CENTRAL BOARD OF SECONDARY EDUCATION

CBSE 2026-27

Mathematics (Standard)

Subject Code: 041 | Class X

Solutions

Sample Question Paper – Set 8

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

General Instructions

1. This question paper contains 38 questions. All questions are compulsory.
2. The question paper is divided into five Sections – A, B, C, D and E.
3. Section A comprises 18 Multiple Choice Questions (MCQs) of 1 mark each and Question Numbers 19 and 20 are Assertion–Reason based questions of 1 mark each.
4. Section B comprises 5 Very Short Answer (VSA) type questions of 2 marks each (Q.21–25).
5. Section C comprises 6 Short Answer (SA) type questions of 3 marks each (Q.26–31).
6. Section D comprises 4 Long Answer (LA) type questions of 5 marks each (Q.32–35).
7. Section E comprises 3 Case-Study based questions of 4 marks each (Q.36–38), with an internal choice in the 2-mark sub-part of each case study.
8. There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C and 2 questions in Section D, and in the 2-mark sub-part of each question in Section E.
9. Use of calculators is not permitted.
10. Draw neat diagrams wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.

Exam Pattern

Section	Type of Questions	No. of Qs	Marks each	Total Marks
A	Multiple Choice Questions & Assertion–Reason	20	1	20
B	Very Short Answer (VSA)	5	2	10
C	Short Answer (SA)	6	3	18
D	Long Answer (LA)	4	5	20
E	Case-Study Based	3	4	12
	Total	**38**		**80**

Unit-wise Weightage of Marks

Unit	Unit Name	Chapter	Marks
I	Number Systems	Real Numbers	6
II	Algebra	Polynomials; Pair of Linear Equations in Two Variables; Quadratic Equations; Arithmetic Progressions	20
III	Coordinate Geometry	Coordinate Geometry	6
IV	Geometry	Triangles; Circles	15
V	Trigonometry	Introduction to Trigonometry; Some Applications of Trigonometry	12

Unit	Unit Name	Chapter	Marks
VI	Mensuration	Areas Related to Circles; Surface Areas and Volumes	10
VII	Statistics & Probability	Statistics; Probability	11
	Total		**80**

SECTION – A

Section A consists of 20 questions of 1 mark each.

Q1. The HCF of 40, 110 and 360 is: **[1]**

(a) 40 (b) 110 (c) 360 (d) 10

Q2. If -4 is a zero of the polynomial $p(x) = x^2 - x - (2 + 2k)$, then the value of k is: **[1]**

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

Q3. The distance between the points $(0, 2\sqrt{5})$ and $(-2\sqrt{5}, 0)$ is: **[1]**

(a) $2\sqrt{10}$ units (b) $4\sqrt{10}$ units (c) $2\sqrt{20}$ units (d) 0

Q4. If $\triangle ABC \sim \triangle DEF$ such that $2AB = DE$ and $BC = 8$ cm, then EF is equal to **[1]**

(a) 4 cm (b) 8 cm (c) 12 cm (d) 16 cm

Q5. A peacock sitting on the top of a tree of height 10 m observes a snake on the ground. The snake is $10\sqrt{3}$ m away from the base of the tree. The angle of depression of the snake from the eye of the peacock is: **[1]**

(a) $30°$ (b) $45°$ (c) $60°$ (d) $90°$

Q6. An arc of length 2.2 cm subtends an angle θ at the centre of the circle with radius 2.8 cm. The value of θ is **[1]**

(a) $50°$ (b) $60°$ (c) $45°$ (d) $30°$

Q7. Two dice are thrown together. The probability of getting the difference of the numbers on their upper faces equal to 3 is: **[1]**

(a) $\frac{1}{9}$ (b) $\frac{2}{9}$ (c) $\frac{1}{6}$ (d) $\frac{1}{12}$

Q8. If $x^2 + bx + b = 0$ has two real and distinct roots, then the value of b can be **[1]**

(a) 0 (b) 4 (c) 3 (d) -3

Q9. O is the point of intersection of two chords AB and CD of a circle. If $\angle BOC = 80°$ and $OA = OD$, then $\triangle ODA$ and $\triangle OBC$ are **[1]**

(a) equilateral and similar (b) isosceles and similar
(c) isosceles but not similar (d) not similar

Q10. $\tan 2A = 3 \tan A$ is true, when the measure of $\angle A$ is **[1]**

(a) $90°$ (b) $60°$ (c) $45°$ (d) $30°$

Q11. The sum of the length, breadth and height of a cuboid is $6\sqrt{3}$ cm and the length of its diagonal is $2\sqrt{3}$ cm. The total surface area of the cuboid is: **[1]**

(a) 48 cm^2 (b) 72 cm^2 (c) 96 cm^2 (d) 108 cm^2

Q12. Which of the following gives the middle-most observation of the data, when the observations are arranged in order? **[1]**

(a) Median (b) Mean (c) Range (d) Mode

Q13. If the first three terms of an A.P. are b, c and $2b$, then $b : c$ is: **[1]**

(a) $1 : 2$ (b) $2 : 3$ (c) $3 : 2$ (d) $1 : 3$

Q14. What is the area of a semicircle of diameter d? **[1]**

(a) $\frac{1}{16}\pi d^2$ (b) $\frac{1}{4}\pi d^2$ (c) $\frac{1}{8}\pi d^2$ (d) $\frac{1}{2}\pi d^2$

Q15. If the lines $3x + 2ky = 2$ and $2x + 5y + 1 = 0$ are not parallel, then k has to be: **[1]**

(a) $\frac{15}{4}$
(b) $\neq \frac{15}{4}$
(c) any rational number
(d) any rational number having 4 as denominator

Q16. Two cubes, each of volume 64 cm^3, are joined end to end to form a solid cuboid. The surface area of the resulting cuboid is: **[1]**

(a) 192 cm^2 (b) 160 cm^2 (c) 96 cm^2 (d) 80 cm^2

Q17. The radius of the base of a right circular cone and the radius of a sphere are each 5 cm. If the volume of the cone is equal to the volume of the sphere, then the height of the cone is: **[1]**

(a) 5 cm (b) 20 cm (c) 10 cm (d) 4 cm

Q18. The circumferences of two circles are in the ratio $4 : 5$. What is the ratio of their radii? **[1]**

(a) $16 : 25$ (b) $25 : 16$ (c) $2 : \sqrt{5}$ (d) $4 : 5$

Q19. **Assertion (A):** The angle of elevation of the top of a 30 m high tower, observed from a point on the ground 30 m away from its foot, is 60°.

Reason (R): The angle of elevation of an object from a point is equal to the angle of depression of that point as seen from the object. **[1]**

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

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

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

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

Q20. **Assertion (A):** If each observation of a data set is multiplied by 3, then the mean of the new data is three times the mean of the original data.

Reason (R): If each observation x_i is multiplied by a constant k, then $\sum kx_i = k\sum x_i$, so the mean is also multiplied by k. **[1]**

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

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

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

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

SECTION – B

Section B consists of 5 questions of 2 marks each.

Q21. Find the HCF and LCM of 480 and 720 by the prime factorisation method. **[2]**

OR

OR The HCF of 85 and 238 is expressible in the form $85m - 238$. Find the value of m. **[2]**

Q22. Find the type of triangle ABC whose vertices are $A(1, 0)$, $B(-5, 0)$ and $C(-2, 5)$. **[2]**

Q23. A towing kite is at a vertical height of 200 m above the sea. The rope from the kite to the ship makes an angle of 30° with the horizontal sea level at the ship. Find the length of the rope. **[2]**

Q24. The time (in minutes) spent on a mobile game by 20 children is recorded below. Find the mean time by the step-deviation method, taking $a = 35$ and $h = 10$.

Time (minutes)	10–20	20–30	30–40	40–50
Number of children	3	5	8	4

[2]

Q25. Use $\sin^2 A + \cos^2 A = 1$ to prove that $\tan^2 A + 1 = \sec^2 A$. Hence find the value of $\tan A$ when $\sec A = \dfrac{5}{3}$, where A is acute. **[2]**

OR

OR If $a\sec\theta + b\tan\theta = m$ and $b\sec\theta + a\tan\theta = n$, prove that $a^2 + n^2 = b^2 + m^2$. **[2]**

SECTION – C

Section C consists of 6 questions of 3 marks each.

Q26. The dimensions of a window are 156 cm $\times$ 216 cm. Arjun wants to fix a grill on the window, creating complete squares of the maximum possible size. Find the side length of each square and hence the number of squares formed. **[3]**

OR

OR National Art convention got registrations from students from all parts of the country: 60 are interested in music, 84 in dance and 108 in handicrafts. The organisers wish to keep them in the minimum number of groups such that each group has students of the same art form and every group has the same number of students. Find the number of students in each group, the number of groups in each art form, and the number of rooms required if each group is allotted one room. **[3]**

Q27. If a and b are the zeroes of the polynomial $x^2 + x - 2$, then find the value of $\frac{a}{b} + \frac{b}{a}$. **[3]**

OR

OR Find the zeroes of the polynomial $4x^2 + 4x - 3$ and verify the relationship between the zeroes and the coefficients of the polynomial. **[3]**

Q28. Find the coordinates of the points of trisection of the line segment joining the points $A(-1, 4)$ and $B(-3, -2)$.**[3]**

OR

OR $P(-2, 5)$ and $Q(3, 2)$ are two points. Find the coordinates of the point R on the line segment PQ such that $PR = 2QR$. **[3]**

Q29. E is a point on side CB produced of an isosceles triangle ABC with $AB = AC$. If $AD \perp BC$ and $EF \perp AC$, prove that $\triangle ABD \sim \triangle ECF$. **[3]**

Q30. On a particular day, Vidhi and Unnati could not decide who would drive the car. Each of them flipped their own coin exactly three times. It was agreed that: (1) if Vidhi gets two heads in a row, she drives the car; (2) if Unnati gets a head immediately followed by a tail, she drives the car. Who has the greater probability of driving the car that day? Justify your answer. **[3]**

Q31. Weekly expenditure on Ayurvedic medicines of a few households in a locality is recorded below.

Weekly expenditure (Rs)	Number of households
100–150	4
150–200	5
200–250	y
250–300	2
300–350	2

If the mean expenditure for this is Rs 211, then find the missing frequency y. **[3]**

OR

OR A health centre working for the welfare of patients suffering from dengue recorded the following information about their ages.

Age of patients (years)	Number of patients
0–15	8
15–30	5
30–45	x
45–60	16
60–75	12
75–90	9

If the modal age of the patients is 54, then find the value of x. **[3]**

SECTION – D

Section D consists of 4 questions of 5 marks each.

Q32. 250 logs are stacked in the following manner: 22 logs in the bottom row, 21 logs in the next row, 20 logs in the row next to it, and so on. In how many rows are the 250 logs placed, and how many logs are there in the top row? **[5]**

OR

OR The ratio of the 11^{th} term to the 17^{th} term of an A.P. is $3 : 4$. Find the ratio of the 5^{th} term to the 21^{st} term of the same A.P. Also, find the ratio of the sum of the first 5 terms to the sum of the first 21 terms. **[5]**

Q33. In a parallelogram $ABCD$, the line AR is drawn through Q, the mid-point of side CD. It meets BD at P and BC produced at R, with R beyond C. Prove that (i) $AQ = QR$; (ii) $AP = 2PQ$; (iii) $PR = 2AP$. **[5]**

OR

OR The diagonal BD of a parallelogram $ABCD$ intersects the segment AE at F, where E is any point on the side BC. Prove that $DF \times EF = FB \times FA$. **[5]**

Q34. A boy whose eye level is 1.35 m above the ground spots a balloon moving with the wind in a horizontal line at some height above the ground. The angle of elevation of the balloon from his eyes at an instant is $60°$. After 12 seconds, the angle of elevation reduces to $30°$. If the speed of the wind is 3 m/s, find the height of the balloon above the ground. (Use $\sqrt{3} = 1.73$.) **[5]**

Q35. Two circles with centres O and O', of radii 6 cm and 8 cm respectively, intersect at two points P and Q such that OP and $O'P$ are tangents to the two circles at P. Find the length of the common chord PQ. **[5]**

SECTION – E

Section E consists of 3 case-study based questions of 4 marks each, with an internal choice in the 2-mark sub-part of each.

Q36. Read the following passage carefully and answer the questions that follow. **[4]**

In an equilateral triangle of side 10 cm, equilateral triangles of side 1 cm are formed, as shown in the figure, with one triangle in the first row, three in the second row, five in the third row, and so on, down to the tenth row at the bottom. (The figure shows the rows labelled from the top row to the bottom row, with alternate small triangles shaded.)
Based on the above information, answer the following questions using arithmetic progression:

(i) How many triangles are there in the bottom-most row? [1]

(ii) How many triangles are there in the fourth row from the bottom? [1]

(iii) Find the total number of triangles of side 1 cm up to and including the 8th row. [2]

OR

(iii) How many more triangles are there from the 5th row to the 10th row than in the first 4 rows? Show working. [2]

Q37. Read the following passage carefully and answer the questions that follow. **[4]**

A stable owner has four horses. He usually ties each horse with a 7 m long rope to a peg at each corner of a square-shaped grass field of side 20 m, so that the horses can graze. Tying the ropes sometimes injures the horses, so he is considering a fence. Each rope is shorter than a side of the field, so the four grazing regions lie inside the field and do not overlap.
Based on the above information, answer the following questions:

(i) Find the area of the square-shaped grass field. [1]

(ii) Find the area of the grass field in which one horse can graze. (Use $\pi = \frac{22}{7}$.) [1]

(iii) Find the total area grazed by all four horses together. (Use $\pi = \frac{22}{7}$.) [2]

OR

(iii) If the length of each rope is increased from 7 m to 10 m, find the area grazed by one horse. (Use $\pi = 3.14$.) [2]

Q38. Read the following passage carefully and answer the questions that follow. **[4]**

Two schools P and Q award prizes to their students for two games, Hockey (Rs x per student) and Cricket (Rs y per student). School P awards a total of Rs 9500 to 5 hockey players and 4 cricket players, while school Q awards a total of Rs 7370 to 4 hockey players and 3 cricket players.
Based on the above information, answer the following questions:

(i) Represent the given information algebraically in terms of x and y. [1]

(ii) Find the prize amount for one hockey player. [1]

(iii) Find the total prize amount if 2 students each from hockey and cricket receive the prize. [2]

OR

(iii) Which game gets the larger prize per student, and by how much? [2]

***** END OF PAPER *****