

CBSE Board
Class X Mathematics
Sample Paper 3 (Standard)

Time: 3 hrs

Total Marks: 80

General Instructions:

1. All the questions are **compulsory**.
 2. The question paper consists of **40** questions divided into **four sections** A, B, C, and D. **Section A** comprises of **20** questions of 1 mark each, **Section B** comprises of **6** questions of 2 marks each, **Section C** comprises of **8** questions of 3 marks each and **Section D** comprises of **6** questions of 4 marks each.
 3. There is no overall choice. However, an internal choice has been provided in **two questions of 1 mark** each, **two questions of 2 marks** each, **three questions of 3 marks** each, and **three questions of 4 marks** each. You have to attempt only one of the alternatives in all such questions.
 4. Use of calculator is **not** permitted.
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Section A

**(Q 1- Q 10 are multiple choice questions.
Select the most appropriate answer from the given options.)**

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. If the mean of 6, 7, x, 8, y, 14 is 9, then
A. $x + y = 19$
B. $x - y = 21$
C. $x + y = 21$
D. $x - y = 19$
3. The number of decimal places after which the decimal expansion of the rational number $\frac{23}{2^2 \times 5}$ will terminate, is
A. 1
B. 2
C. 3
D. 4

4. If the system of equations $2x + 3y = 5$, $4x + ky = 10$ has infinitely many solutions, then $k =$
- A. 1
 - B. $\frac{1}{2}$
 - C. 3
 - D. 6
5. $\sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}}$ is equal to
- A. $\sec \theta + \tan \theta$
 - B. $\sec \theta - \tan \theta$
 - C. $\sec^2 \theta + \tan^2 \theta$
 - D. $\sec^2 \theta - \tan^2 \theta$
6. If $x = a \sec \theta$ and $y = b \tan \theta$, then $b^2 x^2 - a^2 y^2 =$
- A. ab
 - B. $a^2 - b^2$
 - C. $a^2 b^2$
 - D. $a^2 + b^2$
7. If $\triangle ABC$ is a right angled at C, then the value of $\cos (A + B)$ is
- A. 0
 - B. 1
 - C. -1
 - D. 2
8. The distance of A (5, -12) from the origin is
- A. 10 units
 - B. 11 units
 - C. 12 units
 - D. 13 units
9. If the point (3, a) lies on the line represented by $2x - 3y = 5$ then the value of a is equal to
- A. $\frac{1}{3}$
 - B. $\frac{1}{5}$
 - C. 7
 - D. 9

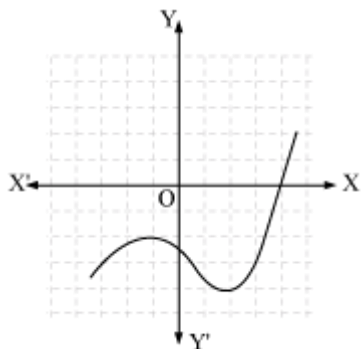
10. The perimeter of a triangle with vertices $(0, 4)$, $(0, 0)$ and $(3, 0)$ is

- A. $7 + \sqrt{5}$
- B. 5
- C. 12
- D. 17

(Q 11- Q 15) Fill in the blanks

11. If r , h and l denote respectively the radius of base, height and slant height of a right circular cone, then total surface area is _____.

12. The graph of $y = p(x)$ is given in the following figure for some polynomial $p(x)$. The number of zeroes of $p(x)$ is _____.



OR

A quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively $\frac{1}{4}$ and -1 is _____.

13. Given $\Delta ABC \sim \Delta PQR$, if $\frac{AB}{PQ} = \frac{4}{9}$ then $\frac{\text{ar}\Delta ABC}{\text{ar}\Delta PQR} = \frac{\boxed{}}{\boxed{}}$

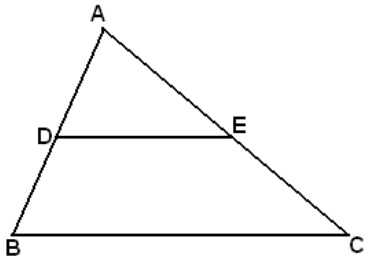
14. _____ is the sum of the first n natural numbers.

15. The probability of getting at most one head when two coins are tossed simultaneously is _____ .

(Q 16- Q 20) Answer the following

16. If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 + 2x + 1$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$.

17. In $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $\frac{AD}{DB} = \frac{2}{3}$ and $EC = 4$ cm, then find AE.



OR

If the areas of two similar triangles are in the ratio 25: 64, find the ratio of their corresponding sides.

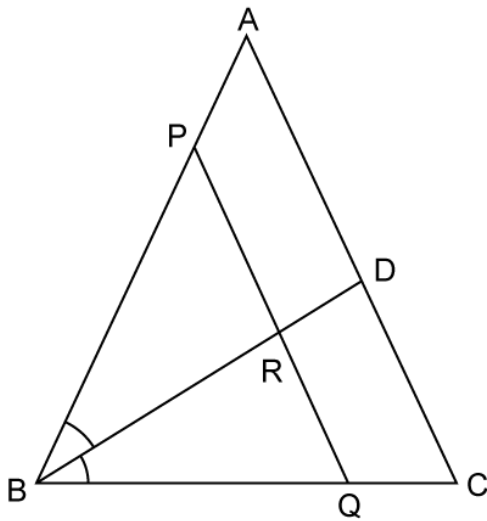
18. The radii of two circles are 19 cm and 9 cm respectively. Find the radius of the circle which has its circumference equal to the sum of the circumferences of the two circles.
19. Write the next term of the AP $\sqrt{2}, \sqrt{8}, \sqrt{18}, \dots$
20. Determine the set of values of p for which the quadratic equation $px^2 + 6x + 1 = 0$ has real roots.

Section B
(Questions 21 to 26 carry 2 marks each)

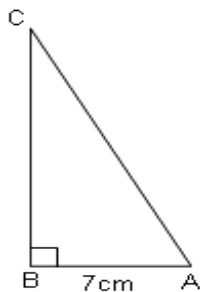
21. Find the zeroes of the quadratic polynomial $x^2 + 7x + 12$ and verify the relationship between the zeroes and its coefficients.
22. A point P is 25 cm away from the centre of a circle, and the length of the tangent drawn from P to the circle is 24 cm. Find the radius of the circle.
23. The perimeters of two similar triangles ABC and PQR are 32 cm and 24 cm, respectively. If $PQ = 12$ cm, then find AB.

OR

In $\triangle ABC$, the bisector of $\angle B$ meets AC at D. A line $PQ \parallel AC$ meets AB, BC and BD at P, Q and R, respectively. Show that $PR \times BQ = QR \times BP$.



24. In $\triangle ABC$, $m\angle B = 90^\circ$, $AB = 7$ cm and $AC - BC = 1$ cm. Determine the values of $\sin C$ and $\cos C$.



25. A bag contains 4 white and some red balls. If the probability of drawing a red ball is double that of drawing a white ball, find the number of red balls in the bag.

OR

Cards bearing numbers 1, 3, 5, ..., 35 are kept in a bag. A card is drawn at random from the bag. Find the probability of getting a card bearing

- (i) A prime number less than 15
(ii) A number divisible by 3 and 5
26. A solid metal cone with radius of base 12 cm and height 24 cm is melted to form solid spherical balls of diameter 6 cm each. Find the number of balls thus formed.

Section C

(Questions 27 to 34 carry 3 marks each)

27. In a seminar, the number of participants in Hindi, English and Mathematics is 60, 84 and 108, respectively. Find the minimum number of rooms required, if in each room the same number of participants are to be seated and all of them being in the same subject.

OR

An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

28. The 4th term of an AP is zero. Prove that its 25th term is triple its 11th term.
29. If in a rectangle, the length is increased and breadth is reduced each by 2 metres, then the area is reduced by 28 sq metres. If the length is reduced by 1 metre and breadth is increased by 2 metres, then the area is increased by 33 sq metres. Find the length and breadth of the rectangle.

OR

If three times larger of the two numbers is divided by the smaller one, we get 4 as quotient and 3 as remainder. Also, if seven times the smaller number is divided by the larger one, we get 5 as quotient and 1 as remainder. Find the numbers.

30. If the zeros of the polynomial $f(x) = x^3 - 3x^2 + x + 1$ are $a - b$, a , $a + b$, find a and b .
31. The point P divides the join of $(2, 1)$ and $(-3, 6)$ in the ratio 2: 3. Does P lie on the line $x - 5y + 15 = 0$?

OR

Show that a quadrilateral with vertices (0, 0), (5, 0), (8, 4) and (3, 4) is a rhombus. Also find its area.

32. If $\tan \theta = \frac{1}{\sqrt{7}}$, show that $\frac{(\operatorname{cosec}^2 \theta - \sec^2 \theta)}{(\operatorname{cosec}^2 \theta + \sec^2 \theta)} = \frac{3}{4}$

33. The cost of fencing a circular field at the rate of Rs. 24 per metre is Rs. 5280. The field is to be ploughed at the rate of Rs. 0.50 per m^2 . Find the cost of ploughing the field.

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

34. Find the mode for the following data which gives the literacy rate (in %) in 40 cities of India.

| Literacy rate (%) | 45-55 | 55-65 | 65-75 | 75-85 | 85-95 |
|-------------------|-------|-------|-------|-------|-------|
| No. of cities | 4 | 11 | 12 | 9 | 4 |

Section D

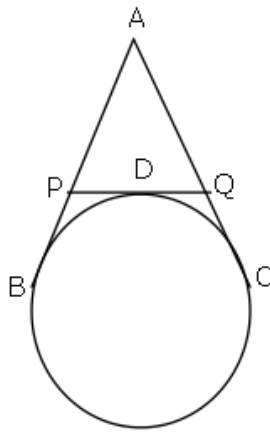
(Questions 35 to 40 carry 4 marks each)

35. Construct an isosceles triangle whose base is 9 cm and altitude is 5 cm. Construct another triangle whose sides are $\frac{3}{4}$ of the corresponding sides of the first isosceles triangle.

OR

Draw a line segment AB of length 7 cm. Taking A as the centre, draw a circle of radius 3 cm, and taking B as a centre, draw another circle of radius 2.5 cm. Construct tangents to each circle from the centre of the other circle.

36. For a Science exhibition Samy presented a diagrammatic representation of 'Rain Water Harvesting' as his project. AB and AC are 5 m long pipes bringing water from the terrace of a building (as shown in the given figure). The triangular space is developed as a garden.



What is the perimeter of the triangular garden? What qualities do you think are encouraged by such exhibitions?

- 37.** A rectangular field is 16 m long and 10 m wide. There is a path of uniform width all around it with an area of 120 m^2 . Find the width of the path.

OR

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

- 38.** A cylindrical container whose diameter is 12 cm and height is 15 cm is filled with ice-cream. Ice-cream is distributed to ten children in equal cones having hemispherical tops. If the height of conical portion is twice the diameter of its base, find the diameter of the ice-cream cone.
- 39.** From a window of a house in a street, h metres above the ground, the angles of elevation and depression of the top and the foot of another house on the opposite side of the street are α and β respectively. Show that the height of the opposite house is $h(1 + \tan \alpha \cot \beta)$ metres.

- 40.** From the following data, draw the two types of cumulative frequency curves and determine the median:

| Height (in cm) | Frequency |
|----------------|-----------|
| 140-144 | 3 |
| 144-148 | 9 |
| 148-152 | 24 |
| 152-156 | 31 |
| 156-160 | 42 |
| 164-164 | 64 |
| 164-168 | 75 |
| 168-172 | 82 |
| 172-176 | 86 |
| 176-180 | 34 |

OR

Find the mean, mode and median of the following data:

| Class | Frequency |
|-------|-----------|
| 0-10 | 5 |
| 10-20 | 10 |
| 20-30 | 18 |
| 30-40 | 30 |
| 40-50 | 20 |
| 50-60 | 12 |
| 60-70 | 5 |