

# MATHEMATICS

Time allowed: 3 hours

Maximum Marks: 80

## General Instructions

- ☐ Same as CBSE Sample Question Paper, 2018-19.

### SECTION A

1. Find HCF of 76, 146 and 720.
2. If  $\alpha$  and  $\beta$  are zeroes of the polynomial  $5x^2 + 12x + 7$  then find the value of  $\frac{1}{\alpha} + \frac{1}{\beta}$ .
3. Find the next term of the A.P.  $\sqrt{3}, \sqrt{12}, \sqrt{27}$ .

OR

In an AP, if the common difference ( $d$ ) = -4, and the seventh term ( $a_7$ ) is 4, then find the first term.

4. For what value of  $k$ , the following pair of equations has infinitely many solutions.  
 $5x + 2y - (k - 2) = 0, \quad 15x + 6y - k = 0$
5. Find the distance between two parallel tangents to a circle of radius 4 cm.
6. A bag contains 6 red and 4 white balls. A ball is taken out of the bag at random. Find the probability of getting a black ball.

OR

The probability of selecting a rotten apple randomly from a heap of 900 apples is 0.18. What is the number of rotten apples in the heap?

### SECTION B

7. Find values of  $x$  and  $y$  satisfying  $d = 27x + 45y$ , where  $d$  = HCF of 45 and 27.
8. Divide  $3x^2 + 5x + 2$  by  $x + 1$ . Find its quotient and remainder.
9. If -2 is a root of the quadratic equation  $2x^2 + px + 16 = 0$  and the quadratic equation  $p(x^2 + x) + k = 0$  has equal roots. Find the value of  $k$ .
10. In  $\triangle ABC$ , right angled at  $B$ ;  $AB = 12$  cm and  $BC = 5$  cm. Find  $\sin A$ .

OR

Prove that:  $\frac{1 + \tan^2 A}{1 + \cot^2 A} = \tan^2 A$ .

11. In  $\triangle PQR$ , right angled at  $Q$ ,  $PQ = 12$  cm, and  $\angle PRQ = 60^\circ$ . Find the lengths of edges  $QR$  and  $PR$ .
12. At one corner of a square grass field of side 25 m, a horse is tied with 14 m long rope. Find the area of the part of field in which the horse can graze.  $\left(\text{Use } \pi = \frac{22}{7}\right)$

OR

An athlete runs on a circular track of radius 49 m and covers a distance of 3080 m along its boundary. How many rounds has he taken to cover this distance?  $\left(\text{Use } \pi = \frac{22}{7}\right)$



### SECTION C

13. Prove that  $\sqrt{5} + \sqrt{2}$  is an irrational number.
14. Find the zeroes of the polynomial  $x^3 + 4x^2 + x - 6$ .
15. The difference of digits of a two digit number is 2. If the sum of original number and the number obtained by reversing the digits is 66 then find the original number.

OR

Two chairs and three tables cost ₹5650 whereas three chairs and two tables cost ₹7100. Find the cost of a chair and a table separately.

16. Find an A.P. whose 5th term is 19 and when 8th term is subtracted from 13th term, we get 15.

OR

Find the sum of first 17 terms of an AP whose 4th and 9th terms are -15 and -30 respectively.

17. Find a point 'P' on y-axis, equidistant from two points A(2, -3) and B(-3, 4).

OR

Calculate the ratio in which the line segment joining the points (-3, -1) and (5, 7) is divided by the line  $x = 2$ .

18. Find value of  $k$  such that the points A(k, 1), B(4, 11) and C(1, 5) are collinear.
19. In an equilateral triangle ABC, D is a point on side BC such that  $BD = \frac{1}{3}BC$ . Prove that  $9AD^2 = 7AB^2$ .
20. A circle touches the side BC of a  $\triangle ABC$  at a point P and touches AB and AC when produced at Q and R respectively. Show that  $AQ = \frac{1}{2}$  (Perimeter of  $\triangle ABC$ ).

21. The mean of the following frequency distribution is 30. Determine the value of 'p'

Class interval	5-15	15-25	25-35	35-45	45-55
Frequency	5	18	15	p	6

OR

In an office, transport expenditures of 90 employees are given below:

Expenditure on transport (in ₹)	0-200	200-400	400-600	600-800	800-1000	1000-1200
Number of employees	14	19	15	11	20	11

Find the modal expenditure on transport.

22. A die is thrown once. Find the probability of getting
- (i) a prime number
  - (ii) a number lying between 2 and 6
  - (iii) a prime or an even number.

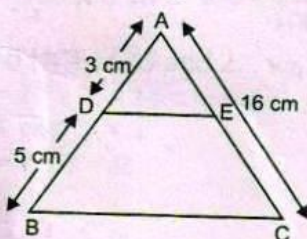
### SECTION D

23. If Zeba was younger by 5 years than what she really is, then the square of her age would have been 11 more than five times her actual age. What is her age now?

OR

The numerator of a fraction is 1 less than the denominator. If 3 is added to each of the numerator and denominator, the fraction is increased by  $\frac{3}{28}$ . Find the fraction.

24. State and prove Basic Proportionality Theorem. Using this, find AE in the given figure if  $DE \parallel BC$ .





25. Draw a circle of radius 5 cm. Draw two tangents to the circle inclined at an angle of  $60^\circ$  to each other. Write steps of construction.
26. The shadow of a flagstaff is three times as long as the shadow of the flagstaff when the Sun rays meet the ground at an angle of  $60^\circ$ . Find the Sun's altitude  $\theta$  at the time of longer shadow.
27. If  $\tan A = n \cdot \tan B$  and  $\sin A = m \cdot \sin B$ , show that  $\cos^2 A = \frac{m^2 - 1}{n^2 - 1}$

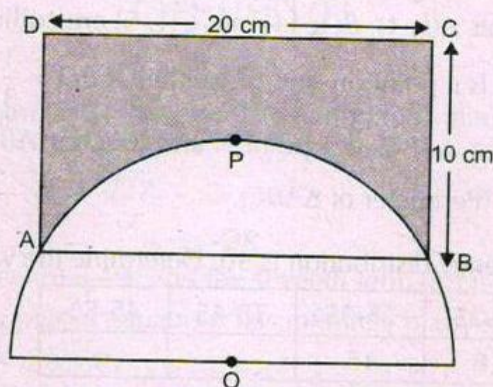
OR

Prove that:  $(\tan \theta + \sec \theta - 1) \cdot (\tan \theta + 1 + \sec \theta) = \frac{2 \sin \theta}{1 - \sin \theta}$

28. Central angles of sectors of two circles with their radii 7 cm and 21 cm are respectively  $120^\circ$  and  $40^\circ$ . Find the ratio of areas of the two sectors. Also find the ratio of lengths of the two arcs.

OR

$ABCD$  is a rectangle of dimensions 20 cm  $\times$  10 cm. A semi-circle is drawn with centre  $O$  and radius  $10\sqrt{2}$  cm and it passes through  $A$  and  $B$  as shown in the figure. Find the area of shaded region. [Leave the answer in terms of  $\pi$ ]



29. A right triangle having sides 15 cm and 20 cm is made to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed. [Use  $\pi = 3.14$ ].
30. The following table gives the marks obtained by 80 students in a selection test.

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

Find the median.