CBSE Class 10 Mathematics · Sample Paper 5 (2026-27 pattern)

Time: 3 hours · Maximum marks: 80 · CBSE Math Revision (not an official CBSE paper)

General instructions

1. This question paper contains 38 questions. All questions are compulsory.
2. The paper is divided into five sections: A, B, C, D and E.
3. Section A: questions 1–18 are MCQs and questions 19–20 are Assertion–Reason based, 1 mark each.
4. Section B: questions 21–25 are very short answer (VSA) questions of 2 marks each.
5. Section C: questions 26–31 are short answer (SA) questions of 3 marks each.
6. Section D: questions 32–35 are long answer (LA) questions of 5 marks each.
7. Section E: questions 36–38 are case study based questions of 4 marks each, with sub-parts of 1, 1 and 2 marks.
8. There is no overall choice. Internal choice is provided in 2 questions of Section B, 2 of Section C, 2 of Section D and in the 2-mark sub-part of each case study in Section E.
9. Draw neat figures wherever required. Take $\pi = \dfrac{22}{7}$ wherever required, unless stated otherwise.
10. Use of calculators is not allowed.

Section A

20 marks

Questions 1 to 20 carry 1 mark each. Questions 1 to 18 are multiple choice questions (MCQs); questions 19 and 20 are Assertion–Reason based questions.

1. If $a > b$ are natural numbers, the LCM of $2^a \times 3^b$ and $2^b \times 3^a$ is **1**

(a) 6^b **(b)** 6^a

(c) $2^a \times 3^b$ **(d)** 6^{a+b}

2. If α, β are the zeroes of $x^2 - px + q$ $(q \neq 0)$, then $\dfrac{\alpha}{\beta} + \dfrac{\beta}{\alpha}$ equals **1**

(a) $\dfrac{p^2 - 2q}{q}$ **(b)** $\dfrac{p^2 + 2q}{q}$

(c) $\dfrac{p^2 - 2q}{p}$ **(d)** $\dfrac{q^2 - 2p}{q}$

3. The lines $3x + 2ky = 2$ and $2x + 5y + 1 = 0$ are parallel (distinct) when k equals **1**

(a) $\dfrac{4}{15}$ **(b)** $-\dfrac{15}{4}$

(c) $\dfrac{15}{4}$ **(d)** $\dfrac{5}{3}$

4. The quadratic equation $x^2 - kx + 8 = 0$ has real roots, one of which is the square of the other. The value of k is **1**

(a) 4 **(b)** 6

(c) 8 **(d)** 12

5. A quadratic equation whose roots are $2 + \sqrt{3}$ and $2 - \sqrt{3}$ is **1**

(a) $x^2 - 4x + 1 = 0$ **(b)** $x^2 + 4x + 1 = 0$

(c) $x^2 - 4x - 1 = 0$ **(d)** $x^2 - 4x + 7 = 0$

6. An AP has 21 terms and its middle term is 12. The sum of all its terms is **1**

(a) 126 **(b)** 240

(c) 252 **(d)** 264

7. Which of the following points is equidistant from $A(1, 3)$ and $B(5, -1)$? **1**

(a) $(5, 3)$ **(b)** $(3, 3)$

(c) $(0, 0)$ **(d)** $(4, 4)$

8. The line $x + y = 4$ divides the segment joining $(-1, 1)$ and $(5, 7)$ in the ratio **1**

(a) $1 : 2$ **(b)** $2 : 1$

(c) $1 : 3$ **(d)** $3 : 1$

9. $\triangle ABC \sim \triangle DEF$ with $AB = 3x$ cm, $DE = 6$ cm, $BC = 12$ cm and $EF = (2x + 2)$ cm. The value of x is **1**

(a) 2 **(b)** 3

(c) 4 **(d)** 6

10. In $\triangle ABC$, $\angle B = 90^\circ$ and $BD \perp AC$. If $AD = 4$ cm and $DC = 9$ cm, then BD is **1**

(a) 5 cm **(b)** 6 cm

(c) 6.5 cm **(d)** $\dfrac{36}{13}$ cm

11. A circle is inscribed in a right triangle with sides 9 cm, 40 cm and 41 cm. Its radius is **1**

(a) 3 cm **(b)** 4 cm

(c) 4.5 cm **(d)** 5 cm

12. PA and PB are tangents from P to a circle with centre O, and $\angle AOB = 2\angle APB$. Then $\angle APB$ is **1**

(a) 45° **(b)** 60°

(c) 90° **(d)** 120°

13. If $\tan\theta = \dfrac{a}{b}$, then $\dfrac{a\sin\theta - b\cos\theta}{a\sin\theta + b\cos\theta}$ equals **1**

(a) $\dfrac{a^2 - b^2}{a^2 + b^2}$ **(b)** $\dfrac{a^2 + b^2}{a^2 - b^2}$

(c) $\dfrac{a - b}{a + b}$ **(d)** 1

14. If $\sin\theta + \cos\theta = \sqrt{2}$ for acute θ, then $\tan\theta + \cot\theta$ equals **1**

(a) 1 **(b)** $\sqrt{2}$

(c) 2 **(d)** $2\sqrt{2}$

15. A cylinder and a cone have equal base radii and equal heights, and their curved surface areas are in the ratio $8 : 5$. The ratio of radius to height is **1**

(a) $3 : 4$ **(b)** $4 : 3$

(c) $5 : 4$ **(d)** $8 : 5$

16. The ratio of the total surface area of a solid hemisphere to the surface area of a sphere of the same radius is **1**

(a) $1 : 2$ **(b)** $2 : 3$

(c) $3 : 4$ **(d)** $1 : 1$

17. A 90° sector is cut out of a circular sheet of radius 14 cm. The perimeter of the remaining (major) sector is $\left(\pi = \frac{22}{7}\right)$ **1**

(a) 66 cm **(b)** 80 cm

(c) 94 cm **(d)** 116 cm

18. A number x is chosen at random from $1, 2, 3, 4$ and a number y at random from $2, 3, 5$. The probability that $x + y$ is a prime number is **1**

(a) $\frac{1}{3}$ **(b)** $\frac{5}{12}$

(c) $\frac{1}{2}$ **(d)** $\frac{7}{12}$

19. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option. **1**

Assertion (A): The equation $x^2 + 3x + 5 = 0$ has no real roots.

Reason (R): If the sum of the roots of a quadratic equation is negative, its roots are not real.

(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.

20. In the following question, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option. **1**

Assertion (A): For an acute angle θ, $\tan\theta$ can be greater than 100.

Reason (R): $\tan\theta = \frac{\sin\theta}{\cos\theta}$, and for acute θ close to 90°, $\cos\theta$ is positive and as small as we like while $\sin\theta$ is close to 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

10 marks

Questions 21 to 25 are very short answer (VSA) type questions carrying 2 marks each. Internal choice is provided in 2 questions.

21. Let $a = 2^3 \times 3$, $b = 2 \times 3 \times 5$ and $c = 3^n \times 5$, where n is a natural number. If $\text{LCM}(a, b, c) = 2^3 \times 3^2 \times 5$, find n and $\text{HCF}(a, b, c)$. **2**

22. If α and β are the zeroes of $x^2 - 7x + k$ and $2\alpha - 3\beta = 4$, find k. **2**

OR

Find the zeroes of $x^2 - 3\sqrt{3}\,x + 6$ and verify the relationship between the zeroes and the coefficients.

23. Find all acute angles θ satisfying $2\sin^2\theta - 3\sin\theta + 1 = 0$. **2**

24. An arc of a circle subtends an angle of 72° at the centre and has length 8.8 cm. Find the radius of the circle and the area of the sector. $\left(\pi = \dfrac{22}{7}\right)$ **2**

25. All two-digit numbers that can be formed from the digits $2, 3, 5$ (repetition allowed) are written on identical cards, and one card is drawn at random. Find the probability that the number is (i) prime, (ii) divisible by 5. **2**

OR

In a class of 40 students, 25 play cricket, 20 play football and 10 play both. A student is chosen at random. Find the probability that the student plays (i) neither game, (ii) exactly one of the two games.

Section C

18 marks

Questions 26 to 31 are short answer (SA) type questions carrying 3 marks each. Internal choice is provided in 2 questions.

26. Let a and b be natural numbers with $\mathrm{HCF}(a, b) = 1$. Using prime factorisation, prove that $\mathrm{HCF}(a + b, ab) = 1$. Verify the result for $a = 12$, $b = 35$. **3**

27. Find the values of k for which $(k+1)x^2 - 2(k-1)x + 1 = 0$ has equal roots. For each such k, find the root. **3**

28. In parallelogram $ABCD$, E is a point on AD with $AE : ED = 1 : 2$. BE meets the diagonal AC at F. Prove that $\triangle AFE \sim \triangle CFB$, and find $AF : FC$ and $EF : FB$. If $AC = 16$ cm, find AF. **3**

29. PA and PB are tangents from P to a circle with centre O, and $\angle APB = 50^\circ$. C is a point on the minor arc AB; the tangent at C meets PA at D and PB at E. Prove that $\angle DOE = \dfrac{1}{2}\angle AOB$, and find $\angle DOE$. **3**

30. Prove that $(\sin\theta + \cos\theta + 1)(\sin\theta + \cos\theta - 1)\sec\theta\,\mathrm{cosec}\,\theta = 2$. **3**

OR

If $\sin\theta = \dfrac{a^2 - b^2}{a^2 + b^2}$, where $a > b > 0$ and θ is acute, find $\sec\theta + \tan\theta$ in terms of a and b.

31. The mode of the following distribution is 36. Find the missing frequency f. **3**

Class	10–20	20–30	30–40	40–50	50–60
Frequency	5	f	20	14	6

OR

Two fair dice are thrown together. Find the probability that (i) the sum is a perfect square; (ii) the larger of the two numbers is 4; (iii) the product is at most 6.

Section D

20 marks

Questions 32 to 35 are long answer (LA) type questions carrying 5 marks each. Internal choice is provided in 2 questions.

32. Consider the AP $40, 36, 32, \ldots$. (a) How many terms must be taken for the sum to be 220? Explain why there are two answers. (b) What is the greatest possible value of the sum of the first n terms? Justify. **5**

OR

A charity show in Kolkata sold 350 tickets and collected ₹47,000. Adult tickets cost ₹160 and child tickets ₹100. (a) Find the number of tickets of each kind sold. (b) The next day the adult price is raised by ₹20 and the child price cut by ₹10, and the same numbers are sold. Find the new collection and the change in collection.

33. In $\triangle ABC$, D is a point on BC with $BD : DC = 3 : 2$, and E is the mid-point of AD. BE produced meets AC at F. By drawing $DG \parallel BF$ to meet AC at G, find (a) $AF : FC$, (b) $BE : EF$. **5**

OR

Prove that the lengths of the tangents drawn from an external point to a circle are equal. Using this, find the radius of the circle inscribed in an isosceles triangle ABC with $AB = AC = 13$ cm and $BC = 10$ cm.

34. From a solid cylinder of radius 6 cm and height 15 cm, a conical cavity of the same radius and height 8 cm is hollowed out at one end. (a) Find the volume of the remaining solid. (b) Find its total surface area. (c) By what percentage is this surface area greater than that of the original solid cylinder? (Leave answers in terms of π where appropriate.) **5**

35. The marks (out of 60) of 80 students in a class test are summarised in a 'less than' cumulative frequency table. **5**

Marks less than	10	20	30	40	50	60
Number of students	6	16	30	50	66	80

(a) Write the frequency distribution. (b) Find the median. (c) Find the mode. (d) Some students who took the test late all scored in the class 50–60. What is the least number of such students who must be added for the median to exceed 40?

Section E

12 marks

Questions 36 to 38 are case study based questions carrying 4 marks each (1 + 1 + 2). Internal choice is provided in the 2-mark sub-part of each case study.

36. **Kite festival.** At the Uttarayan kite festival in Ahmedabad, Kabir flies a kite on a taut, straight string 100 m long, holding it at ground level. (Take $\sqrt{3} = 1.732$, $\sqrt{2} = 1.414$.) **4**

i. The string makes 30° with the ground. How high is the kite? *[1 mark]*

ii. At that moment, what is the horizontal distance of the kite from Kabir? *[1 mark]*

iii. A gust lifts the kite so that the same string now makes 60° with the ground. By how much has the kite risen? *[2 marks]*

OR

Instead, from the 30° position, Kabir winds in string until the angle is 45° while the kite stays at the same height. How much string does he wind in? *[2 marks]*

37. **Three friends' homes.** On a town map with a coordinate grid (1 unit = 100 m), Asha lives at $A(-3, 2)$, Bilal at $B(5, 8)$ and Chitra at $C(8, 4)$. **4**

i. Find the distance between Asha's and Bilal's homes in metres. *[1 mark]*

ii. Find the mid-point of AC. *[1 mark]*

iii. Show that $\triangle ABC$ is right-angled, and verify that the mid-point of AC is equidistant from all three homes. *[2 marks]*

OR

Find the point D such that $ABCD$ (in this order) is a rectangle, and verify one pair of equal opposite sides. *[2 marks]*

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38. **Juice counter.** At a juice counter in Hyderabad, 2 glasses of mango juice and 3 glasses of orange juice cost ₹240, while 3 glasses of mango juice and 2 glasses of orange juice cost ₹235. Let a glass of mango juice cost ₹m and a glass of orange juice ₹o. **4**

i. Write the pair of linear equations. *[1 mark]*

ii. Without finding m and o separately, find the total cost of one glass of mango juice and one glass of orange juice. *[1 mark]*

iii. Find m and o. *[2 marks]*

OR

A customer claims she paid ₹500 for 4 glasses of mango and 6 glasses of orange juice at these prices. Is this possible? Justify using the equations. *[2 marks]*