



CBSE Board
Class X Mathematics
Sample Paper 4

Time: 3 hrs**Total Marks: 80****General Instructions:**

1. All questions are **compulsory**.
2. The question paper consists of **30** questions divided into **four sections** A, B, C, and D. **Section A** comprises of **6** questions of 1 mark each, **Section B** comprises of **6** questions of 2 marks each, **Section C** comprises of **10** questions of 3 marks each and **Section D** comprises of **8** questions of 4 marks each.
3. Use of calculator is **not** permitted.

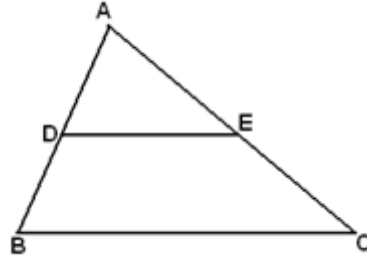
Section A
(Questions 1 to 6 carry 1 mark each)

1. A kite is flying, attached to a thread which is 165 m long. The thread makes an angle of 30° with the ground. Find the height of the kite from the ground, assuming that there is no slack in the thread.
2. Show that the equation $(x^2 + 1)^2 - x^2 = 0$ has no real roots.
OR
Is -1 the root of quadratic equation $3x^2 + 2x - 1 = 0$?
3. Five male and three female candidates are available for selection for the post of manager in a company. Find the probability that a male candidate is selected.
4. If $\triangle ABC \sim \triangle RQP$, $\angle A = 80^\circ$, $\angle B = 60^\circ$, then find the value of $\angle P$.
5. The decimal expansion of the rational number $\frac{2^3}{2^2 \cdot 5}$ will terminate after how many decimal places?

OR

A number divided by 143 leaves 31 as remainder. What will be the remainder when the same number is divided by 13?

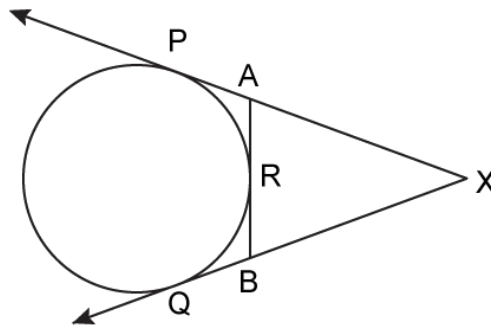
6. In $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $\frac{AD}{DB} = \frac{2}{3}$ and $EC = 4$ cm, then find AE.



Section B

(Questions 7 to 12 carry 2 marks each)

7. In the given figure, XP and XQ are tangents from X to the circle. R is a point on the circle. Prove that $XA + AR = XB + BR$.



8. Find the roots of the equation $6x^2 - \sqrt{2}x - 2 = 0$ by the factorisation method.

OR

Find discriminant of the quadratic equation $3x^2 + 7x + 8 = 0$ and justify.

9. Use Euclid's division algorithm to find H.C.F. of 870 and 225.

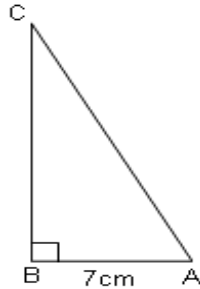
10. If $\cot \theta = \frac{7}{8}$, find the value of $\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)}$

11. The perimeter of a sector of a circle of radius 5.2 cm is 16.4 cm. Find the area of the sector.

OR

Find the area of an isosceles triangle, each of whose equal side is 13 cm and whose base is 24 cm.

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



Section C

(Questions 13 to 22 carry 3 marks each)

13. ABCD is a rectangle formed by joining $A(-1, -1)$, $B(-1, 4)$, $C(5, 4)$ and $D(5, -1)$. P, Q, R and S are the mid points of AB, BC, CD and DA respectively. Is the quadrilateral PQRS a square, a rectangle or a rhombus? Justify your answer.

OR

If $A = (-4, 3)$ and $B = (8, -6)$,

- (i) Find the length of AB
- (ii) In what ratio is the line AB, divided by the x - axis?
14. Solve for x: $\frac{x}{x+1} + \frac{x+1}{x} = \frac{34}{15}$
15. For what values of a and b does the following pairs of linear equations have an infinite number of solutions:
 $2x + 3y = 7$; $(a - b)x + (a + b)y = 3a + b - 2$
16. If θ and ϕ are acute angles of a right triangle, and if $\frac{\sin^2 \theta}{\cos^2 \phi} + \frac{\sin^4 \phi}{\cos^2 \theta} = 1$, then prove that

$$\frac{\cos^4 \theta}{\sin^2 \phi} + \frac{\cos^2 \phi}{\sin^2 \theta} = 1$$

17. Prove that $\sqrt{5}$ is an irrational number.

OR

Prove that a positive integer n is prime number, if no prime p less than or equal to \sqrt{n} divides n.

18. Solve the given equations for x and y by the method of cross-multiplication.

$$7x - 2y = 3; \quad 11x - \frac{3}{2}y = 8$$

19. The line segment joining the points A(2, 1) and B(5, -8) is trisected at the points P and Q where P is nearer to A. If point P lies on the line $2x - y + k = 0$, find the value of k.
20. Find the modal age of 100 residents of a colony from the following data:

Age in yrs. (more than or equal to)	0	10	20	30	40	50	60	70
No. of Persons	100	90	75	50	28	15	5	0

OR

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

Daily Income (In)	100-120	120-140	140-160	160-180	180-200
Number of workers	12	14	8	6	10

Convert the distribution above to a less than type of cumulative frequency distribution and draw its ogive.

21. In ΔPQR , $PD \perp QR$ such that D lies on QR. If $PQ = a$, $PR = b$, $QD = c$ and $DR = d$ and a, b, c and d are positive units, prove that $(a + b)(a - b) = (c + d)(c - d)$.
22. One card is drawn from a pack of 52 cards, each of the 52 cards being equally likely to be drawn. Find the probability that the card drawn is:
- Either a red card or a king
 - A red faced card
 - '10' of a black suit

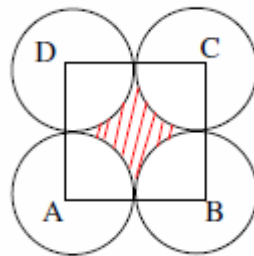
OR

The following distribution shows the daily pocket allowance of children of a locality. The mean pocket allowance is Rs. 18. Find the missing frequency f.

Daily pocket allowance (in Rs.)	11-13	13-15	15-17	17-19	19-21	21-23	23-25
Number of children	7	6	9	13	f	5	4

Section D
(Questions 23 to 30 carry 4 marks each)

23. The interior angles of a polygon are in A.P. The smallest angle is 52° and the common difference is 8° . Find the number of sides of the polygon.
24. In a right-angled triangle, the square of the hypotenuse is equal to the sum of squares of the other two sides.
25. In the given figure, points A, B, C and D are the centres of four circles, each having a radius of 1 unit. If a point is chosen at random from the interior of square ABCD, what is the probability that the point will be chosen from the shaded region?



26. Solve the equations $2x - y + 6 = 0$ and $4x + 5y - 16 = 0$ graphically. Also determine the coordinate of the vertices of the triangle formed by these lines and the x-axis.

OR

$P(2, 4)$, $Q(3, 3)$ and $R(7, 5)$ are the vertices of ΔPQR . Find

- (i) The co-ordinates of the centroid G of ΔPQR
 - (ii) The equation of a line, through G and parallel to PQ.
27. A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 4 cm and the diameter of its base is 8 cm. Determine the volume of the toy. If a cube circumscribes the toy, then find the difference of the volumes of cube and the toy. Also, find the total surface area of the toy.

OR

A vessel is in the form of an inverted cone. Its height is 8 cm and the radius of its top is 5 cm. It is filled with water up to the rim. When lead shots, each of which is a sphere of radius 0.5 cm are dropped into the vessel, $\frac{1}{4}$ of the water flows out. Find the number of lead shots dropped into the vessel.

28. Two circles with centre O and O' of radii 3 cm and 4 cm respectively, intersect at two points P and Q such that OP and O'P are tangents to the two circles. Find the length of the common chord PQ.

29. For the data given below draw less than ogive curve.

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Number of students	7	10	23	51	6	3

30. A tent is of the shape of a right circular cylinder upto a height of 3 metres and conical above it. The total height of the tent is 13.5 metres above the ground. Calculate the cost of painting the inner side of the tent at the rate of Rs. 2 per square metre, if the radius of the base is 14 metres.

OR

A copper wire of 4 mm diameter is evenly wound around a cylinder whose length is 24 cm and diameter 20 cm so as to cover the whole surface. Find the length and weight of the wire assuming the density to be 8.68 gm/cm^3 .