Sample Paper - 6
MATHEMATICS
(With Answers)
CLASS X

[*Time Allowed* : 3 *Hours*]   [*Maximum Marks* : 80]

General Instructions :

   (i) *All questions are compulsory.*
   (ii) *The question paper consists of 30 questions divided into sections – A, B, C and D.*
   (iii) *Section A contains 6 questions of 1 mark each, Section B contains 6 questions of 2 marks each, Section C contains 10 questions of 3 marks each and Section D contains 8 questions of 4 marks each.*
   (iv) *There is no overall choice.*
   (v) *Use of calculators is not permitted.*

Section 'A'

Question numbers 1 to 6 carry 1 mark each.

1. Find the LCM of 96 and 360 by using Fundamental Theorem of Arithmetic.

2. A line segment is of length 5 cm. If the coordinates of its one end are (2, 2) and that of the other end are $(-1, x)$, then find the value of x.

3. In figure, PA and PB are two tangents drawn from an external point P to a circle with centre C and radius 4 cm. If PA $\perp$ PB, then find the length of each tangent.
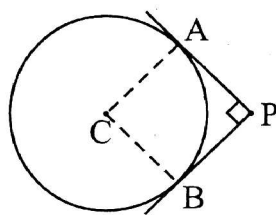

4. The first three terms of an A.P. respectively are $3y - 1$, $3y + 5$ and $5y + 1$. Find the value of y.

5. A die is thrown once. What is the probability that it shows a number greater than 4 ?

6. A solid sphere of radius r is melted and cast into the shape of a solid cone of height r. Find the radius of the base of cone.

Question numbers 7 to 12 carry 2 marks each.

7. Evaluate : $(\cos^2 20° + \cos^2 70°) + \dfrac{\cot 25°}{\tan 65°} + \cot 5° \cot 10° \cot 60°$ $\cot 80° \cot 85°$

8. On a square handkerchief, nine circular designs each of radius 7 cm are made. Find the area of the remaining portion of the handkerchief.
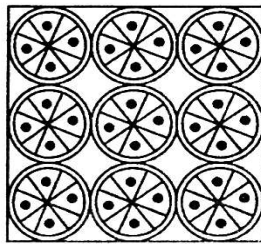
9. The point R divides the line-segment AB, where $A(-4, 0)$ and $B(0, 6)$ are such that $AR = \dfrac{3}{4} AB$. Find the coordinates of R.

10. Find the value of m so that the quadratic equation $mx(5x - 6) + 9 = 0$ has two equal roots.

11. Write the rational number between $\sqrt{2}$ and $\sqrt{3}$.

12. A tower stands vertically on the ground from a point on the ground which is 25 m away from the foot of the tower, the angle of elevation .of the top of the tower is found to be 45°. Find, the height (inmetres) of the tower.
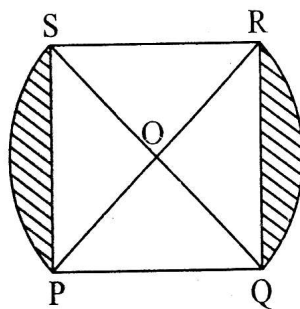
Section 'C'

Question numbers 13 to 22 carry 3 marks each.

13. Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle described on one of its diagonals.

14. QT and RS are medians of a triangle PQR right angled at P. Prove that $A(QT^2 + RS^2) = 5QR^2$.

15. Find the mean of the following frequency distribution :

Class	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25	25 – 30
Frequency	1	2	2	6	.7	2

16. Places A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars ?

17. Cards are marked with the numbers from 2 to 151 are placed in a box and mixed thoroughly. One card is drawn at random from this box. Find the probability that the number on the card is

   (*i*) a prime number less than 75.

   (*ii*) an odd number.

   (*iii*) a number which is a perfect square.

18. If α and β are zeroes of the polynomial $p(x) = 2x^2 + 11x + 5$, find the value of

$$\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta.$$

19. Determine the ratio in which the line $3x + y - 9 = 0$ divides the line-segment joining the points $(1, 3)$ and $(2, 7)$.

20. In figure, $PQRS$ is a square lawn with side $PQ = 42$ metres. Two circular flower beds are there on the sides PS and QR with centre at O, the intersection of its diagonals. Find the total area of the two flower beds (shaded parts).

21. Find the roots of the equation $\dfrac{1}{x+4} + \dfrac{1}{x-7} = \dfrac{11}{30}$, $x \neq -4, 7$.

22. Show that one and only one out of $n, n + 2, n + 4$ is divisible by 3, where 'n' is any positive integer.

Question numbers 23 to 30 cany 4 marks each.

23. An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore (with taking into consideration the time they stop at intermediate.stations). If the average speed of the express train is 11 km/h.more than that of the passenger train, find the'average speed of the two trains.

24. The sum of first six terms .of an.A.P. is .42. The ratio of its 10th term to 30th.term is 1 : 3. Calculate the first and 13th term of the A.P.

25. Prove that opposite sides of a quadrilateral circumscribing a circle subtend: supplementary angles at the centre of the circle.

26. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower'from the foot of the building is 60°. If the tower is 60 m high, find the height of the building.

27. Due to sudden floods, some welfare "associations jointly requested the government to get 100 tents fixed immediately and offered to contribute 50% of the cost. If the lower part of each tent is of the form of a cylinder of diameter 4.2 m and height 4 m with the conical upper part of same diameter but of height 2.8 m, and the canvas to-be used costs ₹100 per sq. m, find the amount, the associations will have to pay. $\left[\text{Use } \pi = \dfrac{22}{7} \right]$

28. Prove that: $\dfrac{\sin\theta}{1-\cos\theta} + \dfrac{\tan\theta}{1+\cos\theta} = \cos\theta\,\operatorname{cosec}\theta + \cot\theta.$

29. The following distribution gives the daily income of 50 workers of a factory:

Daily income (in)	200 – 250	250 – 300	300 – 350	350 – 400	400 – 450	450– 500
Number of workers	10	5	11	8	6	10

Convert the distribution to a less than type cumulative frequency distribution and draw its ogive. Hence obtain the median daily income.

30. Draw a circle of radius 5 cm. From a point *P*, 8 cm away from its centre, construct a pair of tangents to the circle. Measure the length of each one of the tangents.

$$\boxed{\textbf{ANSWERS}}$$

Section 'A'

1. 1440   2. $x = 6$ or $x = -2$ 3. PA = PB = 4 cm

4. $y = 5$ 5. $\dfrac{1}{3}$ 6. $2r$

Section 'B'

7. $\dfrac{6 + \sqrt{3}}{3}$

8. Area of the remaining portion = 378 cm²

9. Coordinates of $R\left(-1, \dfrac{9}{2}\right)$ 10. $m = 5$

11. 1.5 is rational number lying between $\sqrt{2}$ and $\sqrt{3}$ 12. 25 m

Section 'C'

15. Mean = 18

16. Speed of the two cars are 60 km/h and 40 km/h. respectively

17. $(i)\dfrac{7}{50}, (ii)\dfrac{1}{2}, (iii)\dfrac{11}{150}$ 18. $-\dfrac{36}{5}$ 19. Ratio is 3 : 4 internally

20. 504 m²   21. $x = 1, 2,$

Section 'D'

23. Average speed of passenger train is 33 km/h and the average speed of express train is 44 km/h.

24. First term = 2, $a_{13} = -26$

26. Height of the building is 20 metres

27. The associations will have to pay the amount = ₹ 379500

29. Median daily income = ₹ 345

Daily income (classes) ⟶
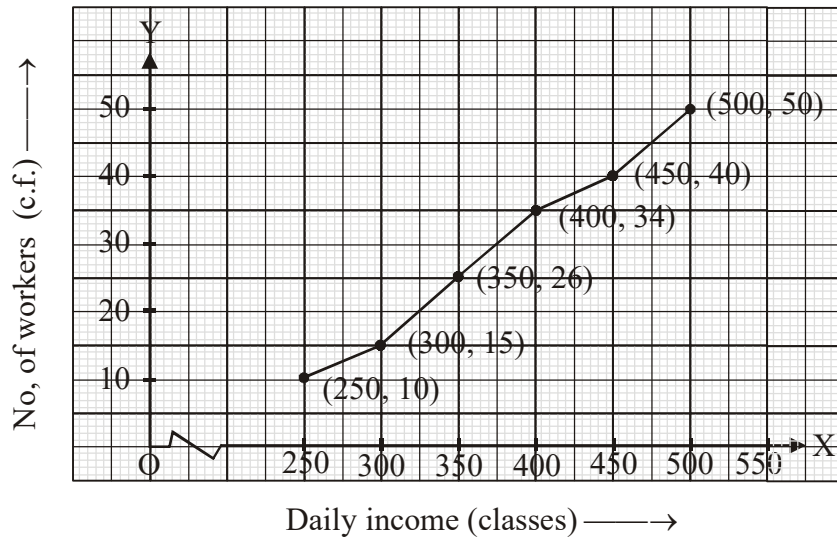
Daily income (classes)	No. of workers (*c.f.*)
less than 250	10
less than 300	15
less than 350	26
less than 400	34
less than 450	40
less than 500	50

30. Length of each tangent = $\sqrt{39}$ cm