CENTRAL BOARD OF SECONDARY EDUCATION

CBSE 2026-27

Mathematics (Standard)

Subject Code: 041 | Class X

Solutions

Sample Question Paper – Set 2

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 two positive integers p and q can be expressed as $p = 18a^2b^4$ and $q = 20a^3b^2$, where a and b are distinct prime numbers, neither of which is 2, 3 or 5, then LCM(p, q) is: **[1]**

(a) $2a^2b^2$ (b) $180a^2b^2$ (c) $12a^2b^2$ (d) $180a^3b^4$

Q2. The value of k for which the equation $kx^2 - 6x - 4 = 0$ has real and equal roots, is **[1]**

(a) $\frac{9}{4}$ (b) -4 (c) $-\frac{9}{4}$ (d) -2

Q3. The point on the x-axis nearest to the point $(-4, -5)$ is: **[1]**

(a) $(0, 0)$ (b) $(-4, 0)$ (c) $(-5, 0)$ (d) $(\sqrt{41}, 0)$

Q4. In $\triangle ABC$, $DE \parallel AB$ with D on AC and E on BC. If $AB = a$, $DE = x$, $BE = b$ and $EC = c$, then x in terms of a, b and c is **[1]**

(a) $\frac{ac}{b}$ (b) $\frac{ac}{b+c}$ (c) $\frac{ab}{c}$ (d) $\frac{ab}{b+c}$

Q5. A vertical pole 7.5 m long casts a shadow 5 m long on the ground. At the same time, a tower casts a shadow 24 m long. The height of the tower is: **[1]**

(a) 20 m (b) 40 m (c) 60 m (d) 36 m

Q6. The hour hand of a clock is 7 cm long. The angle swept by it between 7:00 a.m. and 8:10 a.m. is: **[1]**

(a) $\left(\frac{35}{4}\right)^\circ$ (b) $\left(\frac{35}{2}\right)^\circ$ (c) 35° (d) 70°

Q7. Two dice are rolled simultaneously. The probability that 6 comes up at least once is: **[1]**

(a) $\frac{1}{6}$ (b) $\frac{7}{36}$ (c) $\frac{11}{36}$ (d) $\frac{13}{36}$

Q8. If the sum of two numbers is 1215 and their HCF is 81, then the possible number of pairs of such numbers is: **[1]**

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

Q9. Three chairs and one table cost Rs 900, whereas five chairs and three tables cost Rs 2100. If the cost of one chair is Rs x and the cost of one table is Rs y, the situation is represented algebraically as: **[1]**

(a) $3x + y = 900$, $3x + 5y = 2100$ (b) $x + 3y = 900$, $3x + 5y = 2100$
(c) $3x + y = 900$, $5x + 3y = 2100$ (d) $x + 3y = 900$, $5x + 3y = 2100$

Q10. The line represented by $\frac{x}{4} + \frac{y}{6} = 1$ intersects the x-axis and the y-axis at P and Q respectively. The coordinates of the mid-point of the line segment PQ are: **[1]**

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

Q11. A quadrilateral $PQRS$ is drawn to circumscribe a circle. If $PQ = 12$ cm, $QR = 15$ cm and $RS = 14$ cm, then SP is equal to: **[1]**

(a) 15 cm (b) 14 cm (c) 12 cm (d) 11 cm

Q12. If $4\tan\beta = 3$, then $\frac{4\sin\beta - 3\cos\beta}{4\sin\beta + 3\cos\beta} =$ **[1]**

(a) 0 (b) $\frac{1}{3}$ (c) $\frac{2}{3}$ (d) $\frac{3}{4}$

Q13. The volume of a solid hemisphere is $\frac{396}{7}$ cm^3. The total surface area of the solid hemisphere (in cm^2) is: **[1]**

(a) $\frac{396}{7}$ (b) $\frac{594}{7}$ (c) $\frac{549}{7}$ (d) $\frac{604}{7}$

Q14. The upper limit of the modal class of the given distribution is:

Height (cm)	Below 140	Below 145	Below 150	Below 155	Below 160	Below 165
Number of girls	4	11	29	40	46	51

[1]

(a) 165 (b) 160 (c) 155 (d) 150

Q15. The number of multiples of 4 lying between 12 and 250 is: **[1]**

(a) 59 (b) 59.5 (c) 60 (d) 61

Q16. The coordinates of the end points of a diameter of a circle are $(5, -2)$ and $(5, 2)$. The length of the radius of the circle is: **[1]**

(a) ± 2 (b) ± 4 (c) 4 (d) 2

Q17. A kite is flying at a height of 150 m from the ground. It is attached to a string inclined at 30° to the horizontal. The length of the string is: **[1]**

(a) $100\sqrt{3}$ m (b) 300 m (c) $150\sqrt{2}$ m (d) $150\sqrt{3}$ m

Q18. The length of an arc of a circle with radius 12 cm is 10π cm. The angle subtended by the arc at the centre of the circle is: **[1]**

(a) 120° (b) 6° (c) 75° (d) 150°

Q19. **Assertion (A):** The lines $x + y = 5$ and $2x + 2y = 9$ intersect at exactly one point.
Reason (R): If $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$, the pair of linear equations has no solution. **[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 the roots of $x^2 - 6x + k = 0$ are equal, then $k = 9$.
Reason (R): For equal roots the discriminant is zero, so $36 - 4k = 0$. **[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. AB and CD are tangents to a circle with centre O, touching it at A and C respectively, and AC is a chord. Is $\angle BAC = \angle DCA$? Justify your answer. Assume the two tangents meet at a point P, with B on ray PA beyond A and D on ray PC beyond C. **[2]**

OR

OR AB and AC are tangents drawn from an external point A to a circle with centre O, touching it at B and C. If $\angle BAC = 65^\circ$, find $\angle BOC$. **[2]**

Q22. Find an acute angle θ when $\dfrac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} = \dfrac{1 - \sqrt{3}}{1 + \sqrt{3}}$. **[2]**

OR

OR If $\sin(A + B) = 1$ and $\cos(A - B) = \dfrac{\sqrt{3}}{2}$, $0^\circ < A + B \leq 90^\circ$ and $A > B$, find the measures of angles A and B. **[2]**

Q23. 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]**

OR

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

Q24. In $\triangle ABC$, D is a point on side BC such that $\angle ADC = \angle BAC$. Show that $CA^2 = CD \times CB$. **[2]**

OR

OR AB and CD are two lines meeting at O, with A and D on one side of O and B and C on the other side, such that $OA \cdot OB = OC \cdot OD$. Show that $\angle A = \angle C$ and $\angle B = \angle D$, where $\angle A = \angle OAD$, $\angle C = \angle OCB$, $\angle D = \angle ODA$ and $\angle B = \angle OBC$. **[2]**

Q25. Find the length of the shadow on level ground of a pole of height 18 m when the elevation of the Sun is $60°$. **[2]**

SECTION – C

Section C consists of 6 questions of 3 marks each.

Q26. Solve the following pair of linear equations graphically: $x - y + 1 = 0$ and $x + y = 5$. **[3]**

OR

OR Solve the following pair of linear equations graphically: $2x - y - 2 = 0$ and $-4x + y + 4 = 0$. Also find the absolute difference between the ordinates of the points where the two lines cut the y-axis. **[3]**

Q27. A point $P(x, 7)$ divides the line segment joining $A(-5, 4)$ and $B(7, 9)$ in a certain ratio. Find the ratio and hence find the value of x. **[3]**

OR

OR Find the ratio in which the y-axis divides the line segment joining the points $(5, -6)$ and $(-1, -4)$. Also find the point of intersection. **[3]**

Q28. Two dice are thrown at the same time. Determine the probability that (i) the sum of the numbers on the two dice is 5; (ii) the difference of the numbers on the two dice is 3. **[3]**

OR

OR Two dice are thrown at the same time. Determine the probability that the difference of the numbers on the two dice is 2. **[3]**

Q29. If α, β are the zeroes of the quadratic polynomial $5x^2 + 5x + 1$, find the values of (i) $\alpha^2 + \beta^2$ and (ii) $\alpha^{-1} + \beta^{-1}$. **[3]**

Q30. The table shows the daily expenditure on grocery of 25 households in a locality. Find the modal daily expenditure on grocery by a suitable method.

Daily expenditure (Rs)	100–150	150–200	200–250	250–300	300–350
Number of households	4	5	12	2	2

[3]

Q31. The median of the following data is 16. Find the missing frequencies a and b, if the total of the frequencies is 70.

Class	0–5	5–10	10–15	15–20	20–25	25–30	30–35	35–40
Frequency	12	a	12	15	b	6	6	4

[3]

SECTION – D

Section D consists of 4 questions of 5 marks each.

Q32. Tara scored 40 marks in a test, getting 3 marks for each right answer and losing 1 mark for each wrong answer. Had 4 marks been awarded for each correct answer and 2 marks deducted for each wrong answer, Tara would have scored 50 marks. Assuming that Tara attempted all the questions, find the total number of questions in the test. **[5]**

OR

OR Using the graphical method, solve the pair of linear equations $3x + y + 4 = 0$ and $3x - y + 2 = 0$. **[5]**

Q33. State the Basic Proportionality Theorem and use it to prove the following. Three parallel lines l, m, n are intersected by transversals q and s: q meets them at A, B, C and s meets them at D, E, F, where A and D lie on l, B and E lie on m, and C and F lie on n. Prove that $\dfrac{AB}{BC} = \dfrac{DE}{EF}$. **[5]**

OR

OR State and prove the Basic Proportionality Theorem: if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio. **[5]**

Q34. The angles of depression of the top and the bottom of a building 50 m high, as observed from the top of a tower, are 30° and 60° respectively. Find the height of the tower and the horizontal distance between the building and the tower. **[5]**

OR

OR Two palm trees of equal height stand opposite each other on either side of a river 80 m wide. From a point O on the river between them, the angles of elevation of the tops of the trees are 60° and 30° respectively. Find the height of the trees and the distances of O from the two trees. (Use $\sqrt{3} = 1.73$.) **[5]**

Q35. The perimeter of a certain sector of a circle of radius 5.6 m is 20.0 m. (i) Find the area of the sector. (ii) Find the central angle of the sector in degrees. (Use $\pi = \frac{22}{7}$.) **[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]**

Kabir designs a logo for his school's Mathematics club. The logo is a square tile of side $\sqrt{2}$ cm. He wants to print the area and the perimeter of the tile on the club's badge, and he wants to know whether these values are rational or irrational. You may use the fact that $\sqrt{2}$ is an irrational number.

(i) Find the area of the tile. [1]

(ii) Find the perimeter of the tile, and state whether it is rational or irrational. [1]

(iii) Prove that the perimeter of the tile is an irrational number. [2]

OR

(iii) Write a rational number lying between $\sqrt{2}$ and 2, and justify your answer. [2]

Q37. Case Study: Tiling a rectangular floor **[4]**

A rectangular floor can be completely tiled with 200 square tiles. If the side length of each tile is increased by 1 unit, then only 128 tiles are needed to cover the same floor.
Based on the above information, answer the following questions:

(i) Assuming the original length of each side of a tile is x units, make a quadratic equation from the above information. [1]

(ii) Write the corresponding quadratic equation in standard form. [1]

(iii) Find the value of x, the length of a side of a tile, by factorisation. [2]

OR

(iii) Solve the quadratic equation for x using the quadratic formula. [2]

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

A circle with centre O and radius 75 cm has a tangent AB touching it at A, with B outside the circle. The segment OB meets the circle at Q. The point P lies on AB between A and B so that $PQ \parallel OA$, and $\angle ABO = 30°$.
Based on the above information, answer the following questions:

(i) Find the length of AB. [1]

(ii) Find the length of OB. [1]

(iii) Find the length of AP. [2]

OR

(iii) Find the length of PQ. [2]

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