

CBSE Class 10 — Mathematics (Standard) (Code 041)

Full Syllabus Paper | Set D | Session 2026-27

Time Allowed: 3 Hours

Maximum Marks: 80

General Instructions

- This question paper contains 38 questions in 5 sections. All questions are compulsory.
- Section A (20 marks): 18 multiple-choice questions and 2 Assertion-Reason questions of 1 mark each.
- Section B (10 marks): 5 questions of 2 marks each.
- Section C (18 marks): 6 questions of 3 marks each.
- Section D (20 marks): 4 questions of 5 marks each.
- Section E (12 marks): 3 case-based questions of 4 marks each, with sub-parts.
- There is no negative marking.
- The 20-mark Internal Assessment component is evaluated separately and is not part of this written paper.
- The internal choices given in some board-paper questions are not reproduced; every question in this paper is to be attempted.
- This is an original practice paper written to the CBSE question paper design (unchanged for 2025-26 and 2026-27); it is not a reproduction of any official paper.

SECTION A (QUESTIONS 1-20, 20 MARKS)

1. Given that $\text{HCF}(306, 657) = 9$, $\text{LCM}(306, 657)$ is: 1 mark
(a) 22338 (b) 22828
(c) 20438 (d) 23338
2. The least number that is divisible by every one of the numbers from 1 to 10 is: 1 mark
(a) 5040 (b) 2520
(c) 1260 (d) 10080
3. If α and β are the zeroes of $x^2 - 5x + 6$, then the value of $1/\alpha + 1/\beta - 2\alpha\beta$ is: 1 mark
(a) $67/6$ (b) $-61/6$
(c) $-67/6$ (d) $-77/6$
4. The value of k for which the equations $2x + 3y = 7$ and $(k - 1)x + (k + 2)y = 3k$ have infinitely many solutions is: 1 mark
(a) 1 (b) -7
(c) 7 (d) 5
5. A fraction becomes $9/11$ if 2 is added to both its numerator and denominator, and becomes $5/6$ if 3 is added to both. The fraction is: 1 mark
(a) $7/9$ (b) $5/7$
(c) $9/11$ (d) $3/4$
6. The values of k for which the equation $2x^2 + kx + 3 = 0$ has two equal real roots are: 1 mark
(a) $\pm\sqrt{6}$ (b) ± 6
(c) ± 24 (d) $\pm 2\sqrt{6}$
7. The sum of the first n terms of an AP is $3n^2 + 5n$. Its 10th term is: 1 mark
(a) 350 (b) 58
(c) 66 (d) 62

- 8.** The number of three-digit numbers that are divisible by 7 is: 1 mark
 (a) 127 (b) 128
 (c) 129 (d) 126
- 9.** The ratio in which the y-axis divides the line segment joining (5, -6) and (-1, -4) is: 1 mark
 (a) 1 : 5 (b) 6 : 1
 (c) 5 : 1 (d) 1 : 6
- 10.** If the point P(x, y) is equidistant from A(5, 1) and B(-1, 5), then: 1 mark
 (a) $2x = 3y$ (b) $x = y$
 (c) $3x + 2y = 0$ (d) $3x = 2y$
- 11.** In triangle ABC, DE is parallel to BC, with D on AB and E on AC. If $AD/DB = 3/5$ and AC = 5.6 cm, then AE is: 1 mark
 (a) 2.1 cm (b) 3.5 cm
 (c) 2.4 cm (d) 1.8 cm
- 12.** Two concentric circles have radii 5 cm and 3 cm. The length of the chord of the larger circle that touches the smaller circle is: 1 mark
 (a) 4 cm (b) 6 cm
 (c) 10 cm (d) 8 cm
- 13.** If $3 \cot A = 4$, then the value of $(1 - \tan^2 A)/(1 + \tan^2 A)$ is: 1 mark
 (a) $9/25$ (b) $7/25$
 (c) $16/25$ (d) $1/7$
- 14.** The shadow of a tower on level ground is 40 m longer when the sun's altitude is 30° than when it is 60° . The height of the tower is: 1 mark
 (a) $40\sqrt{3}$ m (b) 20 m
 (c) $20\sqrt{3}$ m (d) $40/\sqrt{3}$ m
- 15.** The minute hand of a clock is 14 cm long. The area swept by it in 5 minutes is (take $\pi = 22/7$): 1 mark
 (a) $77/3 \text{ cm}^2$ (b) $154/3 \text{ cm}^2$
 (c) 154 cm^2 (d) $308/3 \text{ cm}^2$
- 16.** Two cubes, each of volume 64 cm^3 , are joined end to end. The surface area of the resulting cuboid is: 1 mark
 (a) 192 cm^2 (b) 128 cm^2
 (c) 160 cm^2 (d) 96 cm^2
- 17.** For a moderately skewed distribution, the mode is 24 and the mean is 60. Using the empirical relation, the median is: 1 mark
 (a) 42 (b) 48
 (c) 36 (d) 84
- 18.** Two dice are thrown together. The probability that the product of the numbers on the top faces is a perfect square is: 1 mark
 (a) $2/9$ (b) $1/6$
 (c) $1/4$ (d) $7/36$

- 19.** Assertion (A): For any natural number n , the number 6^n can never end with the digit 0. 1 mark
Reason (R): A number ends with the digit 0 only if its prime factorisation contains both 2 and 5.
(a) Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
(b) Both Assertion (A) and Reason (R) are true, but R is NOT the correct explanation of A
(c) Assertion (A) is true, but Reason (R) is false
(d) Assertion (A) is false, but Reason (R) is true
- 20.** Assertion (A): The point $(-1, 6)$ divides the line segment joining $(-3, 10)$ and $(6, -8)$ in the ratio 2 : 7. 1 mark
Reason (R): The distance between the points $(-3, 10)$ and $(6, -8)$ is $9\sqrt{5}$ units.
(a) Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
(b) Both Assertion (A) and Reason (R) are true, but R is NOT the correct explanation of A
(c) Assertion (A) is true, but Reason (R) is false
(d) Assertion (A) is false, but Reason (R) is true

SECTION B (QUESTIONS 21-25, 10 MARKS)

- 21.** Prove that $3 + 2\sqrt{5}$ is irrational, given that $\sqrt{5}$ is irrational. 2 marks
- 22.** If α and β are the zeroes of $p(x) = 2x^2 - 5x + 3$, find a quadratic polynomial whose zeroes are $2\alpha + 1$ and $2\beta + 1$. 2 marks
- 23.** Five years hence, the age of Jacob will be three times that of his son. Five years ago, Jacob's age was seven times that of his son. Find their present ages. 2 marks
- 24.** Find the coordinates of the points of trisection of the line segment joining $A(4, -1)$ and $B(-2, -3)$. 2 marks
- 25.** A box contains cards numbered 11 to 123. A card is drawn at random. Find the probability that the number on the card is (i) a perfect square, (ii) a multiple of 7. 2 marks

SECTION C (QUESTIONS 26-31, 18 MARKS)

- 26.** A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train. 3 marks
- 27.** The sum of the first 7 terms of an AP is 49 and the sum of its first 17 terms is 289. Find the sum of its first n terms. 3 marks
- 28.** In triangle ABC, D and E are points on AB and AC respectively such that DE is parallel to BC. If $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = x - 1$, find the value of x . 3 marks
- 29.** A quadrilateral ABCD is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$. 3 marks
- 30.** Prove that $(\sin A - 2 \sin^3 A)/(2 \cos^3 A - \cos A) = \tan A$. 3 marks
- 31.** The mean of the following distribution is 18. Find the missing frequency f . Class: 11-13, 13-15, 15-17, 17-19, 19-21, 21-23, 23-25; Frequency: 7, 6, 9, 13, f , 5, 4. 3 marks

SECTION D (QUESTIONS 32-35, 20 MARKS)

- 32.** A motorboat whose speed in still water is 18 km/h takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream. 5 marks
- 33.** State and prove the Basic Proportionality Theorem. Using it, show that in a trapezium ABCD with AB parallel to DC, whose diagonals meet at O, $AO/BO = CO/DO$. 5 marks

34. The angles of depression of the top and the bottom of an 8 m tall building from the top of a multi-storeyed building are 30° and 45° respectively. Find the height of the multi-storeyed building and the distance between the two buildings. 5 marks
35. A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Find the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volumes of the cylinder and the toy (take $\pi = 3.14$). 5 marks

SECTION E (QUESTIONS 36-38, 12 MARKS)

A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the seventh year. Assume that the production increases uniformly by a fixed number every year.

36. (i) The number of TV sets produced in the first year is: 1 mark
 (a) 550 (b) 525
 (c) 575 (d) 600
- (ii) Find the number of TV sets produced in the 10th year. 1 mark
- (iii) Find the total number of TV sets produced in the first 7 years. 2 marks

In a classroom, four friends are seated at the points A(3, 4), B(6, 7), C(9, 4) and D(6, 1). Their teacher asks whether ABCD is a square.

37. (i) The distance between A and B is: 1 mark
 (a) $3\sqrt{2}$ units (b) 3 units
 (c) 6 units (d) $2\sqrt{3}$ units
- (ii) Is ABCD a square? Justify your answer. 1 mark
- (iii) Find the coordinates of the point where the diagonals of ABCD meet, and the area of ABCD. 2 marks

In a game of chance, a fair coin is tossed three times. Rani wins if she gets all heads or all tails, and loses otherwise.

38. (i) The probability that Rani loses the game is: 1 mark
 (a) $1/4$ (b) $1/2$
 (c) $1/8$ (d) $3/4$
- (ii) Find the probability of getting exactly two heads. 1 mark
- (iii) Find the probability of getting (i) at least one tail, (ii) more heads than tails. 2 marks

MASTER TESTING AGENCY**Answer Key**

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SECTION A

1.	(a) 22338
2.	(b) 2520
3.	(c) $-67/6$
4.	(c) 7
5.	(a) $7/9$
6.	(d) $\pm 2\sqrt{6}$
7.	(d) 62
8.	(b) 128
9.	(c) 5 : 1
10.	(d) $3x = 2y$
11.	(a) 2.1 cm
12.	(d) 8 cm
13.	(b) $7/25$
14.	(c) $20\sqrt{3}$ m
15.	(b) $154/3$ cm ²
16.	(c) 160 cm ²
17.	(b) 48
18.	(a) $2/9$
19.	(a) Both Assertion (A) and Reason (R) are true, and R is the correct explanation of A
20.	(b) Both Assertion (A) and Reason (R) are true, but R is NOT the correct explanation of A

SECTION B

21.	Model answer / value points Suppose $3 + 2\sqrt{5} = a/b$, where a and b are co-prime integers and b is not 0 ($\frac{1}{2}$). Then $\sqrt{5} = (a - 3b)/(2b)$ ($\frac{1}{2}$). The right-hand side is rational, so $\sqrt{5}$ would be rational ($\frac{1}{2}$), which contradicts the fact that $\sqrt{5}$ is irrational. Hence $3 + 2\sqrt{5}$ is irrational ($\frac{1}{2}$).
22.	Model answer / value points $\alpha + \beta = 5/2$ and $\alpha\beta = 3/2$ ($\frac{1}{2}$). Sum of new zeroes = $2(\alpha + \beta) + 2 = 7$ ($\frac{1}{2}$). Product = $4\alpha\beta + 2(\alpha + \beta) + 1 = 6 + 5 + 1 = 12$ ($\frac{1}{2}$). Required polynomial: $x^2 - 7x + 12$ (or any non-zero multiple of it) ($\frac{1}{2}$).
23.	Model answer / value points Let the present ages be x (Jacob) and y (son). $x + 5 = 3(y + 5)$, so $x - 3y = 10$; $x - 5 = 7(y - 5)$, so $x - 7y = -30$ (1). Subtracting, $4y = 40$, so $y = 10$ and $x = 40$. Jacob is 40 years and his son 10 years old (1).
24.	Model answer / value points The points divide AB in the ratios 1 : 2 and 2 : 1. $P = ((1(-2) + 2(4))/3, (1(-3) + 2(-1))/3) = (2, -5/3)$ (1). $Q = ((2(-2) + 1(4))/3, (2(-3) + 1(-1))/3) = (0, -7/3)$ (1).
25.	Model answer / value points Total outcomes = $123 - 11 + 1 = 113$. (i) Perfect squares: 16, 25, 36, 49, 64, 81, 100, 121, i.e. 8 numbers, so $P = 8/113$ (1). (ii) Multiples of 7: 14, 21, ..., 119, i.e. 16 numbers, so $P = 16/113$ (1).

SECTION C

26.	Model answer / value points Let the speed be x km/h. $360/x - 360/(x + 5) = 1$ (1). So $1800 = x(x + 5)$, i.e. $x^2 + 5x - 1800 = 0$ (1). $(x + 45)(x - 40) = 0$; speed cannot be negative, so $x = 40$ km/h (1).
27.	Model answer / value points $S_7 = (7/2)(2a + 6d) = 49$ gives $a + 3d = 7$; $S_{17} = (17/2)(2a + 16d) = 289$ gives $a + 8d = 17$ (1). So $d = 2$ and $a = 1$ (1). $S_n = (n/2)[2(1) + (n - 1)2] = n^2$ (1).
28.	Model answer / value points By the Basic Proportionality Theorem, $AD/DB = AE/EC$, so $x/(x - 2) = (x + 2)/(x - 1)$ (1). $x(x - 1) = (x + 2)(x - 2)$, i.e. $x^2 - x = x^2 - 4$ (1). Hence $x = 4$ (1).
29.	Model answer / value points Let the circle touch AB, BC, CD and DA at P, Q, R and S. Tangents from an external point are equal: $AP = AS$, $BP = BQ$, $CR = CQ$, $DR = DS$ (1). Adding: $(AP + BP) + (CR + DR) = (AS + DS) + (BQ + CQ)$ (1), i.e. $AB + CD = AD + BC$ (1).
30.	Model answer / value points $LHS = \sin A(1 - 2 \sin^2 A)/[\cos A(2 \cos^2 A - 1)]$ (1). Since $1 - 2 \sin^2 A = 1 - 2(1 - \cos^2 A) = 2 \cos^2 A - 1$ (1), $LHS = \sin A/\cos A = \tan A = RHS$ (1).
31.	Model answer / value points Class marks: 12, 14, 16, 18, 20, 22, 24. Sum of $f = 44 + f$; sum of $fx = 84 + 84 + 144 + 234 + 20f + 110 + 96 = 752 + 20f$ ($1\frac{1}{2}$). Mean = $(752 + 20f)/(44 + f) = 18$, so $752 + 20f = 792 + 18f$ (1), giving $f = 20$ ($\frac{1}{2}$).

SECTION D

32.	Model answer / value points Let the speed of the stream be x km/h. Upstream speed = $18 - x$, downstream speed = $18 + x$ (1). $24/(18 - x) - 24/(18 + x) = 1$ (1). So $48x = 324 - x^2$, i.e. $x^2 + 48x - 324 = 0$ (1). $(x + 54)(x - 6) = 0$ (1). Speed cannot be negative, so the stream flows at 6 km/h (1).
33.	Model answer / value points Statement (1). Proof: join BE and CD, draw the perpendiculars, and use $\text{ar}(\triangle ADE)/\text{ar}(\triangle BDE) = AD/DB$ and $\text{ar}(\triangle ADE)/\text{ar}(\triangle DEC) = AE/EC$ with $\text{ar}(\triangle BDE) = \text{ar}(\triangle DEC)$ (triangles on the same base DE between the same parallels) to get $AD/DB = AE/EC$ (2). Application: draw OE parallel to AB (and DC) meeting AD at E. In triangle ADC, $AE/ED = AO/OC$; in triangle DAB, $AE/ED = BO/OD$. Hence $AO/OC = BO/OD$, i.e. $AO/BO = CO/DO$ (2).
34.	Model answer / value points Let the height be H m and the distance d m (diagram, 1). From the bottom: $\tan 45^\circ = H/d$, so $d = H$ (1). From the top: $\tan 30^\circ = (H - 8)/d$, so $H - 8 = H/\sqrt{3}$ (1). $H(\sqrt{3} - 1) = 8\sqrt{3}$, so $H = 8\sqrt{3}/(\sqrt{3} - 1) = 4\sqrt{3}(\sqrt{3} + 1) = 12 + 4\sqrt{3}$ m, about 18.93 m (1). The distance between the buildings is also $12 + 4\sqrt{3}$ m (1).
35.	Model answer / value points $r = 2$ cm. Volume of cone = $(1/3)\pi r^2 h = (1/3)(3.14)(4)(2) = 8.37 \text{ cm}^3$; volume of hemisphere = $(2/3)\pi r^3 = 16.75 \text{ cm}^3$ (2). Volume of toy = $8\pi = 25.12 \text{ cm}^3$ (1). The cylinder has radius 2 cm and height $2 + 2 = 4$ cm, so its volume = $\pi(4)(4) = 50.24 \text{ cm}^3$ (1). Difference = $50.24 - 25.12 = 25.12 \text{ cm}^3$ (1).

SECTION E

36(i).	(a) 550
36(ii).	Model answer / value points $a + 2d = 600$ and $a + 6d = 700$ give $d = 25$ and $a = 550$. $a_{10} = a + 9d = 550 + 225 = 775$ sets.
36(iii).	Model answer / value points $S_7 = (7/2)[2(550) + 6(25)]$ (1) = $(7/2)(1250) = 4375$ sets (1).
37(i).	(a) $3\sqrt{2}$ units
37(ii).	Model answer / value points

	AB = BC = CD = DA = $3\sqrt{2}$ and the diagonals AC = BD = 6 units. All sides are equal and the diagonals are equal, so ABCD is a square.
37(iii).	Model answer / value points The diagonals bisect each other at the mid-point of AC: $((3 + 9)/2, (4 + 4)/2) = (6, 4)$ (1). Area = (side) ² = $(3\sqrt{2})^2 = 18$ square units (1).
38(i).	(d) 3/4
38(ii).	Model answer / value points Outcomes: HHH, HHT, HTH, THH, HTT, THT, TTH, TTT (8). Exactly two heads: HHT, HTH, THH, so P = 3/8.
38(iii).	Model answer / value points (i) Only HHH has no tail, so P(at least one tail) = $1 - 1/8 = 7/8$ (1). (ii) HHH, HHT, HTH, THH: P = $4/8 = 1/2$ (1).