

DEV TUTORIAL

SUBJECT: MATHEMATICS

MAX. MARKS : 80

CLASS : X

DURATION : 3 HRS

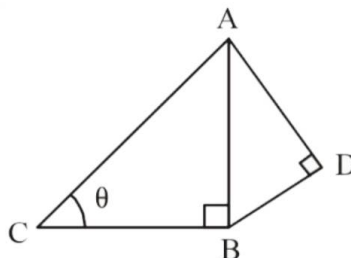
General Instruction:

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.

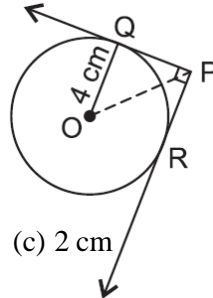
1. If the LCM of a and 18 is 36 and the HCF of a and 18 is 2, then a =
(a) 1 (b) 2 (c) 3 (d) 4
2. The sum of exponents of prime factors in the prime-factorisation of 196 is:
(a) 3 (b) 4 (c) 5 (d) 6
3. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and -3, then
(a) $a = -7, b = -1$ (b) $a = 5, b = -1$ (c) $a = 2, b = -6$ (d) $a = 0, b = -6$
4. Three cubes each of side 15 cm are joined end to end. The total surface area of the cuboid is:
(a) 3150 cm^2 (b) 1575 cm^2 (c) 1012.5 cm^2 (d) 576.4 cm^2
5. 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)
6. 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)
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 $\cos \theta + \cos^2 \theta = 1$, the value of $\sin^2 \theta + \sin^4 \theta$ is :
(a) -1 (b) 0 (c) 1 (d) 2
9. In the figure given below, $AD = 4 \text{ cm}$, $BD = 3 \text{ cm}$ and $CB = 12 \text{ cm}$, then $\cot \theta$ equals :



- (a) $3/4$ (b) $5/12$ (c) $4/3$ (d) $12/5$

10. The perimeters of two similar triangles are 26 cm and 39 cm. The ratio of their areas will be :
 (a) 2 : 3 (b) 6 : 9 (c) 4 : 6 (d) 4 : 9
11. If $\Delta ABC \sim \Delta EDF$ and ΔABC is not similar to ΔDEF , then which of the following is not true?
 (a) $BC \cdot EF = AC \cdot FD$ (b) $AB \cdot EF = AC \cdot DE$ (c) $BC \cdot DE = AB \cdot EF$ (d) $BC \cdot DE = AB \cdot FD$

12. In the given figure, from an external point P, two tangents PQ and PR are drawn to a circle of radius 4 cm with centre O. If $\angle QPR = 90^\circ$, then length of PQ is



- (a) 3 cm (b) 4 cm (c) 2 cm (d) 2.2 cm
13. 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) $22/7$ cm (b) 11cm (c) 22 cm (d) 44 cm
14. If the circumference of a circle increases from 2π to 4π then its areathe original area :
 (a) Half (b) Double (c) Three times (d) Four times
15. The radii of 2 cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 3. Then, the ratio of their volumes is:
 (a) 19 : 20 (b) 20 : 27 (c) 18:25 (d) 17:23
16. Two dice are thrown at the same time and the product of numbers appearing on them is noted. The probability that the product is a prime number is
 (a) $1/3$ (b) $1/6$ (c) $1/5$ (d) $5/6$
17. If the distance between the points (4,p) and (1,0) is 5, then value of p is
 (a) 4 only (b) ± 4 (c) -4 only (d) 0
18. 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) $1/45$ (b) $2/15$ (c) $4/45$ (d) $1/9$

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 mid-point of the line segment joining the points A (3, 4) and B (k, 6) is P (x, y) and $x + y - 10 = 0$, the value of k is 7

Reason (R): Midpoint of line segment is $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

- (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):** 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

SECTION-B

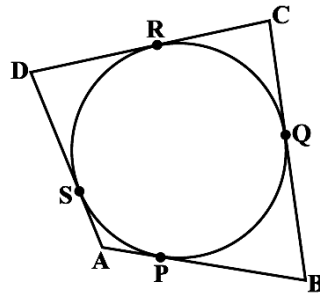
Questions 21 to 25 carry 2M each

21. The short and long hands of a clock are 4 cm and 6 cm long respectively. Find the sum of distances travelled by their tips in 2 days

OR

A car has two wipers which do not overlap. Each wiper has a blade of length 21 cm sweeping through an angle of 120° . Find the total area cleaned at each sweep of the blades

22. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$.

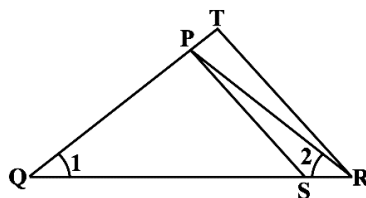


23. If $\sin(A - B) = \frac{1}{2}$, $\cos(A + B) = \frac{1}{2}$, $0^\circ < A + B \leq 90^\circ$, $A > B$. Find A and B.

24. 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

25. In the figure, $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$, Show that $\Delta PQS \sim \Delta TQR$.



OR

ABCD is a trapezium in which $AB \parallel CD$ and its diagonals intersect each other at the point O.

Using a similarity criterion of two triangles, show that $\frac{OA}{OC} = \frac{OB}{OD}$

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.

27. If a, b are the zeroes of the polynomial $2x^2 - 5x + 7$, then find a polynomial whose zeroes are $2a + 3b, 3a + 2b$

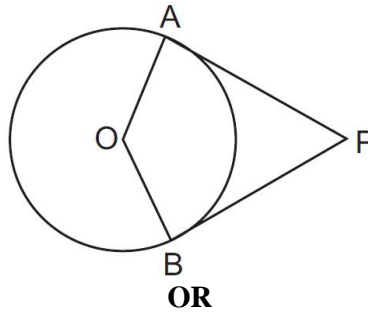
28. Prove that $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$

OR

Prove that $\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A$

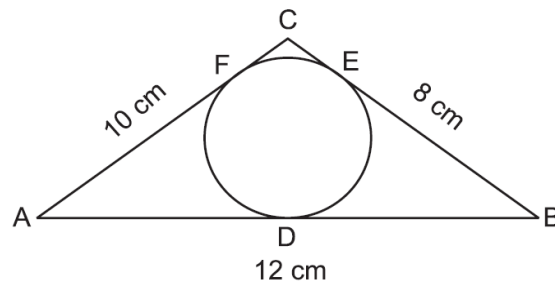
29. Find the ratio in which the line $2x + y - 4 = 0$ divides the line segment joining the points $A(2, -2)$ and $B(3, 7)$

30. 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 .



31. From a pack of 52 playing cards, jacks, queens, kings and aces of red colour are removed. From the remaining a card is drawn at random. Find the probability that the card drawn is (i) a black queen (ii) a red card (iii) a face card.

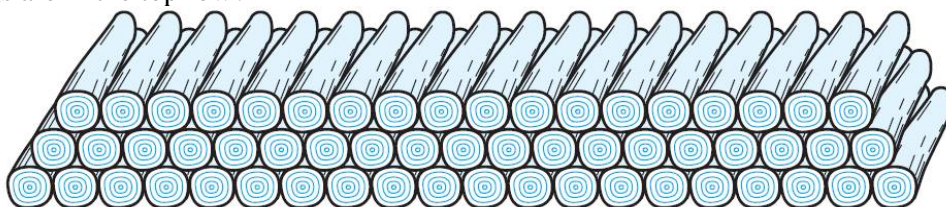
SECTION-D

Questions 32 to 35 carry 5M each

32. 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

33. 200 logs are stacked in the following manner: 20 logs in the bottom row, 19 in the next row, 18 in the row next to it and so on (see below figure). In how many rows are the 200 logs placed and how many logs are in the top row?

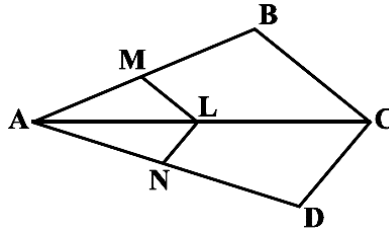


OR

The sum of the third and the seventh terms of an AP is 6 and their product is 8. Find the sum of first sixteen terms of the AP.

34. Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio. Using the above theorem.

Prove that $\frac{AM}{MB} = \frac{AN}{ND}$ if $LM \parallel CB$ and $LN \parallel CD$ as shown in the figure.



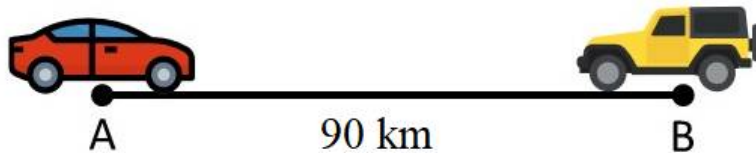
35. Two pipes running together can fill a cistern in $3\frac{1}{13}$ hours. If one pipe takes 3 hours more than the other to fill it, find the time in which each pipe would fill the cistern.

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?

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

36. On the roadway, Points A and B, which stand in for Chandigarh and Kurukshetra, respectively, are located nearly 90 kilometres apart. At the same time, a car departs from Kurukshetra and one from Chandigarh. These cars will collide in 9 hours if they are travelling in the same direction, and in $9/7$ hours if they are travelling in the other direction. Let X and Y be two cars that are travelling at x and y kilometres per hour from places A and B, respectively. On the basis of the above information, answer the following questions:

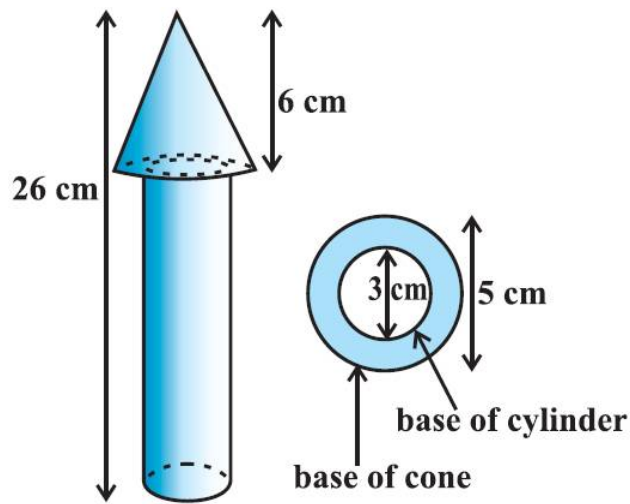


- (a) When both cars move in the same direction, then find the situation can be represented algebraically. [2]

OR

- (a) When both cars move in the opposite direction, then find the situation can be represented algebraically. [2]
(b) Find the speed of car x. [1]
(c) Find the speed of car y. [1]

37. 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:



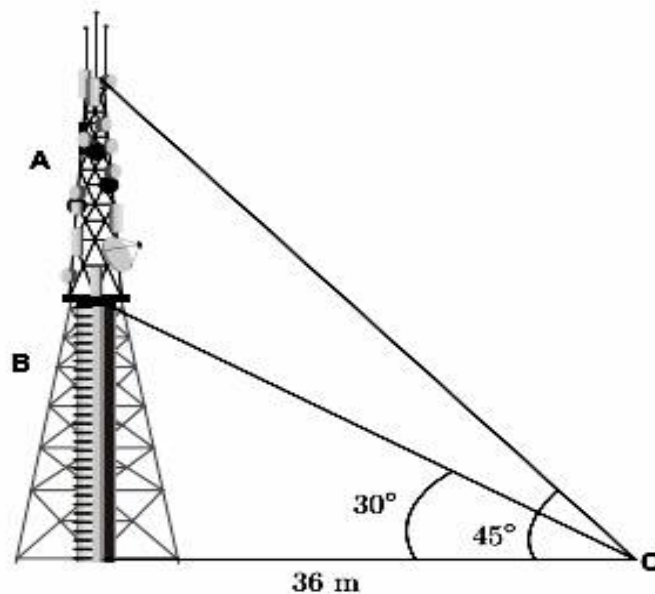
- (a) If its cylindrical part is to be painted yellow, find the surface area need to be painted. [1]
 (b) If its conical part is to be painted green, find the surface area need to be painted. [2]

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]

38. 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)

