



SAMPLE PAPER MATHS (NCERT SET)

Class 10 - Mathematics

Time Allowed: 3 hours

Maximum Marks: 80

1. Verify that 3, -1 and $-\frac{1}{3}$ are the zeroes of the cubic polynomial $p(x) = 3x^3 - 5x^2 - 11x - 3$, and then verify the relationship between the zeroes and the coefficients. [3]
2. Champa went to a **Sale** to purchase some pants and skirts. When her friends asked her how many of each she had bought, she answered, **The number of skirts is two less than twice the number of pants purchased. Also, the number of skirts is four less than four times the number of pants purchased.** Help her friends to find how many pants and skirts Champa bought. [3]
3. Aftab tells his daughter, **Seven years ago, I was seven times as old as you were then. Also, three years from now, I shall be three times as old as you will be.** (Isn't this interesting?) Represent this situation algebraically and graphically by the method of substitution. [2]
4. The sum of a two-digit number and the number obtained by reversing the digits is 66. If the digits of the number differ by 2, find the number. How many such numbers are there? [3]
5. A cottage industry produces a certain number of toys in a day. The cost of production of each toy (in rupees) was found to be 55 minus the number of articles produced in a day. On a particular day, the total cost of production was Rs.750. We would like to find out the number of toys produced on that day. Represent situation mathematically (quadratic equation) [2]
6. A pole has to be erected at a point on the boundary of a circular park of diameter 13 metres in such a way that the difference of its distances from two diametrically opposite fixed gates A and B on the boundary is 7 metres. Is it possible to do so? If yes, at what distances from the two gates should the pole be erected? [2]
7. How many two-digit numbers are divisible by 3? [1]
8. Find the sum of first 24 terms of the list of numbers whose nth term is given by $a_n = 3 + 2n$. [3]
9. Elpis Technology is a TV manufacturer company. It produces smart TV sets not only for the Indian market but also exports them to many foreign countries. Their TV sets have been in demand every time but due to the Covid-19 pandemic, they are not getting sufficient spare parts especially chips to accelerate the production. They have to work in a limited capacity due to the lack of raw material. [5]



They produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year, find:

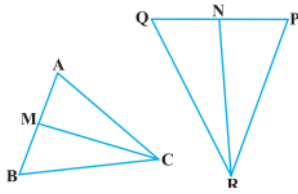
- i. the production in the 1st year (2)
- ii. the production in the 10th year (1)
- iii. the total production in first 7 years (1)

10. In Fig. CM and RN are respectively the medians of $\triangle ABC$ and $\triangle PQR$. If $\triangle ABC \sim \triangle PQR$, prove that: [3]

i. $\triangle AMC \sim \triangle PNR$

ii. $\frac{CM}{RN} = \frac{AB}{PQ}$

iii. $\triangle CMB \sim \triangle RNQ$

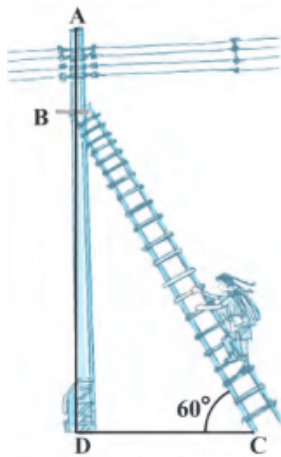


11. Find the coordinates of the point of trisection (i.e., points dividing in three equal parts) of the line segment joining the points A(2, -2) and B(-7, 4). [2]

12. If the points A (6, 1), B (8, 2), C (9, 4) and D (p, 3) are the vertices of a parallelogram, taken in order, find the value of p. [2]

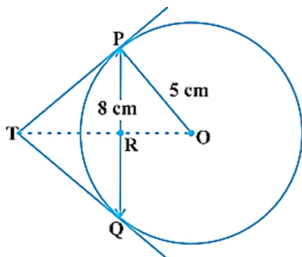
13. Prove that $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \frac{1}{\sec \theta - \tan \theta}$, using identity $\sec^2 \theta = 1 + \tan^2 \theta$. [3]

14. An electrician has to repair an electric fault on a pole of height 5 m. She needs to reach a point 1.3m below the top of the pole to undertake the repair work. What should be the length of the ladder that she should use which, when inclined at an angle of 60° to the horizontal, would enable her to reach the required position? Also, how far from the foot of the pole should she place the foot of the ladder? (You may take $\sqrt{3} = 1.73$) [5]



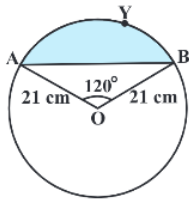
15. The angles of depression of the top and bottom of an 8 m tall building from top of a multistoreyed building are 30° and 45° , respectively. Find the height of multi-storeyed building and distance between two buildings. [3]

16. 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. [3]

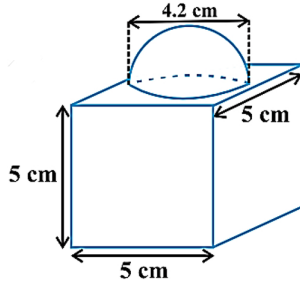


17. Prove that in two concentric circles, the chord of the larger circle, which touches the smaller circle is bisected at the point of contact. [2]

18. Find the area of the segment AYB shown in Figure, if the radius of the circle is 21 cm and $\angle AOB = 120^\circ$. (Use $\pi = \frac{22}{7}$). [3]

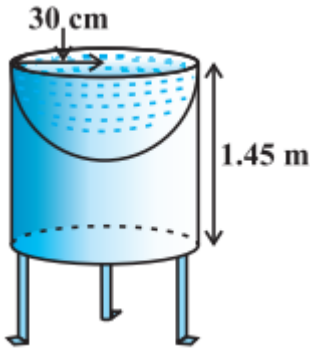


19. A decorative block shown in Figure is made of two solids - a cube and a hemisphere. The base of the block is a cube with edge 5 cm, and the hemisphere fixed on the top has a diameter 4.2 cm. Find the total surface area of the block. (Take $\pi = \frac{22}{7}$). [3]



20. Mayank made a bird-bath for his garden in the shape of a cylinder with a hemispherical depression at one end (see Fig.). The height of the cylinder is 1.45 m and its radius is 30 cm. Find the total surface area of the bird-bath. [2]

(Take $\pi = \frac{22}{7}$)



21. A survey regarding the heights (in cm) of 51 girls of Class X of a school was conducted and the following data was obtained. Find the median height. [3]

Height (in cm)	No. of girls
Less than 140	4
Less than 145	11
Less than 150	29
Less than 155	40
Less than 160	46
Less than 165	51

22. The distribution given below shows the number of wickets taken by bowlers in one-day cricket matches. Find the mean number of wickets by choosing a suitable method. What does the mean signify? [2]

Number of Wickets	20-60	60-100	100-150	150-250	250-350	350-450
Number of Bowlers	7	5	16	12	2	3

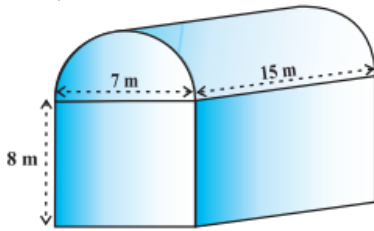
23. Harpreet tosses two different coins simultaneously (say, one is of ₹ 1 and other of ₹ 2). What is the probability that he gets at least one head? [1]

24. A carton consists of 100 shirts of which 88 are good, 8 have minor defects and 4 have major defects. Jimmy, a trader, will only accept the shirts which are good, but Sujatha, another trader, will only reject the shirts which have major defects. One shirt is drawn at random from the carton. What is the probability that
- it is acceptable to Jimmy?
 - it is acceptable to Sujatha?

25. Show that $3\sqrt{2}$ is irrational. [3]

26. Explain why $7 \times 11 \times 13 + 13$ and $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 + 5$ are composite numbers. [2]

27. Shanta runs an industry in a shed which is in the shape of a cuboid surmounted by a half cylinder. If the base of the shed is of dimension $7 \text{ m} \times 15 \text{ m}$ and the height of the cuboidal portion is 8 m , find the volume of air that the shed can hold. Further, suppose the machinery in the shed occupies a total space of 300 m^3 , and there are 20 workers, each of whom occupy about 0.08 m^3 space on an average. Then, how much air is in the shed? (Take $\pi = \frac{22}{7}$) [3]



28. Sides AB and AC and median AD of a triangle ABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that $\triangle ABC \sim \triangle PQR$. [3]

29. Prove $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$, where the angles involved are acute angles for which the expressions are defined. [2]

30. Find the sum of first 24 terms of the list of numbers whose n th term is given by $a_n = 3 + 2n$. [3]