CENTRAL BOARD OF SECONDARY EDUCATION

CBSE 2026-27

Mathematics (Standard)

Subject Code: 041 | Class X

Solutions

Sample Question Paper – Set 4

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 $p^2 = \dfrac{32}{50}$, then p is a/an: **[1]**

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

Q2. If 2 and $\frac{1}{2}$ are the zeroes of $px^2 + 5x + r$, then: **[1]**

(a) $p = r = 2$ (b) $p = r = -2$ (c) $p = 2,\ r = -2$ (d) $p = -2,\ r = 2$

Q3. The point which lies on the perpendicular bisector of the line segment joining the points $A(-3, -4)$ and $B(3, 4)$ is: **[1]**

(a) $(0, 0)$ (b) $(0, 3)$ (c) $(3, 0)$ (d) $(0, 4)$

Q4. In $\triangle ABC$, D and E lie on AB and AC such that $DE \parallel BC$. If $AE = 2$ cm, $AD = 3$ cm and $BD = 4.5$ cm, then CE is **[1]**

(a) 3 cm (b) 2 cm (c) 4.5 cm (d) 1.5 cm

Q5. The height of a tower is 20 m. The length of its shadow on level ground, when the Sun's altitude is $60°$, is: **[1]**

(a) $\dfrac{20}{\sqrt{3}}$ m (b) $\dfrac{20}{3}$ m (c) $20\sqrt{3}$ m (d) 20 m

Q6. If an arc subtends an angle of $90°$ at the centre of a circle, then the ratio of its length to the circumference of the circle is: **[1]**

(a) 2 : 3 (b) 1 : 4 (c) 4 : 1 (d) 1 : 3

Q7. A letter of the English alphabet is chosen at random. The probability that it is a letter of the word MATHEMATICS is: **[1]**

(a) $\frac{4}{13}$ (b) $\frac{9}{26}$ (c) $\frac{5}{13}$ (d) $\frac{11}{26}$

Q8. The value of k for which $x = 5$ is a solution of $2x^2 + (k - 1)x + 10 = 0$ is: **[1]**

(a) 11 (b) -11 (c) 13 (d) -13

Q9. PA and PB are tangents to a circle with centre O from an external point P, with $\angle APB = 90°$. If $AB = 3\sqrt{2}$ cm, then the diameter of the circle is: **[1]**

(a) $3\sqrt{2}$ cm (b) $6\sqrt{2}$ cm (c) 3 cm (d) 6 cm

Q10. $\sec\theta$, when expressed in terms of $\cot\theta$, is equal to **[1]**

(a) $\dfrac{1 + \cot^2\theta}{\cot\theta}$ (b) $\sqrt{1 + \cot^2\theta}$ (c) $\dfrac{\sqrt{1 + \cot^2\theta}}{\cot\theta}$ (d) $\dfrac{\sqrt{1 - \cot^2\theta}}{\cot\theta}$

Q11. A cone of height 12 cm and slant height 13 cm is surmounted on a hemisphere whose radius equals the radius of the cone. The entire height of the solid is: **[1]**

(a) 17 cm (b) 18 cm (c) 22 cm (d) 23 cm

Q12. If the value of each observation of a statistical data is increased by 3, then the mean of the data: **[1]**

(a) remains unchanged (b) increases by 3
(c) increases by 6 (d) increases by $3n$

Q13. The common difference of an A.P. in which $a_{15} - a_{11} = 48$, is **[1]**

(a) 12 (b) 16 (c) -12 (d) -16

Q14. $\left[\dfrac{3}{4}\tan^2 30° - \sec^2 45° + \sin^2 60°\right]$ is equal to **[1]**

(a) -1 (b) $\frac{5}{6}$ (c) $-\frac{3}{2}$ (d) $\frac{1}{6}$

Q15. On the top face of a wooden cube of side 7 cm, hemispherical depressions of radius 0.35 cm are to be formed

by taking out wood. The maximum number of depressions that can be formed is: **[1]**

(a) 400 (b) 100 (c) 20 (d) 10

Q16. The mean age of a combined group of men and women is 35 years. If the mean ages of the men and women are 38 years and 30 years respectively, then the percentage of women in the group is: **[1]**

(a) 15 (b) 25.5 (c) 35 (d) 37.5

Q17. If the length of an arc of a circle subtending an angle $60°$ at its centre is 22 cm, then the radius of the circle is: **[1]**

(a) $\sqrt{21}$ cm (b) 21 cm (c) $\sqrt{42}$ cm (d) 42 cm

Q18. A card is drawn from a well shuffled deck of cards. The probability that the card drawn is neither a king nor a queen is: **[1]**

(a) $\frac{11}{13}$ (b) $\frac{12}{13}$ (c) $\frac{11}{26}$ (d) $\frac{11}{52}$

Q19. **Assertion (A):** If the product of two numbers is 5780 and their HCF is 17, then their LCM is 340.
Reason (R): HCF is always a factor of LCM. **[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):** Mid-point of a line segment divides the line segment in the ratio $1 : 1$.
Reason (R): The ratio in which the point $(-3, k)$ divides the line segment joining the points $(-5, 4)$ and $(-2, 3)$ is $1 : 2$. **[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. The coordinates of the end points of the line segment AB are $A(-2, -2)$ and $B(2, -4)$. P is the point on AB such that $BP = \frac{4}{7}AB$. Find the coordinates of point P. **[2]**

OR

OR Find the ratio in which the point $P(-4, 6)$ divides the line segment joining the points $A(-6, 10)$ and $B(3, -8)$. **[2]**

Q22. Evaluate $\dfrac{3\sin 30° - 4\sin^3 30°}{2\sin^2 50° + 2\cos^2 50°}$. **[2]**

OR

OR 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]**

Q23. A box contains 12 balls of which some are red in colour. If 6 more red balls are put in the box and a ball is drawn at random, the probability of drawing a red ball doubles what it was before. Find the number of red balls in the box. **[2]**

Q24. Prove that the abscissa of a point P which is equidistant from the points $A(7, 1)$ and $B(3, 5)$ is 2 more than its ordinate. **[2]**

Q25. A ladder 8 m long rests against a vertical wall, making an angle of $60°$ with the ground. Find the height on the wall reached by the top of the ladder. **[2]**

SECTION – C

Section C consists of 6 questions of 3 marks each.

Q26. Ridhi drew a polygon with n sides. The smallest exterior angle is 8° and each subsequent exterior angle is 4° more than the previous one. Find the number of sides of the polygon. **[3]**

OR

OR Find the sum of the integers between 1 and 400 that are multiples of 4 as well as of 5. **[3]**

Q27. In the given figure $ABCD$ is a parallelogram. BE bisects CD at M and meets AC at L, where E lies on AD produced beyond D. Prove that $EL = 2BL$. **[3]**

OR

OR CD is the perpendicular bisector of AB, with D the midpoint of AB and $CD \perp AB$. E lies on CB, $EF \perp CD$ with F on CD, and AE meets CD at G. Prove that $\dfrac{CF}{CD} = \dfrac{FG}{DG}$. **[3]**

Q28. Water in a canal, 6 m wide and 1.5 m deep, flows at 10 km/h. How much area can it irrigate in 30 minutes if 8 cm of standing water is needed? **[3]**

OR

OR Water flows through a cylindrical pipe of internal diameter 4 cm at the rate of 20 metres per minute. How long will it take to fill a conical tank of base radius 40 cm and depth 72 cm? Give the answer in minutes. **[3]**

Q29. The radii of two concentric circles are 13 cm and 8 cm. AB is a diameter of the bigger circle and BD is a tangent to the smaller circle, touching it at D and meeting the bigger circle again at P on producing. Find AP. **[3]**

Q30. In a circle with centre O and radius 7 cm, the chord AB subtends an angle of 120° at the centre. C is a point on the major arc such that $OACB$ is the major sector. (i) Find the perimeter of the major sector $OACB$. (ii) If the area of $\triangle OAB$ is 21.2 cm^2, find the area of the segment between the chord AB and the minor arc. (Use $\pi = \frac{22}{7}$.) **[3]**

Q31. $\triangle ABC \sim \triangle DEF$. The perimeters of $\triangle ABC$ and $\triangle DEF$ are 25 cm and 15 cm respectively. If $AB = 9$ cm, find DE. **[3]**

SECTION – D

Section D consists of 4 questions of 5 marks each.

Q32. 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]**

OR

OR 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]**

Q33. (i) Prove that $\sqrt{\sec^2\theta + \operatorname{cosec}^2\theta} = \tan\theta + \cot\theta$. (ii) Evaluate $\dfrac{\cos 45^\circ}{\sec 30^\circ + \operatorname{cosec} 30^\circ}$. **[5]**

OR

OR If $x\sin^3\theta + y\cos^3\theta = \sin\theta\cos\theta$ and $x\sin\theta = y\cos\theta$, prove that $x^2 + y^2 = 1$. **[5]**

Q34. A shopkeeper has a box of 40 mobile covers: 12 are red, 9 are blue, 11 are black and the rest are green. One cover is drawn at random from the box. Find the probability that the cover drawn is (i) green; (ii) not red; (iii) red or blue. The shopkeeper then adds 6 more black covers to the box and draws one cover again. (iv) Find the probability that it is black. Instead, the shopkeeper removes all the green covers from the original box of 40 and draws one cover at random. (v) Find the probability that it is blue. **[5]**

Q35. The denominator of a fraction is one more than twice its numerator. If the sum of the fraction and its reciprocal is $2\frac{16}{21}$, find the fraction. **[5]**

OR

OR The denominator of a fraction is 2 more than its numerator. If 2 is added to both its numerator and denominator, then the sum of the new fraction and the original fraction is $\frac{46}{35}$. Find the original fraction. **[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]**

Ms. Mukta plays a prime number game with her class. She announces the number 2. The first student multiplies it by a prime number and passes the product to the second student. The second student multiplies it by a prime number and passes it on, and so on. The last student gets the product 173250.

(i) What is the least prime number used by the students? [1]

(ii) How many students are in the class? [1]

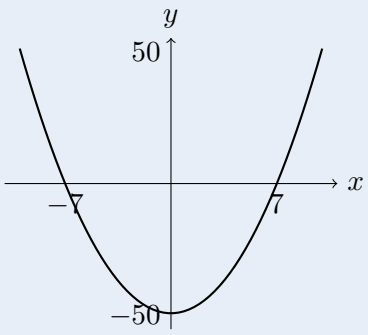
(iii) Express 173250 as a product of prime factors, and find the prime number that was used the maximum number of times. [2]

OR

(iii) Find the sum of all the distinct prime numbers used by the students. [2]

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

While playing in a garden, Samaira saw a honeycomb. Her mother told her that it is made by honey bees to store honey, and that its shape is a mathematical structure. The shape of the honeycomb is represented by the graph of a polynomial $y = p(x)$, shown below.



Based on the above information, answer the following questions:

(i) How many zeroes does the polynomial represented by the graph have? [1]

(ii) Write the zeroes of the polynomial. [1]

(iii) If the zeroes of the polynomial $x^2 + (a+1)x + b$ are 2 and -3, find the values of a and b. [2]

OR

(iii) If the square of the difference of the zeroes of the polynomial $x^2 + px + 45$ is 144, find the value of p. [2]

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

In a park, four poles stand at positions A, B, C and D around a circular fountain with centre O. The cloth joining the poles AB, BC, CD and DA touches the circular fountain at P, Q, R and S respectively. The quadrilateral $ABCD$ therefore circumscribes the fountain.
Based on the above information, answer the following questions:

(i) If O is the centre of the circular fountain, then find $\angle OSA$. [1]

(ii) If $AB = AD$, write the name of the figure $ABCD$. [1]

(iii) If $DR = 7$ cm and $AD = 11$ cm, find the length of AP. [2]

OR

(iii) If $\angle QCR = 60°$, find the measure of $\angle QOR$. [2]

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