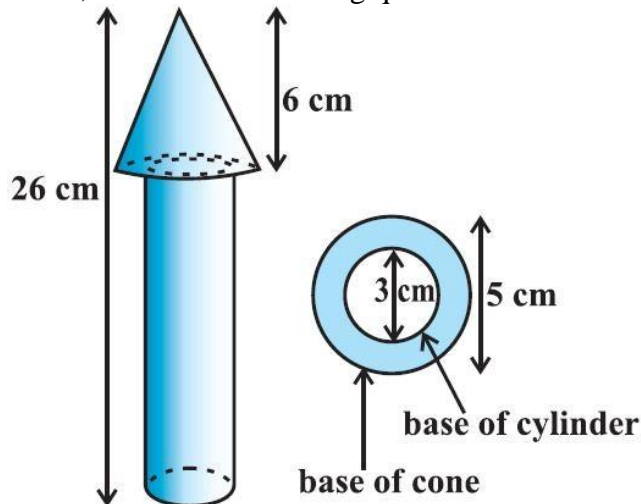
PQRS is a diameter of a circle of radius 6 cm. The lengths PQ, QR and RS are equal. Semi-circles are drawn on PQ and QS as diameters as shown in below figure. Find the perimeter and area of the shaded region



SECTION-E (Case Study Based Questions)

Questions 36 to 38 carry 4M each

36. In a toys manufacturing company, wooden parts are assembled and painted to prepare a toy. One specific toy is in the shape of a cone mounted on a cylinder. For the wood processing activity center, the wood is taken out of storage to be sawed, after which it undergoes rough polishing, then is cut, drilled and has holes punched in it. It is then fine polished using sandpaper. For the retail packaging and delivery activity center, the polished wood sub-parts are assembled together, then decorated using paint. The total height of the toy is 26 cm and the height of its conical part is 6 cm. The diameters of the base of the conical part is 5 cm and that of the cylindrical part is 3 cm. On the basis of the above information, answer the following questions:



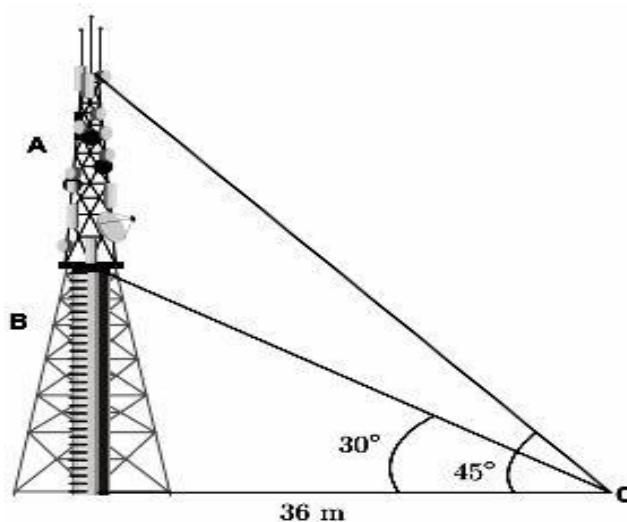
- (a) If its cylindrical part is to be painted yellow, find the surface area need to be painted. [1]
(b) If its conical part is to be painted green, find the surface area need to be painted. [2]

OR

- (b) Find the volume of the wood used in making this toy. [2]
(c) If the cost of painting the toy is 3 paise per sq cm, then find the cost of painting the toy. (Use $\pi = 3.14$) [1]

37. Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure, including microwave dishes. They are among the tallest human-made structures. There are 2 main types: guyed and self-supporting structures. On a similar concept, a radio station tower was built in two sections A and B.

Tower is supported by wires from a point O. Distance between the base of the tower and point O is 36 m. From point O, the angle of elevation of the top of section B is 30° and the angle of elevation of the top of section A is 45° .



- (i) What is the height of the section B? (1)
- (ii) What is the height of the section A? (1)
- (iii) What is the length of the wire structure from the point O to the top of section A? (2)

OR

- (iii) What is the length of the wire structure from the point O to the top of section B? (2)

38. Mohan is an auto driver. His autorickshaw was too old and he had to spend a lot of money on repair and maintenance every now and then. One day he got to know about the EV scheme of the Government of India where he can not only get a good exchange bonus but also avail heavy discounts on the purchase of an electric vehicle. So, he took a loan of 71,18,000 from a reputed bank and purchased a new autorickshaw.

Mohan repays his total loan of 118000 rupees by paying every month starting with the first instalment of 1000 rupees.



- (i) If he increases the instalment by 100 rupees every month, then what amount will be paid by him in the 30th instalment? [1]
- (ii) If he increases the instalment by 100 rupees every month, then what amount of loan does he still have to pay after 30th instalment? [2]

OR

- (ii) If he increases the instalment by 200 rupees every month, then what amount would he pay in 40th instalment? [2]
- (iii) If he increases the instalment by 100 rupees every month, then what amount will be paid by him in the 100th instalment [1]

