

ABHINAV ACADEMY
TEST 01

SUBJECT: MATHEMATICS
CLASS : X

MAX. MARKS : 80
DURATION : 3 HRS

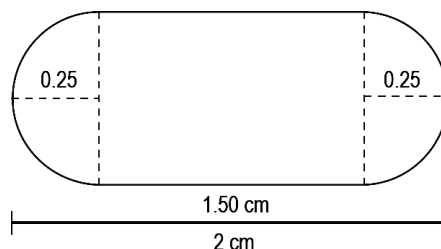
General Instruction:

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. In a formula racing competition, the time taken by two racing cars A and B to complete 1 round of the track is 30 minutes and p minutes respectively. If the cars meet again at the starting point for the first time after 90 minutes and the HCF (30, p) = 15, then the value of p is
(a) 45 minutes (b) 60 minutes (c) 75 minutes (d) 180 minutes
2. The solution of the following pair of equation is:
 $x - 3y = 2, 3x - y = 14$
(a) $x = 5, y = 1$ (b) $x = 2, y = 3$ (c) $x = 1, y = 2$ (d) $x = 1, y = 4$
3. If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$, where x and y are prime numbers, then the HCF (a, b) is:
(a) xy (b) xy^2 (c) x^3y^3 (d) x^2y^2
4. The ratio in which x-axis divides the join of (2, -3) and (5, 6) is:
(a) 1: 2 (b) 3 : 4 (c) 1: 3 (d) 1: 5
5. The 11th and 13th terms of an AP are 35 and 41 respectively, its common difference is
(a) 38 (b) 32 (c) 6 (d) 3
6. A medicine-capsule is in the shape of a cylinder of radius 0.25 cm with two hemispheres stuck to each of its ends. The length of the entire capsule is 2 cm. What is the total surface area of the capsule? (Take π as 3.14)



- (a) 0.785 cm^2 (b) 0.98125 cm^2 (c) 2.7475 cm^2 (d) 3.14 cm^2
7. A 1.6 m tall girl stands at distance of 3.2 m from a lamp post and casts shadow of 4.8 m on the ground, then the height of the lamp post is

- (a) 8 m (b) 4 m (c) 6 m (d) $\frac{8}{3}$ m

8. A tangent is drawn from a point at a distance of 17 cm of circle (O, r) of radius 8 cm. The length of tangent is
 (a) 5 cm (b) 9 cm (c) 15 cm (d) 23 cm

9. 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

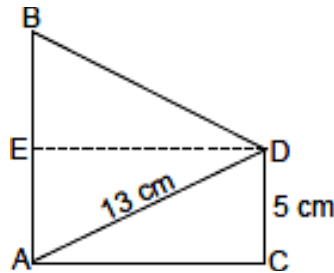
The lower limit of the median class is

- (a) 15 (b) 30 (c) 45 (d) 60

10. If in two triangles, DEF and PQR, $\angle D = \angle Q$ and $\angle R = \angle E$, then which of the following is not true?

- (a) $\frac{EF}{PR} = \frac{DF}{PQ}$ (b) $\frac{EF}{RP} = \frac{DE}{PQ}$ (c) $\frac{DE}{QR} = \frac{DF}{PQ}$ (d) $\frac{EF}{RP} = \frac{DE}{QR}$

11. In the given figure, if $AB = 14$ cm, then the value of $\tan B$ is:



- (a) $\frac{4}{3}$ (b) $\frac{14}{3}$ (c) $\frac{5}{3}$ (d) $\frac{13}{3}$

12. Two cubes each with 6 cm edge are joined end to end. The surface area of the resulting cuboid is
 (a) 180 cm^2 (b) 360 cm^2 (c) 300 cm^2 (d) 260 cm^2

13. A cone, a hemisphere and cylinder are of the same base and of the same height. The ratio of their volumes is

- (a) 1 : 2 : 3 (b) 2 : 1 : 3 (c) 3 : 1 : 2 (d) 3 : 2 : 1

14. The probability of getting a bad egg in a lot of 400 is 0.035. The number of bad eggs in the lot is

- (a) 7 (b) 14 (c) 21 (d) 28

15. If $\sqrt{3} \sin \theta - \cos \theta = 0$ and $0^\circ < \theta < 90^\circ$, find the value of θ .

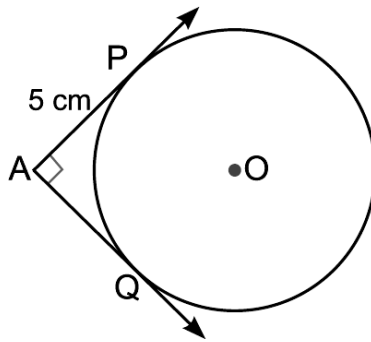
- (a) 30° (b) 45° (c) 60° (d) 90°

16. Find the value of k for which the equation $x^2 + k(2x + k - 1) + 2 = 0$ has real and equal roots.

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

17. In the below figure, the pair of tangents AP and AQ drawn from an external point A to a circle with centre O are perpendicular to each other and length of each tangent is 5 cm. Then radius of the circle is

- (a) 10 cm (b) 7.5 cm (c) 5 cm (d) 2.5 cm



18. The radii of two cylinders are in the ratio 5 : 7 and their heights are in the ratio 3 : 5. The ratio of their curved surface area is
 (a) 3 : 7 (b) 7 : 3 (c) 5 : 7 (d) 3 : 5

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):** If $x = 2 \sin^2\theta$ and $y = 2 \cos^2\theta + 1$ then the value of $x + y = 3$.
Reason (R): For any value of θ , $\sin^2\theta + \cos^2\theta = 1$

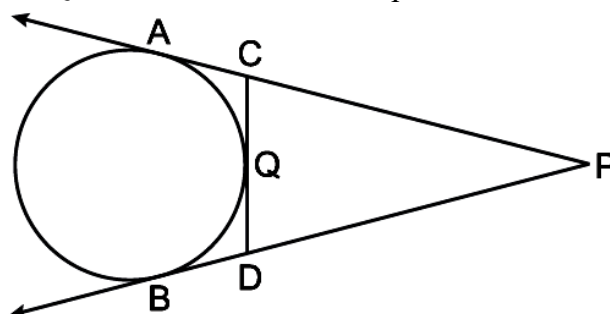
20. **Assertion (A):** The length of the minute hand of a clock is 7 cm. Then the area swept by the minute hand in 5 minute is $77/6 \text{ cm}^2$.

Reason (R): The length of an arc of a sector of angle q and radius r is given by $l = \frac{\theta}{360^\circ} \times 2\pi r$

SECTION-B

Questions 21 to 25 carry 2M each

21. Find the point on y-axis which is equidistant from the points $(5, -2)$ and $(-3, 2)$.
22. X is a point on the side BC of $\triangle ABC$. XM and XN are drawn parallel to AB and AC respectively meeting AB in N and AC in M. MN produced meets CB produced at T. Prove that $TX^2 = TB \times TC$.
23. The probability of selecting a blue marble at random from a jar that contains only blue, black and green marbles is $1/5$. The probability of selecting a black marble at random from the same jar is $1/4$. If the jar contains 11 green marbles, find the total number of marbles in the jar.
24. In figure PA and PB are tangents to the circle drawn from an external point P. CD is the third tangent touching the circle at Q. If $PA = 15 \text{ cm}$, find the perimeter of $\triangle PCD$.



OR

Two concentric circles are of radii 8 cm and 5 cm. Find the length of the chord of the larger circle which touches the smaller circle.

25. For what value of k , the following system of equations have infinite solutions:

$$2x - 3y = 7, (k + 2)x - (2k + 1)y = 3(2k - 1)?$$

OR

Sumit is 3 times as old as his son. Five years later, he shall be two and a half time as old as his son. How old is Sumit at present?

SECTION-C

Questions 26 to 31 carry 3 marks each

26. Find the coordinates of the points which divide the line segment joining A $(-2, 2)$ and B $(2, 8)$ into four equal parts.

27. If PQ is a tangent drawn from an external point P to a circle with centre O and QOR is a diameter where length of QOR is 8 cm such that $\angle POR = 120^\circ$, then find OP and PQ.

28. If $\sec \theta + \tan \theta = p$, prove that $\sin \theta = \frac{p^2 - 1}{p^2 + 1}$.

OR

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

29. Daily wages of 110 workers, obtained in a survey, are tabulated below:

Daily Wages (in Rs.)	100-120	120-140	140-160	160-180	180-200	200-220	220-240
Number of Workers	10	15	20	22	18	12	13

Compute the mean daily wages and modal daily wages of these workers.

30. Solve the following linear equations:

$$152x - 378y = -74 \text{ and } -378x + 152y = -604$$

31. The sum of the 5th and the 9th terms of an AP is 30. If its 25th term is three times its 8th term, find the AP.

OR

If the ratio of the sum of first n terms of two AP's is $(7n + 1) : (4n + 27)$, find the ratio of their m th terms.

SECTION-D

Questions 32 to 35 carry 5M each

32. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm^2 .

OR

Rasheed got a playing top (lattu) as his birthday present, which surprisingly had no colour on it. He wanted to colour it with his crayons. The top is shaped like a cone surmounted by a hemisphere. The entire top is 5 cm in height and the diameter of the top is 3.5 cm. Find the area he has to colour.

33. A motor boat whose speed is 15 km/hr in still water goes 30 km downstream and comes back in 4 hours 30 minutes. Find the speed of the stream.

34. State and prove Basic Proportional Theorem.

35. The lower window of a house is at a height of 2 m above the ground and its upper window is 4 m vertically above the lower window. At certain instant, the angles of elevation of a balloon from

these windows are observed to be 60° and 30° , respectively. Find the height of the balloon above the ground.

OR

From the top of a 60 m high building, the angles of depression of the top and the bottom of a tower are 45° and 60° respectively. Find the height of the tower. [Take $\sqrt{3} = 1.73$]

SECTION-E (Case Study Based Questions)
Questions 36 to 38 carry 4M each

36. Shivani took a pack of 52 cards. She kept aside all the black face cards and shuffled the remaining cards well.



Based on the above information answer the following questions.

- Write the number of total possible outcomes.
- She draws a card from the well-shuffled pack of remaining cards. What is the probability that the card is a face card?
- Write the probability of drawing a black card.

OR

- What is the probability of getting neither a black card nor an ace card?

37. In the month of April to June 2022, the exports of passenger cars from India increased by 26% in the corresponding quarter of 2021–22, as per a report. A car manufacturing company planned to produce 1800 cars in 4th year and 2600 cars in 8th year. Assuming that the production increases uniformly by a fixed number every year.



Based on the above information answer the following questions.

- Find the production in the 1st year. (1)
- Find the production in the 12th year. (1)
- Find the total production in first 10 years. (2)

OR

- In how many years will the total production reach 31200 cars? (2)

38. Aditya plantations have two rectangular fields of the same width but different lengths. They are required to plant 168 trees in the smaller field and 462 trees in the larger field. In both fields, the trees will be planted in the same number of rows but in different number of columns.



- (i) What is the maximum number of rows in which the trees can be planted in each of the fields? (2)
(ii) If the trees are planted in the number of rows obtained in part (i), how many columns will each field have?
(iii) If total cost of planted trees in one column is Rs. 500, then find the cost to plant the trees in smaller field.

OR

If the total cost of planted trees in one column is Rs. 500, the find the cost to plant the trees in larger field.