CBSE 2025 Maths Standard — Set 3

English Medium

Time Allowed: 3 Hours | Maximum Marks: 80

General Instructions:

1. This question paper contains 38 questions. All questions are compulsory.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 6 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section E has 3 case-study based questions carrying 4 marks each.
7. Draw neat figures wherever required.

Section A

Multiple Choice Questions (1 mark each)

Q.1 [1 mark]

If tan 3θ = √3, then θ/2 equals:

(a) 60°

(b) 30°

(c) 20°

(d) 10°

Q.2 [1 mark]

If x is the LCM of 4, 6, 8 and y is the LCM of 3, 5, 7 and p is the LCM of x and y, then which of the following is true?

(a) p = 35x

(b) p = 4y

(c) p = 8x

(d) p = 16y

Q.3 [1 mark]

The value of 'k' for which the system of linear equations 6x + y = 3k and 36x + 6y = 3 have infinitely many solutions is:

(a) 6

(b) 1/6

(c) 1/2

(d) 1/3

Q.4 [1 mark]

If α and β are the zeroes of the polynomial $p(x) = x^2 – ax – b$, then the value of (α + β + αβ) is equal to:

(a) a + b

(b) –a – b

(c) a – b

(d) –a + b

Q.5 [1 mark]

If x/12 – 3/x = 0, then the values of x are:

(a) ±6

(b) ±4

(c) ±12

(d) ±3

Q.6 [1 mark]

The line represented by x/4 + y/6 = 1, intersects x-axis and y-axis respectively at P and Q. The coordinates of the mid-point of line segment PQ are:

(a) (2, 3)

(b) (3, 2)

(c) (2, 0)

(d) (0, 3)

Q.7 [1 mark]

Two of the vertices of ΔPQR are P(–1, 5) and Q(5, 2). The coordinates of a point which divides PQ in the ratio 2 : 1 are:

(a) (3, –3)

(b) (5, 5)

(c) (3, 3)

(d) (5, 1)

Q.8 [1 mark]

If tangents PA and PB drawn from an external point P to the circle with centre O are inclined to each other at an angle of 80° as shown in the given figure, then the measure of ∠POA is:

(a) 40°
(b) 50°
(c) 60°
(d) 80°

Q.9 [1 mark]

(cot θ + tan θ) equals:

(a) cosec θ sec θ
(b) sin θ sec θ
(c) cos θ tan θ
(d) sin θ cos θ

Q.10 [1 mark]

If in two triangles ΔDEF and ΔPQR, ∠D = ∠Q and ∠R = ∠E, then which of the following is NOT true?

(a) DE/QR = DF/PQ
(b) EF/PR = DF/PQ
(c) EF/RP = DE/QR
(d) DE/PQ = EF/RP

Q.11 [1 mark]

The measurements of ΔLMN and ΔABC are shown in the figure given below. The length of side AC is:

[Figure: ΔLMN has LM = 45 cm, MN = 63 cm, ∠M = 130°, ∠N = 28°. ΔABC has AB = 5 cm, ∠B = 130°. LN = 72 cm.]

(a) 16 cm
(b) 7 cm
(c) 8 cm
(d) 4 cm

Q.12 [1 mark]

If the volumes of two cubes are in the ratio 8 : 125, then the ratio of their surface areas is:

(a) 8 : 125
(b) 4 : 25
(c) 2 : 5
(d) 16 : 25

Q.13 [1 mark]

If the area of a sector of circle of radius 36 cm is 54π cm^2, then the length of the corresponding arc of the sector is:

(a) 8π cm
(b) 6π cm
(c) 4π cm
(d) 3π cm

Q.14 [1 mark]

A die is thrown once. The probability of getting a number which is NOT a factor of 36, is:

(a) 1/2
(b) 2/3
(c) 1/6
(d) 5/6

Q.15 [1 mark]

If the mean of 2, 9, x+6, 2x+3, 5, 10, 5 is 7, then the value of x is:

(a) 9
(b) 6
(c) 5
(d) 3

Q.16 [1 mark]

AOBC is a rectangle whose three vertices are A(0, 2), O(0, 0) and B(4, 0). The square of the length of its diagonal is equal to:

(a) 36
(b) 20
(c) 16
(d) 4

Q.17 [1 mark]

Zeroes of the polynomial $p(x) = x^2 – 3\sqrt{2}\,x + 4$ are:

(a) $2, \sqrt{2}$
(b) $2\sqrt{2}, \sqrt{2}$
(c) $4\sqrt{2}, -\sqrt{2}$
(d) $\sqrt{2}, 2$

Q.18 [1 mark]

In the given figure, in ΔABC, $AD \perp BC$ and $\angle BAC = 90°$. If BC = 16 cm and DC = 4 cm, then the value of x is:

[Figure shows triangle ABC with AD perpendicular to BC, BC = 16 cm, DC = 4 cm, AC = x]

(a) 4 cm
(b) 5 cm
(c) 8 cm
(d) 3 cm

Q.19 [1 mark]

Assertion (A): A ladder leaning against a wall, stands at a horizontal distance of 6 m from the wall. If the height of the wall up to which the ladder reaches is 8 m, then the length of the ladder is 10 m.

Reason (R): The ladder makes an angle of 60° with the ground.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the

correct explanation of the Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is NOT the correct explanation of the Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

Q.20 [1 mark]

Assertion (A): If two tangents are drawn to a circle from an external point, then they subtend equal angles at the centre of the circle.

Reason (R): A parallelogram circumscribing a circle is a rhombus.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is NOT the correct explanation of the Assertion (A).

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

Section B

Very Short Answer Questions (2 marks each)

Q.21 [2 marks]

If $4k = \tan^2 60° - 2\,\text{cosec}^2 30° - 2\tan^2 30°$, then find the value of k.

Q.22 [2 marks]

The probability of guessing the correct answer of a certain test question is x/12. If the probability of not guessing the correct answer is 5/6, then find the value of x.

Q.23 [2 marks]

Find the smallest number which is divisible by both 644 and 462.

OR

Q.23 [2 marks]

[OR] Two numbers are in the ratio 4 : 5 and their HCF is 11. Find the LCM of these numbers.

Q.24 [2 marks]

Find the value(s) of 'k' so that the quadratic equation $4x^2 + kx + 1 = 0$ has real and equal roots.

OR

Q.24 [2 marks]

[OR] If 'α' and 'β' are the zeroes of the polynomial $p(y) = y^2 – 5y + 3$, then find the value of $\alpha^4\beta^3 + \alpha^3\beta^4$.

Q.25 [2 marks]

Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

Q.26 [2 marks]

If the mid-point of the line segment joining the points A(3, 4) and B(k, 6) is P(x, y) and $x + y – 10 = 0$, find the value of k.

OR

Q.26 [2 marks]

[OR] Find the coordinates of the points which divide the line segment joining A(–2, 2) and B(2, 8) into four equal parts.

Section C

Short Answer Questions (3 marks each)

Q.27 [3 marks]

Prove that $(5\sqrt{3} + 2/3)$ is an irrational number given that $\sqrt{3}$ is an irrational

number.

Q.28 [3 marks]

Prove that: $\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2 \operatorname{cosec} A$

OR

Q.28 [3 marks]

[OR] Prove that: $\left(\frac{1}{\cos A} - \cos A\right)\left(\frac{1}{\sin A} - \sin A\right) = \frac{1}{\tan A + \cot A}$

Q.29 [3 marks]

A chord of a circle of radius 10 cm subtends a right angle at the centre of the circle. Find the area of the corresponding minor segment. [Use $\pi = 3.14$]

Q.30 [3 marks]

Three unbiased coins are tossed simultaneously. Find the probability of getting:

(a) exactly two tails

(b) at least one head

(c) at most two heads

Q.31 [3 marks]

In the given figure, PC is a tangent to the circle at C. AOB is the diameter which when extended meets the tangent at P. If $\angle PCA = 110°$, find $\angle CBA$ and $\angle BCO$.

[Figure shows circle with centre O, diameter AOB extended to P, PC tangent at C]

Q.32 [3 marks]

The perimeter of an isosceles triangle is 32 cm. If each equal side is 5/6 th of the base, find the area of the triangle.

Section D

Long Answer Questions (5 marks each)

Q.33 [5 marks]

The sum of the third and the seventh term of an AP is 6 and their product is 8. Find the sum of the first sixteen terms of the AP.

OR

Q.33 [5 marks]

[OR] The minimum age of children eligible to participate in a painting competition is 8 years. It is observed that the age of the youngest boy was 8 years and the ages of the participants, when seated in order of age, have a common difference of 4 months. If the sum of the ages of all the participants is 168 years, find the age of the eldest participant in the painting competition.

Q.34 [5 marks]

In the given figure, PA, QB and RC are perpendicular to AC. If PA = x units, QB = y units and RC = z units, prove that $1/x + 1/z = 1/y$.

[Figure shows points A, B, C on a line with perpendiculars PA, QB, RC]

OR

Q.34 [5 marks]

[OR] Sides AB and BC and median AD of triangle ABC are respectively proportional to sides PQ and QR and median PM of ΔPQR. Show that ΔABC ~ ΔPQR.

Q.35 [5 marks]

A vessel is in the form of an inverted cone. Its height is 8 cm and the radius of its top, which is open, is 5 cm. It is filled with water up to the brim. When lead shots, each of which is a sphere of radius 0.5 cm, are dropped into the vessel, one-fourth of the water flows out. Find the number of lead shots dropped in the vessel.

Q.36(a) [5 marks]

[Case Study 1 - Garden Lawn] A garden designer is planning a rectangular lawn that is to be surrounded by a uniform walkway. The total area of the lawn and the walkway is 360 square metres. The width of the walkway is same on all sides. The dimensions of the lawn itself are 12 metres × 10 metres.

(i) Formulate the quadratic equation representing the total area of the lawn and the walkway, taking width of walkway = x m.

Q.36(b) [5 marks]

[Case Study 1 - Garden Lawn] (ii)(a) Solve the quadratic equation to find the width of the walkway 'x'.

OR

Q.36(b) [5 marks]

[Case Study 1 - Garden Lawn] [OR] (ii)(b) If the cost of paving the walkway at the rate of Rs.50 per square metre is Rs.12,000, calculate the area of the walkway.

Q.36(c) [5 marks]

[Case Study 1 - Garden Lawn] (iii) Find the perimeter of the lawn.

Q.37(a) [4 marks]

[Case Study 2 - Lighthouse] A lighthouse stands tall on a cliff by the sea, watching over ships that pass by. One day a ship is seen approaching the shore and from the top of the lighthouse, the angles of depression of the ship are observed to be 30° and 45° as it moves from point P to point Q. The height of the lighthouse is 50 metres.

(i) Find the distance of the ship from the base of the lighthouse when it is at

point Q, where the angle of depression is 45°.

Q.37(b) [4 marks]

[Case Study 2 - Lighthouse] (ii) Find the measures of ∠PBA and ∠QBA.

Q.37(c) [4 marks]

[Case Study 2 - Lighthouse] (iii)(a) Find the distance travelled by the ship between points P and Q.

OR

Q.37(c) [4 marks]

[Case Study 2 - Lighthouse] [OR] (iii)(b) If the ship continues moving towards the shore and takes 10 minutes to travel from Q to A, calculate the speed of the ship in km/h, from Q to A.

Q.38(a) [4 marks]

[Case Study 3 - Rainfall Data] The India Meteorological Department observes seasonal and annual rainfall every year in different sub-divisions of our country. It helps them to compare and analyse the results.

The table below shows sub-divisions wise seasonal (monsoon) rainfall (in mm) in 2023:

Rainfall (mm)	No. of Sub-divisions
200 – 400	3
400 – 600	4
600 – 800	7
800 – 1000	4
1000 – 1200	3
1200 – 1400	3

(i) Write the modal class.

Q.38(b) [4 marks]

[Case Study 3 - Rainfall Data] (ii)(a) Find the median of the given data.

OR

Q.38(b) [4 marks]

[Case Study 3 - Rainfall Data] [OR] (ii)(b) Find the mean rainfall in the season.

Q.38(c) [4 marks]

[Case Study 3 - Rainfall Data] (iii) If a sub-division having at least 800 mm rainfall during monsoon season is considered a good rainfall sub-division, then how many sub-divisions had good rainfall?