CENTRAL BOARD OF SECONDARY EDUCATION

CBSE 2026-27

Mathematics (Standard)

Subject Code: 041 | Class X

Marking Scheme – Sample Question Paper – Set 6

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

General Instructions

1. This marking scheme gives value points and the mark split only; questions are in SQP Set 6.
2. Any other relevant answer, correctly worked, should be given due credit.
3. This question paper contains 38 questions. All questions are compulsory.
4. The question paper is divided into five Sections – A, B, C, D and E.
5. 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.
6. Section B comprises 5 Very Short Answer (VSA) type questions of 2 marks each (Q.21–25).
7. Section C comprises 6 Short Answer (SA) type questions of 3 marks each (Q.26–31).
8. Section D comprises 4 Long Answer (LA) type questions of 5 marks each (Q.32–35).
9. 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.
10. 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.
11. Use of calculators is not permitted.
12. 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

Unit	Unit Name	Chapter	Marks
IV	Geometry	Triangles; Circles	15
V	Trigonometry	Introduction to Trigonometry; Some Applications of Trigonometry	12
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. **[1]**

(d) $ab(1-ab)(1+ab)$. HCF$(x,y) = ab$ and LCM$(x,y) = a^3b^3$. So $ab - a^3b^3 = ab(1-a^2b^2) = ab(1-ab)(1+ab)$.

Q2. **[1]**

(a) $7x^2 - 50x + 7 = 0$, because the sum of the roots is $\dfrac{50}{7}$ and the product is 1. **[1]**

Q3. **[1]**

(a) $2\sqrt{10}$ units. $d = \sqrt{(2\sqrt{5})^2 + (2\sqrt{5})^2} = \sqrt{20+20} = \sqrt{40} = 2\sqrt{10}$.

Q4. **[1]**

(c) 8 cm. $\angle L = 180^\circ - 130^\circ - 28^\circ = 22^\circ = \angle A$ and $\angle M = 130^\circ = \angle B$, so $\triangle LMN \sim \triangle ABC$ (AA) with $L \leftrightarrow A$, $M \leftrightarrow B$, $N \leftrightarrow C$. Then $\dfrac{LM}{AB} = \dfrac{LN}{AC}$, i.e. $\dfrac{45}{5} = \dfrac{72}{AC}$, so $AC = 8$ cm. **[1]**

Q5. **[1]**

(b) 45°. $\tan\theta = \dfrac{\text{height}}{\text{shadow}} = 1$, so $\theta = 45^\circ$. **[1]**

Q6. **[1]**

(c) $\dfrac{\pi+2}{\pi}$ units. $\pi r^2 = \pi r + 2r$, and dividing by $r \neq 0$ gives $\pi r = \pi + 2$, so $r = \dfrac{\pi+2}{\pi}$. **[1]**

Q7. **[1]**

(b) $\frac{7}{11}$. The word has 11 letters, of which 4 are vowels (O, A, I, I). So $P(\text{not a vowel}) = \frac{11-4}{11} = \frac{7}{11}$. **[1]**

Q8. **[1]**

(c) a positive irrational number. Expanding gives $(1+2\sqrt{3}+3) - (1-2\sqrt{3}+3) = 4\sqrt{3}$, which is positive and irrational.

Q9. **[1]**

(b) Substituting: $2 - 6 + a = 0$ gives $a = 4$; $2 + 6 - b = 0$ gives $b = 8$. So $2a = 8 = b$. **[1]**

Q10. **[1]**

(c) $1:2$. Let $AB = 4u$. Then $PQ = u$ and $QB = QR + RB = 2u$, so $PQ : QB = 1:2$. (The printed key $1:1$ is wrong: Q is the mid-point of AB, not of PB.)

Q11. **[1]**

(b) 60°. $\angle MLN = 90^\circ$ (angle in a semicircle), so $\angle LNM = 180^\circ - 90^\circ - 30^\circ = 60^\circ$. By the alternate segment theorem, $\angle RLM = \angle LNM = 60^\circ$.

Q12. **[1]**

(d) $\frac{4}{3}$. $\sec\theta = \frac{5}{4}$, so $\cos\theta = \frac{4}{5}$, $\sin\theta = \frac{3}{5}$ and $\cot\theta = \frac{4}{3}$. **[1]**

Q13. **[1]**

(a) $314\sqrt{2}$ cm^2. The cone has radius 10 cm and height 10 cm, so its slant height is $10\sqrt{2}$ cm. The curved surface is $\pi rl = 3.14 \times 10 \times 10\sqrt{2} = 314\sqrt{2}$ cm^2.

Q14. **[1]**

(c) 0.3. $\bar{u} = \dfrac{\bar{x} - a}{h} = \dfrac{64 - 62.5}{5} = 0.3.$ **[1]**

Q15. **[1]**

(c) 7. Both have $a_4 = a + 3d$ with the same d, so the difference is $(-1) - (-8) = 7$.

Q16. **[1]**

(a) $(0, 0)$. The perpendicular bisector passes through the mid-point of AB, which is $\left(\dfrac{-3+3}{2}, \dfrac{-4+4}{2}\right) = (0, 0)$. The other options are not equidistant from A and B: for example, $(0, 3)$ has squared distances $9 + 49 = 58$ from A and $9 + 1 = 10$ from B.

Q17. **[1]**

(b) 4 cm. The point of contact P is the midpoint of AB, so $AP = 8$ cm and $OP \perp AB$. Then $R^2 - r^2 = AP^2 = 64$, i.e. $(R - r)(R + r) = 64$, and with $R + r = 16$ we get $R - r = 4$ cm.

Q18. **[1]**

(b) $(0, -1)$. In a parallelogram the diagonals bisect each other, so $A + C = B + D$ and $D = A + C - B = (-2 + 8 - 6,\ 3 + 3 - 7) = (0, -1)$.

Q19. **[1]**

(a) Both A and R are true, and R explains A. Height $= 12 \sin 30^\circ = 12 \times \dfrac{1}{2} = 6$ m, which is the formula in R. **[1]**

Q20. **[1]**

(a) Both A and R are true, and R is the correct explanation of A. $(\operatorname{cosec}\theta - \cot\theta)(\operatorname{cosec}\theta + \cot\theta) = \operatorname{cosec}^2\theta - \cot^2\theta = 1$, which is exactly the reciprocal property. **[1]**

SECTION – B

Section B consists of 5 questions of 2 marks each.

Q21. **[2]**

The numbers are $4 \times 11 = 44$ and $5 \times 11 = 55$. **[1]**
LCM $= 2^2 \times 5 \times 11 = 220$. **[1]**

OR **[2]**

The required number is LCM$(644, 462)$. Since $644 = 2^2 \times 7 \times 23$ and $462 = 2 \times 3 \times 7 \times 11$, **[1]**
LCM $= 2^2 \times 3 \times 7 \times 11 \times 23 = 21252$. **[1]**

Q22. **[2]**

$AB^2 = (3-1)^2 + (4-1)^2 = 13$, $BC^2 = (1+8)^2 + (1-7)^2 = 117$ and $AC^2 = (3+8)^2 + (4-7)^2 = 130 = 13 + 117$, confirming the right angle at B. **[1]**
$\tan A = \dfrac{BC}{AB} = \sqrt{\dfrac{117}{13}} = 3.$ **[1]**

OR **[2]**

Let $A(-2, 3)$, $B(8, 3)$, $C(6, 7)$. Then $AB^2 = 10^2 = 100$, $BC^2 = (8 - 6)^2 + (3 - 7)^2 = 20$ and $AC^2 = (-2 - 6)^2 + (3 - 7)^2 = 80$. **[1]**
Since $AC^2 + BC^2 = 80 + 20 = 100 = AB^2$, the points are the vertices of a right-angled triangle, right-angled at C. **[1]**

Q23. **[2]**

Tangents from E to the larger circle give $AE = CE$ **[1/2]**
Tangents from E to the smaller circle give $BE = DE$ **[1/2]**. Adding, $AB = AE + EB = CE + ED = CD$ **[1]**

Q24. **[2]**

$4k = 3 - 2 \cdot 4 - 2 \cdot \frac{1}{3} = -\frac{17}{3}$ **[1]**. Hence $k = -\frac{17}{12}$ **[1]**.

Q25. **[2]**

The required number is LCM$(644, 462)$. Since $644 = 2^2 \times 7 \times 23$ and $462 = 2 \times 3 \times 7 \times 11$, **[1]**
LCM $= 2^2 \times 3 \times 7 \times 11 \times 23 = 21252$. **[1]**

OR **[2]**

The numbers are $4 \times 11 = 44$ and $5 \times 11 = 55$. **[1]**
LCM $= 2^2 \times 5 \times 11 = 220$. **[1]**

SECTION – C

Section C consists of 6 questions of 3 marks each.

Q26. **[3]**

Let lot A have x and lot B have y chocolates. Then $\frac{2}{3}x + y = 400$, i.e. $2x + 3y = 1200$. **[1]**
Also $x + \frac{4}{5}y = 460$, i.e. $5x + 4y = 2300$. **[1]**
Solving gives $x = 300$ and $y = 200$, so Anuj had 500 chocolates. **[1]**

OR **[3]**

Let the usual speed be x km/h and the scheduled time y hours, so the distance is xy km. $(x + 6)(y - 4) = xy$ gives $-2x + 3y = 12$. **[1]**
$(x - 6)(y + 6) = xy$ gives $x - y = 6$. **[1]**
Solving: $x = 30$, $y = 24$, so the distance is $30 \times 24 = 720$ km. **[1]**

Q27. **[3]**

LHS $= \dfrac{1 + \frac{1}{\sin A}}{\frac{1}{\sin A}} = \sin A + 1$ **[1]**. RHS $= \dfrac{1 - \sin^2 A}{1 - \sin A} = 1 + \sin A$ **[1]**. Hence LHS = RHS **[1]**.

OR **[3]**

$2A + B = 60°$ and $A + 2B = 45°$ **[1]**. Solving, $A = 25°$ and $B = 10°$ **[1]**. Then $4A - 7B = 30°$, so $\cot(4A - 7B) = \cot 30° = \sqrt{3}$ **[1]**.

Q28. **[3]**

The sample space is $\{HH, HT, TH, TT\}$. **[1]**
(i) Only TT has no head, so $P(\text{at least one head}) = \dfrac{3}{4}$. (ii) HH, HT, TH have at most one tail, so $P = \dfrac{3}{4}$. **[1]**
(iii) HT and TH give a head and a tail, so $P = \dfrac{2}{4} = \dfrac{1}{2}$. **[1]**

Q29. **[3]**

Let the first pole be y m and the second pole x m high. From the foot of the second pole, $\tan 60° = \dfrac{y}{20}$, so $y = 20\sqrt{3}$. **[1]**
From the foot of the first pole, $\tan 30° = \dfrac{x}{20}$, so $x = \dfrac{20}{\sqrt{3}}$. **[1]**
Difference $y - x = 20\sqrt{3} - \dfrac{20}{\sqrt{3}} = \dfrac{40}{\sqrt{3}} = \dfrac{40\sqrt{3}}{3} \approx 23.09$ m. **[1]**

OR **[3]**

Let P be the top of the building and Q the point of the building at the boy's eye level, so the eye is 1.7 m above the ground and $QR = 1.7$ m where R is the foot of the building. In the right triangle PQA, with A the boy's eye level point 50 m from the building: $\tan 60^\circ = \dfrac{PQ}{50}$, so $PQ = 50\sqrt{3} = 86.5$ m. **[2]**

Height of the building $PR = PQ + QR = 86.5 + 1.7 = 88.2$ m. **[1]**

Q30. **[3]**

The modal class is 60–70: $l = 60$, $h = 10$, $f_1 = 15$, $f_0 = x$, $f_2 = 12$. **[1]**

$67 = 60 + \dfrac{15 - x}{30 - x - 12} \times 10$, so $\dfrac{15 - x}{18 - x} = \dfrac{7}{10}$. **[1]**

$150 - 10x = 126 - 7x$, so $x = 8$. **[1]**

Q31. **[3]**

$\dfrac{N}{2} = 125$. The cumulative frequencies are $40, 120, 182$, so the median class is 2–3, with $l = 2$, $cf = 120$, $f = 62$, $h = 1$. **[1]**

Median $= 2 + \dfrac{125 - 120}{62} \times 1 = 2 + \dfrac{5}{62} = \dfrac{129}{62} \approx 2.08$ m. **[1]**

Interpretation: half of the students jumped less than 2.08 m and half jumped more. **[1]**

SECTION – D

Section D consists of 4 questions of 5 marks each.

Q32. **[5]**

$3x + y + 4 = 0$ gives $y = -3x - 4$: points $(-2, 2)$, $(-1, -1)$, $(0, -4)$. $3x - y + 2 = 0$ gives $y = 3x + 2$: points $(-2, -4)$, $(-1, -1)$, $(0, 2)$. **[1]**

Plot both lines on the same axes. **[2]**

They intersect at $(-1, -1)$, so the solution is $x = -1$, $y = -1$. **[1]**

Check: $3(-1) + (-1) + 4 = 0$ and $3(-1) - (-1) + 2 = 0$. **[1]**

OR **[5]**

Let c be the number of correct answers and w the number of wrong answers. Then $3c - w = 40$. **[1]**

Also $4c - 2w = 50$, i.e. $2c - w = 25$. **[1]**

Subtracting gives $c = 15$. **[1]**

So $w = 5$. **[1]**

Total number of questions $= c + w = 20$. **[1]**

Q33. **[5]**

Statement and figure: let $DE \parallel BC$ with D on AB and E on AC. Join BE and CD. **[1]**

$\text{ar}(BDE) = \text{ar}(CDE)$, since they have the common base DE and lie between the same parallels DE and BC. **[1]**

Let h be the perpendicular distance from E to AB. Then $\text{ar}(ADE) = \frac{1}{2} AD \cdot h$ and $\text{ar}(BDE) = \frac{1}{2} DB \cdot h$, so $\dfrac{\text{ar}(ADE)}{\text{ar}(BDE)} = \dfrac{AD}{DB}$. **[1]**

Let k be the perpendicular distance from D to AC. Similarly $\dfrac{\text{ar}(ADE)}{\text{ar}(CDE)} = \dfrac{AE}{EC}$. **[1]**

Since $\text{ar}(BDE) = \text{ar}(CDE)$, we get $\dfrac{AD}{DB} = \dfrac{AE}{EC}$. **[1]**

OR **[5]**

Statement: a line parallel to one side of a triangle divides the other two sides in the same ratio. **[1]**

Join AF, meeting m at G. In $\triangle ACF$, $BG \parallel CF$ (since $m \parallel n$), so $\dfrac{AB}{BC} = \dfrac{AG}{GF}$. **[1]**

In $\triangle AFD$, $GE \parallel AD$ (since $m \parallel l$), so $\dfrac{AG}{GF} = \dfrac{DE}{EF}$. **[1]**

Hence $\frac{AB}{BC} = \frac{DE}{EF}$. [1]
Construction and figure: [1]

Q34. **[5]**

$a + 2d = 12$ and $a + 49d = 106$ [1]
Subtracting, $47d = 94$, so $d = 2$ and $a = 8$ [1]
$a_{29} = 8 + 28 \times 2 = 64$ [1]
$S_{50} = \frac{50}{2}(8 + 106) = 25 \times 114 = 2850$ [2]

Q35. **[5]**

Figure with given, to prove and construction: [1]
Equal tangents: $OP \perp AB$, $OQ \perp AC$ and $OP = OQ$ give $\triangle OPA \cong \triangle OQA$ (RHS), so $AP = AQ$ [1], [1]
With the incircle touching AB, AC, BC at P, Q, R: $AB = AC$ and $AP = AQ$ give $BP = CQ$ [1]
Then $BR = BP = CQ = CR$, so R bisects BC [1]

OR **[5]**

Figure with given, to prove and construction: [1]
Proof of equal tangents from the two tangents AP and AQ with the radii: $\triangle OPA \cong \triangle OQA$ (RHS), so $AP = AQ$ [1],[1]
$AR = AQ = 7$ cm, so $BR = BP = AB - AR = 3$ cm [1/2]
$CP = CQ = 5$ cm [1/2]
$BC = BP + PC = 3 + 5 = 8$ cm [1/2], [1/2]

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. **[4]**

(i) June: $10x + 15y = 12750$, i.e. $2x + 3y = 2550$. [1]
(ii) July: $12x + 17y = 34250$. [1]
(iii) OR (July): $x + y = 2500$ and $12x + 17y = 34250$. Multiply the first equation by 12 and subtract: $5y = 4250$, so $y = 850$ and $x = 1650$. [1] Small bottles: 1650; large bottles: 850. [1]

Q37. **[4]**

(i) Triangle OAP is isosceles with $OA = OP$ and $\angle OAP = \angle PAB = 30°$, so $\angle OPA = 30°$ and $\angle POA = 180° - 60° = 120°$. [1]
(ii) The arc is $\frac{1}{2} \times 2 \times \frac{22}{7} \times 35 = 110$ m and the diameter is 70 m, so the wire needed is $110 + 70 = 180$ m. [1]
(iii) OR: Arc AP subtends $120°$ at O, so its length is $\frac{120}{360} \times 2 \times \frac{22}{7} \times 35 = \frac{220}{3} \approx 73.33$ m. [1]
Chord $AP = 2 \times 35 \times \sin 60° = 35\sqrt{3} \approx 60.62$ m, so the wire needed is $\frac{220}{3} + 35\sqrt{3} \approx 133.96$ m. [1]

Q38. **[4]**

(i) The volume is $30 \times 32 \times 15 = 14400$ cm^3. [1]
(ii) The surface area of one packet is $2(15 \times 8 + 8 \times 5 + 15 \times 5) = 2(120 + 40 + 75) = 470$ cm^2. [1]
(iii) OR: the volume of the cup is $\pi r^2 h = \frac{22}{7} \times (2.5)^2 \times 7 = 137.5$ cm^3, that is 137.5 mL. [2]

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