CENTRAL BOARD OF SECONDARY EDUCATION

# CBSE 2026-27

## Mathematics (Standard)

Subject Code: 041 | Class X

Solutions

## Sample Question Paper – Set 6

**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 $x = ab^3$ and $y = a^3b$, where $a$ and $b$ are distinct prime numbers, then $[\text{HCF}(x, y) - \text{LCM}(x, y)]$ is equal to: **[1]**

(a) $1 - a^3b^3$ (b) $ab(1 - ab)$ (c) $ab - a^4b^4$ (d) $ab(1 - ab)(1 + ab)$

**Q2.** The quadratic equation whose roots are 7 and $\frac{1}{7}$ is: **[1]**

(a) $7x^2 - 50x + 7 = 0$ (b) $7x^2 - 50x + 1 = 0$ (c) $7x^2 + 50x - 7 = 0$ (d) $7x^2 + 50x - 1 = 0$

**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.** The measurements of $\triangle LMN$ and $\triangle ABC$ are: $LM = 45$ cm, $LN = 72$ cm, $MN = 63$ cm, $\angle LMN = 130°$, $\angle LNM = 28°$; and $AB = 5$ cm, $\angle BAC = 22°$, $\angle ABC = 130°$. The length of $AC$ is **[1]**

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

**Q5.** At some time of the day, the length of the shadow of a tower is equal to its height. At that time the Sun's altitude is: **[1]**

(a) 30° (b) 45° (c) 60° (d) 90°

**Q6.** The numerical value of the area of a circle is equal to that of the perimeter of a semicircular disc, both having equal radius. The radius is: **[1]**

(a) 1 unit (b) 2 units (c) $\frac{\pi + 2}{\pi}$ units (d) $\frac{2\pi + 2}{\pi}$ units

**Q7.** A letter is chosen at random from the letters of the word PROBABILITY. The probability that it is not a vowel is: **[1]**

(a) $\frac{4}{11}$ (b) $\frac{7}{11}$ (c) $\frac{1}{11}$ (d) $\frac{10}{11}$

**Q8.** $\left(1 + \sqrt{3}\right)^2 - \left(1 - \sqrt{3}\right)^2$ is: **[1]**

(a) a positive rational number. (b) a negative integer.
(c) a positive irrational number. (d) a negative irrational number.

**Q9.** If $x = 1$, $y = 2$ is a solution of the pair of linear equations $2x - 3y + a = 0$ and $2x + 3y - b = 0$, then: **[1]**

(a) $a = 2b$ (b) $2a = b$ (c) $a + 2b = 0$ (d) $2a + b = 0$

**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.** $RS$ is a tangent to a circle at the point $L$, and $MN$ is a diameter of the circle. If $\angle NML = 30°$, then $\angle RLM$ is: **[1]**

(a) 30° (b) 60° (c) 90° (d) 120°

**Q12.** If $4 \sec\theta - 5 = 0$, then the value of $\cot\theta$ is **[1]**

(a) $\frac{3}{4}$ (b) $\frac{4}{5}$ (c) $\frac{5}{3}$ (d) $\frac{4}{3}$

**Q13.** A conical cavity of maximum volume is carved out from a solid wooden hemisphere of radius 10 cm. The base of the cone lies on the flat face of the hemisphere, and its vertex touches the lowest point of the curved surface. The curved surface area of the cavity is (take $\pi = 3.14$): **[1]**

(a) $314\sqrt{2}$ cm$^2$ (b) 314 cm$^2$ (c) $\frac{3140}{3}$ cm$^2$ (d) $3140\sqrt{2}$ cm$^2$

**Q14.** While calculating the mean of a grouped frequency distribution by the step-deviation method, $u = \frac{x - a}{h}$ was used. It was found that $\bar{x} = 64$, $h = 5$ and $a = 62.5$. The value of $\bar{u}$ is: **[1]**

(a) 0.5 (b) 1.5 (c) 0.3 (d) 7.5

**Q15.** Two A.P.s have the same common difference. The first term of one of them is $-1$ and the first term of the other is $-8$. The difference between their $4^{\text{th}}$ terms is **[1]**

(a) $1$ (b) $-7$ (c) $7$ (d) $9$

**Q16.** 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) $(0,4)$

**Q17.** Two concentric circles have radii $R$ and $r$ with $R > r$, and their radii satisfy $R + r = 16$ cm. A chord $AB$ of the outer circle touches the inner circle, and $AB = 16$ cm. Then $R - r$ is: **[1]**

(a) $8$ cm (b) $4$ cm (c) $2$ cm (d) $3$ cm

**Q18.** The fourth vertex $D$ of a parallelogram $ABCD$ whose three vertices are $A(-2,3)$, $B(6,7)$ and $C(8,3)$ is:**[1]**

(a) $(0,1)$ (b) $(0,-1)$ (c) $(-1,0)$ (d) $(1,0)$

**Q19.** **Assertion (A):** A ladder $12$ m long leans against a vertical wall and makes an angle of $30^\circ$ with the ground. It reaches a height of $6$ m on the wall.
**Reason (R):** A ladder of length $L$ inclined at $\theta$ to the ground reaches a height of $L\sin\theta$ on the wall. **[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):** For $0^\circ < \theta \le 90^\circ$, $\operatorname{cosec}\theta - \cot\theta$ and $\operatorname{cosec}\theta + \cot\theta$ are reciprocals of each other.
**Reason (R):** $\operatorname{cosec}^2\theta - \cot^2\theta = 1$. **[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.

## SECTION – B

*Section B consists of 5 questions of 2 marks each.*

**Q21.** Two numbers are in the ratio $4:5$ and their HCF is $11$. Find their LCM. **[2]**

**OR**

**OR** Find the smallest number which is divisible by both $644$ and $462$. **[2]**

**Q22.** Vertices of a right triangle $ABC$ with $\angle B = 90^\circ$ are $A(3,4)$, $B(1,1)$ and $C(-8,7)$. Find the value of $\tan A$. **[2]**

**OR**

**OR** Show that the points $(-2,3)$, $(8,3)$ and $(6,7)$ are the vertices of a right-angled triangle. **[2]**

**Q23.** In the figure, two common tangents $AB$ and $CD$ to two non-overlapping circles intersect at a point $E$ between the circles. Here $A$ and $C$ lie on the larger circle and $B$ and $D$ lie on the smaller circle. Prove that $AB = CD$. **[2]**

**Q24.** If $4k = \tan^2 60^\circ - 2\operatorname{cosec}^2 30^\circ - 2\tan^2 30^\circ$, then find the value of $k$. **[2]**

**Q25.** Find the smallest number which is divisible by both $644$ and $462$. **[2]**

**OR**

**OR** Two numbers are in the ratio $4 : 5$ and their HCF is $11$. Find their LCM. **[2]**

## SECTION – C

*Section C consists of 6 questions of 3 marks each.*

**Q26.** Anuj had some chocolates, which he divided into two lots A and B. He sold lot A at Rs 2 for 3 chocolates and lot B at Rs 1 per chocolate, collecting Rs 400 in all. If he had sold lot A at Rs 1 per chocolate and lot B at Rs 4 for 5 chocolates, his total collection would have been Rs 460. Find the total number of chocolates he had. **[3]**

**OR**

**OR** A train covered a certain distance at a uniform speed. Had the train been $6$ km/h faster, it would have taken $4$ hours less than the scheduled time. Had it been $6$ km/h slower, it would have taken $6$ hours more than the scheduled time. Find the length of the journey. **[3]**

**Q27.** Prove that $\dfrac{1+\operatorname{cosec} A}{\operatorname{cosec} A} = \dfrac{\cos^2 A}{1-\sin A}$. **[3]**

**OR**

**OR** Let $2A+B$ and $A+2B$ be acute angles such that $\sin(2A+B) = \dfrac{\sqrt{3}}{2}$ and $\tan(A+2B) = 1$. Find the value of $\cot(4A-7B)$. **[3]**

**Q28.** Two coins are tossed simultaneously. What is the probability of getting (i) at least one head; (ii) at most one tail; (iii) a head and a tail? **[3]**

**Q29.** Two vertical poles of different heights stand $20$ m apart on level ground. The angle of elevation of the top of the first pole from the foot of the second pole is $60°$, and the angle of elevation of the top of the second pole from the foot of the first pole is $30°$. Find the difference between the heights of the two poles. **[3]**

**OR**

**OR** A boy $1.7$ m tall stands on horizontal ground $50$ m away from a building. The angle of elevation of the top of the building from his eye is $60°$. Find the height of the building. (Use $\sqrt{3} = 1.73$.) **[3]**

**Q30.** The mode of the following data is $67$. Find the missing frequency $x$.

| Class | 40–50 | 50–60 | 60–70 | 70–80 | 80–90 |
|---|---|---|---|---|---|
| Frequency | 5 | $x$ | 15 | 12 | 7 |

**[3]**

**Q31.** Following is the distribution of the long jump competition in which $250$ students participated. Find the median distance jumped by the students. Interpret the median.

| Distance (m) | 0–1 | 1–2 | 2–3 | 3–4 | 4–5 |
|---|---|---|---|---|---|
| Number of students | 40 | 80 | 62 | 38 | 30 |

**[3]**

## SECTION – D

*Section D consists of 4 questions of 5 marks each.*

**Q32.** Using the graphical method, solve the pair of linear equations $3x + y + 4 = 0$ and $3x - y + 2 = 0$. **[5]**

**OR**

**OR** 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]**

**Q33.** 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]**

**OR**

**OR** 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 $\frac{AB}{BC} = \frac{DE}{EF}$. **[5]**

**Q34.** An A.P. consists of $50$ terms, of which the $3^{rd}$ term is $12$ and the last term is $106$. Find the $29^{th}$ term of the A.P. and the sum of all its $50$ terms. **[5]**

**Q35.** Prove that the lengths of tangents drawn from an external point to a circle are equal. Using this result, prove that if $ABC$ is an isosceles triangle with $AB = AC$ circumscribed about a circle, then the base $BC$ is bisected by the point of contact. **[5]**

**OR**

**OR** Prove that the lengths of tangents drawn from an external point to a circle are equal. Using this result, find the length $BC$ of $\triangle ABC$ in which a circle is inscribed touching $AB$, $BC$ and $CA$ at $R$, $P$ and $Q$ respectively, given $AB = 10$ cm, $AQ = 7$ cm and $CQ = 5$ cm. **[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]**

A student entrepreneur started a company that manufactures sanitizers in two sizes, small and large. The cost of a small bottle is Rs 10 and that of a large bottle is Rs 15. In June the company sold $1000$ bottles and recorded a total sale of Rs 12750. Seeing the increased demand, the company increased the price of both sizes by Rs 2 each. In July it sold $2500$ bottles and recorded a total sale of Rs 34250.
Let $x$ and $y$ denote the numbers of small and large bottles sold in a month.
Based on the above information, answer the following questions:

(i) Form a linear equation in two variables representing the sale for June. [1]

(ii) Form a linear equation in two variables representing the sale for July. [1]

(iii) Find how many sanitizer bottles of each type were actually sold in June. [2]

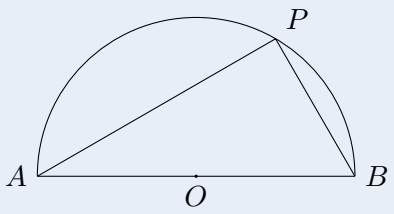
**OR**

(iii) Find how many sanitizer bottles of each type were sold in July. [2]

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

Anurag purchased a farmhouse in the form of a semicircle with diameter $AB = 70$ m and centre $O$, the midpoint of $AB$. He marks a point $P$ on the arc such that $\angle PAB = 30^\circ$, and joins $AP$ and $PB$. This divides

the farmhouse into three parts. Part I, between the chord $PB$ and the arc $PB$, has mango saplings. Part II is the triangle $APB$, where tomatoes are grown. Part III, between the chord $AP$ and the arc $AP$, has oranges.




Based on the above information, answer the following questions:

(i) What is the measure of $\angle POA$? [1]

(ii) Find the length of wire needed to fence the entire boundary of the farmhouse. (Use $\pi = \frac{22}{7}$.) [1]

(iii) Find the area of Part I, where the mango saplings are planted. (Use $\pi = \frac{22}{7}$.) [2]

**OR**

(iii) Find the length of wire needed to fence Part III. (Use $\pi = \frac{22}{7}$.) [2]

**Q38.** Case Study: Tetra-packed milk **[4]**

Tetra-packed milk is sold in cuboidal packets. Each packet is a cuboid of dimensions $15$ cm $\times$ $8$ cm $\times$ $5$ cm. These packets are packed in cuboidal cartons of dimensions $30$ cm $\times$ $32$ cm $\times$ $15$ cm. A cylindrical cup of diameter $5$ cm and height $7$ cm is also shown.
Based on the above information, answer the following questions:

(i) Find the volume of the cuboidal carton. [1]

(ii) Find the total surface area of one milk packet. [1]

(iii) How many milk packets can be packed in one carton? [2]

**OR**

(iii) How much milk can the cup hold? (Take $\pi = \frac{22}{7}$.) [2]

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