CBSE Class 10 Mathematics: Sample Paper 1

Based on NCERT · the board's 2024 to 2026 pattern | Time: 3 hours · **Maximum marks: 80**

1. All questions are compulsory. Internal choice is given in some questions; attempt one of the alternatives.
2. Section A has 20 objective questions of 1 mark each: multiple-choice and assertion-reason.
3. Section B has very short answer questions of 2 marks; Section C short answer questions of 3 marks; Section D long answer questions of 5 marks; Section E case-based questions of 4 marks.
4. Wherever necessary, draw neat, labelled diagrams. Calculators are not allowed.
5. For the assertion-reason questions, choose: (a) Both A and R are true, and R is the correct explanation of A. (b) Both A and R are true, but R is not the correct explanation of A. (c) A is true, but R is false. (d) A is false, but R is true.

Section A (20 × 1 mark)

1. The line drawn from the eye of an observer to the point of the object being viewed is called the [1]

(a) horizontal
(b) vertical
(c) line of sight
(d) angle of elevation

2. Assertion (A): $5x^2 - 3 = 0$ is a quadratic equation. Reason (R): $ax^2 + bx + c = 0$ is a quadratic equation whenever $a \neq 0$, even if $b = 0$. [1]

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

3. To draw the line $3x - 2y = 0$, a suitable pair of points is [1]

(a) (2, 0) and (0, 3)
(b) (0, 0) and (3, 2)
(c) (0, 0) and (0, 0)
(d) (0, 0) and (2, 3)

4. Two angles of a triangle are 48° and 67°. A triangle similar to it has angles [1]

(a) 67°, 67°, 46°
(b) 67°, 56°, 57°
(c) 48°, 66°, 66°
(d) 65°, 48°, 67°

5. In a right triangle one acute angle is 45° and the hypotenuse is $10\sqrt{2}$ cm. The length of each of the other two sides is [1]

(a) $5\sqrt{2}$ cm
(b) $10\sqrt{2}$ cm
(c) 20 cm
(d) 10 cm

6. Which term of the AP 8, 14, 20, . . . is 176? [1]

(a) 30th
(b) 28th
(c) 29th
(d) 31st

7. For a grouped distribution, $\Sigma f_i = 40$ and $\Sigma f_i x_i = 1260$. The mean is [1]

(a) 31.5
(b) 32
(c) 3.15
(d) 30

8. From a point on level ground 18 m from the foot of a water tower, the angle of elevation of its top is 45°. The height of the water tower is [1]

(a) 18 m
(b) $18\sqrt{3}$ m
(c) $6\sqrt{3}$ m
(d) 9 m

9. The probability that the morning bus from Bhopal reaches Indore late is 0.37. The probability that it is not late is [1]

(a) 0.37 (b) 0.63
(c) 1.37 (d) 0.73

10. If $2^a \times 3^b = 432$, where a and b are natural numbers, then (a, b) is [1]

(a) (3, 4) (b) (4, 3)
(c) (2, 4) (d) (4, 2)

11. ΔABC and ΔDEF are equiangular, with A, B, C matching D, E, F. AB = 4 cm, BC = 6 cm and DE = 10 cm. Then EF is [1]

(a) 2.4 cm (b) 12 cm
(c) 15 cm (d) 4 cm

12. In the triangle with vertices A(2, 3), B(6, 6) and C(−1, 7), the right angle is at [1]

(a) A (b) B
(c) C (d) no vertex: the triangle has no right angle

13. A circular mirror with centre O and radius 28 cm has a strip cut off along a straight line AB, where $\angle AOB = 60°$. The area of the strip cut off is. Take $\pi = 22/7$. [1]

(a) $(\frac{1232}{3} + 196\sqrt{3})$ cm² (b) $(\frac{1232}{3} - 196\sqrt{3})$ cm²
(c) $(\frac{2464}{3} - 196\sqrt{3})$ cm² (d) $(\frac{1232}{3} - 392\sqrt{3})$ cm²

14. Which of the following is a zero of $x^2 + 2x - 15$? [1]

(a) 3 (b) 5
(c) −3 (d) 15

15. After simplifying, the equation $(x + 3)^2 = x(x - 2) + 5$ is [1]

(a) a quadratic equation (b) an equation with no x in it
(c) a cubic equation (d) a linear equation

16. In practice at a court in Kochi, a basketball player attempts 80 free throws and scores on 52 of them. The empirical probability that she scores on a free throw is [1]

(a) $\frac{7}{20}$ (b) $\frac{13}{20}$
(c) 0.52 (d) $\frac{20}{13}$

17. To factorise $6x^2 + 7x - 3$ by splitting the middle term, 7x is written as [1]

(a) 9x − 2x (b) 6x + x
(c) −9x + 2x (d) 3x + 4x

18. A solid cone has base radius 3 cm and height 7 cm. Take $\pi = 22/7$. Its volume is [1]

(a) 198 cm³ (b) 66 cm³
(c) 22 cm³ (d) 132 cm³

19. A line l is at a distance of 7 cm from the centre of a circle of radius 6.5 cm. Then l is [1]

(a) a tangent to the circle (b) a secant of the circle
(c) a line that does not meet the circle (d) a line through the centre

20. Assertion (A): A line drawn parallel to one side of a triangle, meeting the other two sides at distinct points, divides them in the same ratio. Reason (R): Any line meeting two sides of a triangle divides them in the same ratio. [1]

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

Section B (5 × 2 marks)

21. A circle touches all four sides of a quadrilateral PQRS in which PQ = (2x + 3) cm, QR = 3x cm, RS = 9 cm and SP = 10 cm. Find x and the side QR. [2]

22. If $\tan 2\theta = \sqrt{3}$, where $0° < 2\theta < 90°$, find θ. Hence show that $\tan 2\theta$ is not equal to $2\tan\theta$. [2]

23. A storage tank is a cylinder 10 m long with a hemisphere of radius 7 m at each end. Take $\pi = 22/7$. Find the outer surface area of the tank. [2]

Or *A boiler is a cylinder 6 m long with a hemisphere of radius 3.5 m at each end. Take $\pi = 22/7$. Find the outer surface area of the boiler.*

24. An AP has first term −12, common difference 5 and last term 108. Find the number of terms and its middle term. [2]

25. In a grouped distribution with class size 5, the modal class is 25-30 with frequency 18. The class before it has frequency 12 and the class after it has frequency 9. Find the mode. [2]

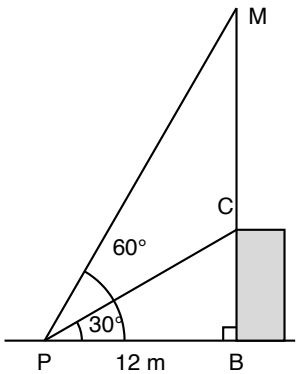
Section C (6 × 3 marks)

26. A card is drawn from a well-shuffled deck of 52 cards. Find the probability that it is (i) a black card that is not a face card, (ii) a number card (2 to 10) of hearts, (iii) neither a club nor a king. [3]

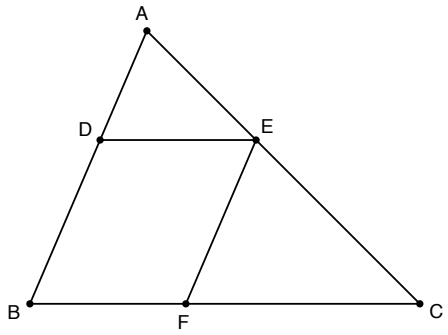
27. α and β are the zeroes of $ax^2 + bx + c$, $a \neq 0$. Starting from $ax^2 + bx + c = k(x - \alpha)(x - \beta)$, show that $\alpha + \beta = -\frac{b}{a}$ and $\alpha\beta = \frac{c}{a}$. [3]

28. A circular window with centre O and radius 30 cm has a straight wooden bar AB fixed across it, where $\angle AOB = 120°$. Find the length of the bar and the area of the smaller glass pane. (Take $\pi = 3.14$ and $\sqrt{3} = 1.73$.) [3]

29. A mobile mast CM stands on the flat roof of a building BC. From a point P on the ground 12 m from the foot B of the building, the angles of elevation of the foot C and the top M of the mast are 30° and 60°. Find the height of the building and the height of the mast. (Use $\sqrt{3} \approx 1.73$.) [3]



30. In ΔABC, D is a point on AB. The line through D parallel to BC meets AC at E, and the line through E parallel to AB meets BC at F, as in the figure. Prove that $\frac{AD}{DB} = \frac{BF}{FC}$. [3]



31. Solve graphically: x + y = 5 and 2x − y = 4. [3]

Section D (4 × 5 marks)

32. The daily earnings of 50 vegetable vendors at a market in Mumbai are given below. (a) Find the mean by the step deviation method. (b) Find the mode. (c) Compare the two. [5]

Earnings (₹)	Number of vendors
200-300	4
300-400	8
400-500	14
500-600	12
600-700	8
700-800	4

Or *The lengths of 40 fish in a catch landed at Kochi harbour are given below. (a) Find the mean by the step deviation method. (b) Find the mode. (c) Compare the two.*

Length (mm)	Number of fish
100-120	3
120-140	6
140-160	12
160-180	10
180-200	5
200-220	4

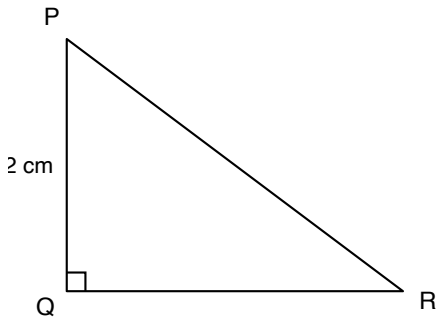
33. (a) Prove that the lengths of the two tangents drawn from an external point to a circle are equal. (b) Show also that the line joining the external point to the centre bisects the angle between the tangents. (c) For a circle of radius 33 cm whose centre O is 65 cm from the external point P, find the length of each tangent and the distance from P to the nearest point of the circle. [5]

Or *(a) PA and PB are tangents from P to a circle with centre O. Prove that the centre lies on the bisector of ∠APB. (b) Deduce that PA = PB. (c) If the radius is 11 cm and PA = 60 cm, find OP and the distance from P to the nearest point of the circle.*

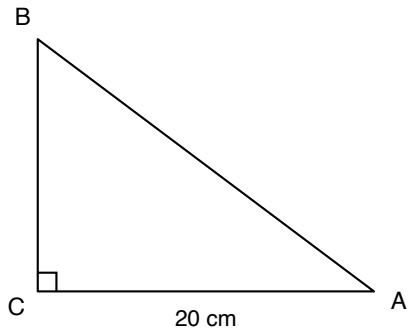
34. A science museum in Kolkata sells adult and student tickets. On Saturday, 40 adult and 60 student tickets brought in ₹5,200. On Sunday, 50 adult and 90 student tickets brought in ₹7,100. (a) Form the pair of equations. (b) Find the price of each ticket. (c) Find what a group of 12 adults and 30 students pays. [5]

Or *At a plant nursery in Pune, 5 rose plants and 8 tulsi plants cost ₹490, while 3 rose plants and 10 tulsi plants cost ₹450. (a) Form the pair of equations. (b) Find the price of each plant. (c) Find the cost of 4 rose and 6 tulsi plants.*

35. In ΔPQR, right-angled at Q, PQ = 12 cm and $\sin R = \frac{3}{5}$ (see the figure). (a) Find PR and QR. (b) Find cos P and tan P. (c) Verify that $1 + \tan^2 R = \sec^2 R$. [5]



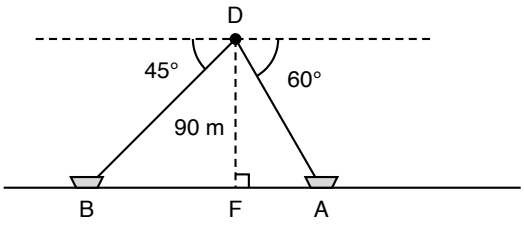
Or *In ΔABC, right-angled at C, AC = 20 cm and $\cos A = \frac{4}{5}$ (see the figure). (a) Find AB and BC. (b) Find sin B and tan B. (c) Verify that $\cot^2 A + 1 = \operatorname{cosec}^2 A$.*



Section E (3 × 4 marks)

36. Read the passage and answer the questions that follow. [4]

A coastguard drone D hovers 90 m above the sea, directly above the point F on the water. Its camera picks up a fishing boat A on one side at an angle of depression of 60°, and a second boat B on the other side, in the same straight line with F, at an angle of depression of 45°, as in the figure. The crew on the boats use these readings to fix their positions. (Use $\sqrt{3} \approx 1.73$.)



(a) The angle of elevation of the drone, as seen from boat A, is [1]

(a) 30°
(b) 45°
(c) 60°
(d) 90°

(b) The distance FA is [1]

(a) $90\sqrt{3}$ m
(b) $30\sqrt{3}$ m
(c) 45 m
(d) 90 m

(c) Find the distance between the boats A and B. [2]

Or *A third boat C, on the same side of F as A and in line with it, is seen at an angle of depression of 30°. Find the distance AC.*

37. Read the passage and answer the questions that follow. [4]

A gram panchayat near Hassan is fencing a rectangular plot for a community vegetable garden. The surveyor notes that the length of the plot is 6 m more than its breadth and that its area is 160 m^2. The panchayat needs the dimensions to order the fencing wire and to plan the beds. Let the breadth of the plot be x metres.

(a) The quadratic equation satisfied by x is [1]

(a) $x^2 + 6x - 160 = 0$
(b) $x^2 - 6x - 160 = 0$
(c) $x^2 + 6x + 160 = 0$
(d) $2x + 6 = 160$

(b) The discriminant of this equation is [1]

(a) 676
(b) 604
(c) 26
(d) −604

(c) Find the length and breadth of the plot. [2]

Or *Find the length of wire needed to fence the plot once around.*

38. Read the passage and answer the questions that follow. [4]

A printing unit in Surat makes a triangular logo ABC for a cooperative dairy and a large banner PQR of exactly the same shape. The banner's longest side RP had not been measured when the order sheet below was written. A third piece, a sticker XYZ, was cut by a new worker from his own measurements.

Item	Sides
Logo ABC	AB = 4 cm, BC = 6 cm, CA = 7 cm
Banner PQR	QR = 12 cm, PQ = 18 cm, RP = ?
Sticker XYZ	XY = 8 cm, YZ = 12 cm, ZX = 13 cm

(a) The scale factor of the banner to the logo is [1]

(a) 3 (b) $\frac{1}{3}$

(c) 2 (d) $\frac{3}{2}$

(b) The length of RP is [1]

(a) 21 cm (b) 28 cm

(c) 18 cm (d) 14 cm

(c) Write the similarity between the logo and the banner with the vertices in the correct order, and name the criterion. [2]

Or *Is the sticker XYZ similar to the logo ABC? Justify.*