CENTRAL BOARD OF SECONDARY EDUCATION

CBSE 2026-27

Mathematics (Standard)

Subject Code: 041 | Class X

Solutions

Sample Question Paper – Set 3

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. If LCM$(x, 18) = 36$ and HCF$(x, 18) = 2$, then x is: **[1]**

(a) 2 (b) 3 (c) 4 (d) 5

Q2. If $p - 1$, $p + 1$ and $2p + 3$ are in A.P., then the value of p is **[1]**

(a) -2 (b) 4 (c) 0 (d) 2

Q3. If $A\left(\frac{m}{3}, 5\right)$ is the mid-point of the line segment joining the points $Q(-6, 7)$ and $R(-2, 3)$, then the value of m is: **[1]**

(a) -12 (b) -4 (c) 12 (d) -6

Q4. PQ is a tangent to a circle with centre O, touching it at Q, and OP is joined. If $\angle OPQ = x$ and $\angle POQ = y$, then $x + y$ is: **[1]**

(a) $45°$ (b) $90°$ (c) $60°$ (d) $180°$

Q5. If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$, $0° < A + B < 90°$, $A > B$, then the values of A and B respectively are: **[1]**

(a) $60°,\ 30°$ (b) $60°,\ 45°$ (c) $45°,\ 15°$ (d) $60°,\ 15°$

Q6. A cap is cylindrical in shape, surmounted by a conical top. The cylindrical part and the conical part have the same base radius. If the volume of the cylindrical part is equal to that of the conical part, then the ratio of the height of the cylindrical part to the height of the conical part is: **[1]**

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

Q7. If the maximum number of students has obtained 52 marks out of 80, then: **[1]**

(a) 52 is the mean of the data. (b) 52 is the median of the data.
(c) 52 is the mode of the data. (d) 52 is the range of the data.

Q8. The LCM of two prime numbers p and q (with $p > q$) is 221. The value of $3p - q$ is: **[1]**

(a) 4 (b) 28 (c) 38 (d) 48

Q9. For what value(s) of k does the quadratic equation $x^2 + 2\sqrt{2}\,kx + 18 = 0$ have equal roots? **[1]**

(a) ± 3 (b) ± 2 (c) ± 9 (d) $\pm\sqrt{3}$

Q10. Points P, Q, R divide the line segment AB into four equal parts, in the order A, P, Q, R, B. The point Q divides PB in the ratio: **[1]**

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

Q11. In $\triangle OPS$, M lies on side OP and N lies on side OS such that $MN \parallel PS$. Given $MP = 8.5$ cm, $ON = 4.8$ cm and $NS = 6$ cm, the length of OP is **[1]**

(a) 6.8 cm (b) 17 cm (c) 15.3 cm (d) 9.6 cm

Q12. A 30 m long rope is tightly stretched from the top of a pole to the ground. If the rope makes an angle of $60°$ with the ground, the height of the pole is: **[1]**

(a) $10\sqrt{3}$ m (b) $30\sqrt{3}$ m (c) 15 m (d) $15\sqrt{3}$ m

Q13. Five congruent circles of radius 1 cm are arranged as in the Olympic symbol: three rings in the upper row and two in the lower row, so that each lower ring overlaps two upper rings. There are four overlapping regions, shown dotted. In each overlap the two points where the overlapping circles meet are joined by a chord of length 1 cm. Assuming the thickness of the rings is negligible, the total area of the four dotted regions is **[1]**

(a) $4\left[\frac{\pi}{12} - \frac{\sqrt{3}}{4}\right]$ cm^2 (b) $\left[\frac{\pi}{6} - \frac{\sqrt{3}}{4}\right]$ cm^2 (c) $4\left[\frac{\pi}{6} - \frac{\sqrt{3}}{4}\right]$ cm^2 (d) $8\left[\frac{\pi}{6} - \frac{\sqrt{3}}{4}\right]$ cm^2

Q14. For an event E, if $P(E) + P(\overline{E}) = q$, then the value of $q^2 - 4$ is: **[1]**

(a) -3 (b) 3 (c) 5 (d) -5

Q15. If $a^2 = \dfrac{23}{25}$, then a is: **[1]**

(a) rational (b) irrational (c) whole number (d) integer

Q16. If the system of equations $3x + y = 1$ and $(2k-1)x + (k-1)y = 2k + 1$ is inconsistent, then $k =$ **[1]**

(a) -1 (b) 0 (c) 1 (d) 2

Q17. $A(-4, 5)$ and $C(8, 2)$ are two opposite vertices of a parallelogram $ABCD$. Its diagonals intersect each other at $P(a, b)$. The relation between a and b is: **[1]**

(a) $b = a - 1.5$ (b) $b = a + 1.5$ (c) $b = a - 4.5$ (d) $b = a + 4.5$

Q18. An observer 1.8 m tall stands at a distance of 38.2 m from a chimney along the ground. The angle of elevation of the top of the chimney from the eyes of the observer is $45°$. The height of the chimney above the ground is: **[1]**

(a) 38.2 m (b) 36.4 m (c) 40 m (d) $38.2\sqrt{2}$ m

Q19. Assertion (A): If $\cos A + \cos^2 A = 1$, then $\sin^2 A + \sin^4 A = 1$.
Reason (R): $\sin^2 A + \cos^2 A = 1$. **[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): A ladder leaning against a wall stands at a horizontal distance of 6 m from the wall. If the ladder reaches a height of 8 m on the wall, then the length of the ladder is 10 m.
Reason (R): The ladder makes an angle of $60°$ with the ground. **[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 value of x for which $(\sin A + \text{cosec}\, A)^2 + (\cos A + \sec A)^2 = x + \tan^2 A + \cot^2 A$. **[2]**

OR

OR Evaluate $\dfrac{3\sin 30° - 4\sin^3 30°}{2\sin^2 50° + 2\cos^2 50°}$. **[2]**

Q22. The curved surface area of a right circular cone is 12320 cm^2. If the radius of its base is 56 cm, find its height. (Take $\pi = \frac{22}{7}$.) **[2]**

OR

OR A paper cone used to serve ice-cream has base radius 3 cm and vertical height 4 cm. Take $\pi = 3.14$. (i) Find the volume of ice-cream the cone can hold. (ii) Find the area of paper needed to make the cone, ignoring the overlap and the open top. **[2]**

Q23. A survey recorded the hours of reading per week of some students:

Hours per week	0–10	10–20	20–30	30–40
Number of students	2	3	k	5

If the mean of the data is 24, find the value of k. **[2]**

OR

OR Mrs. Garg recorded the marks obtained by her students in the following table. She calculated the modal marks of the students of the class as 45. While printing the data, a blank was left. Find the missing frequency in the table given below.

Marks obtained	Number of students
0–20	5
20–40	10
40–60	(blank)
60–80	6
80–100	3

[2]

Q24. 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]**

Q25. In a pack of 52 playing cards one card is lost. From the remaining cards, a card is drawn at random. Find the probability that the drawn card is the queen of hearts, if the lost card is a black card. **[2]**

OR

OR One card is drawn at random from a well shuffled deck of 52 cards. Find the probability that the card drawn (i) is the queen of hearts; (ii) is not a jack. **[2]**

SECTION – C

Section C consists of 6 questions of 3 marks each.

Q26. Prove that $\sqrt{3}$ is an irrational number. **[3]**

OR

OR Prove that $\sqrt{5}$ is an irrational number. **[3]**

Q27. Find the sum of all integers between 50 and 500 which are divisible by 7. **[3]**

OR

OR How many numbers lie between 10 and 300 which leave remainder 3 when divided by 4? Also find their sum. **[3]**

Q28. $\mathrm{P}(x, y)$, $\mathrm{Q}(-2, -3)$ and $\mathrm{R}(2, 3)$ are the vertices of a right triangle PQR, right angled at P. Find the relationship between x and y. Hence, find all possible values of x for which $y = 2$. **[3]**

Q29. If the angles of elevation of the top of a candle from two coins, distant a cm and b cm $(a > b)$ from its base and in the same straight line from it, are 30° and 60°, then find the height of the candle. **[3]**

Q30. Find the area of the sector of a circle of radius 42 cm and central angle 30°. Also find the area of the corresponding major sector. (Use $\pi = \frac{22}{7}$.) **[3]**

Q31. Fifty circular discs, each of radius 7 cm and thickness 0.5 cm, are placed one above the other to form a solid cylinder. (i) Find the total surface area of the solid. (ii) Find the volume of space left in a cubical box of inner side 25 cm when the solid is placed inside it. (Take $\pi = \frac{22}{7}$.) **[3]**

SECTION – D

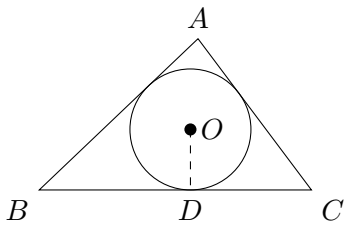
Section D consists of 4 questions of 5 marks each.

Q32. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream. **[5]**

OR

OR Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank. **[5]**

Q33. A triangle ABC is drawn to circumscribe a circle of radius 4 cm, so that the segments BD and DC into which BC is divided by the point of contact D are of lengths 10 cm and 8 cm respectively. If the area of $\triangle ABC$ is 90 cm^2, find the lengths of the sides AB and AC.



[5]

OR

OR PQ and PR are two tangents to a circle with centre O and radius 5 cm, touching it at Q and R. AB is another tangent to the circle at C, where C lies on OP; A lies on PQ and B lies on PR. If $OP = 13$ cm, find the lengths AB and PA. **[5]**

Q34. A student noted the number of cars passing through a spot on a road for 100 periods, each of 3 minutes, and summarised the counts below. Find the mean and median of the following data.

Number of cars	Frequency (periods)
0–10	7
10–20	14
20–30	13
30–40	12
40–50	20
50–60	11
60–70	15
70–80	8

[5]

Q35. Determine graphically the coordinates of the vertices of the triangle formed by the lines $2x - 3y + 6 = 0$, $2x + 3y - 18 = 0$ and $x = 0$. **[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. Case Study: Garden walkway **[4]**

A garden designer is planning a rectangular lawn of 12 m by 10 m. The lawn is to be surrounded by a walkway of uniform width x m on all sides. The total area of the lawn and the walkway together is 360 m^2.
Based on the above information, answer the following questions:

(i) Formulate the quadratic equation representing the total area of the lawn and the walkway, taking the width of the walkway as x m. [1]

(ii) Find the perimeter of the lawn. [1]

(iii) Solve the quadratic equation to find the width x of the walkway. [2]

OR

(iii) If the cost of paving the walkway at the rate of Rs 50 per square metre is Rs 12000, calculate the area of the walkway. [2]

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

A backyard is in the shape of a right-angled triangle ABC with $\angle B = 90°$, $AB = 7$ m and $BC = 15$ m. A circular pit with centre O and radius r has been dug inside it so that it touches the walls AB, BC and AC at R, Q and P respectively, with $AP = x$ m.
Based on the above information, answer the following questions:

(i) Find the length of AR in terms of x. [1]

(ii) Write the type of quadrilateral $BQOR$. [1]

(iii) Find the length PC in terms of x, and hence find the value of x. [2]

OR

(iii) Find x, and hence find the radius r of the circle. [2]

Q38. Case Study: Triangular shelf unit **[4]**

Triangle is a very popular shape used in interior designing. A cabinet designed by an interior designer has a large triangle $\triangle ABC$ and a smaller triangle $\triangle DEF$ that holds a shelf. The point P lies on DE and the point Q lies on DF such that $PQ \parallel EF$.
Based on the above information, answer the following questions:

(i) Show that $\triangle DPQ \sim \triangle DEF$. [1]

(ii) If $DP = 50$ cm and $PE = 70$ cm, find $\dfrac{PQ}{EF}$. [1]

(iii) If $2AB = 5DE$ and $\triangle ABC \sim \triangle DEF$, show that $\dfrac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF}$ is constant. [2]

OR

(iii) If AM and DN are medians of $\triangle ABC$ and $\triangle DEF$ respectively, with M the midpoint of BC and N the midpoint of EF, prove that $\triangle ABM \sim \triangle DEN$. [2]

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