



B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

FIRST TERM EXAMINATION (2026-27)

MATHEMATICS (STANDARD) — CLASS X — Subject Code: 041

Time allowed : 3 hours
Date : 31-08-2026

Maximum Marks : 80
Admission No.

General Instructions :

Read the following instructions carefully and follow them :

- (i) This question paper contains 38 questions. All questions are compulsory.
- (ii) This question paper is divided into FIVE Sections — A, B, C, D and E.
- (iii) In Section A, Questions no. 1 to 18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion-Reason based questions of 1 mark each.
- (iv) In Section B, Questions no. 21 to 25 are very short answer (VSA) type questions, carrying 2 marks each.
- (v) In Section C, Questions no. 26 to 31 are short answer (SA) type questions, carrying 3 marks each.
- (vi) In Section D, Questions no. 32 to 35 are long answer (LA) type questions carrying 5 marks each.
- (vii) In Section E, Questions no. 36 to 38 are case study based questions carrying 4 marks each. Internal choice is provided in 2 marks questions in each case study.
- (viii) There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.
- (ix) Draw neat diagrams wherever required.
- (x) Use of calculator is NOT allowed.

SECTION A

This section comprises multiple choice questions (MCQs) of 1 mark each.

Q.1 The zeroes of the polynomial $p(x) = x^2 - x - 6$ are : 1

- (A) 3, 2
- (B) -3, 2
- (C) 3, -2
- (D) -3, -2

Q.2 If two positive integers a and b are written as $a = x^3 y^2$ and $b = x y^3$, where x, y are prime numbers, then $HCF(a, b)$ is : 1

- (A) $x y^2$
- (B) $x^3 y^3$
- (C) $x^2 y^2$
- (D) $x y$

Q.3 If m and n are the zeroes of the polynomial $f(x) = 2x^2 - 8 - 8x$, then the value of $m^2 + n^2$ is : 1

- (A) 0
- (B) 32
- (C) 24
- (D) 16

Q.4 If one zero of the polynomial $p(x) = 3x^2 - 8x + k$ is the reciprocal of the other, then the value of k is : 1

- (A) 3
- (B) -3
- (C) $\frac{1}{3}$
- (D) 8

Q.5 The pair of linear equations $2x + 3y - 9 = 0$ and $4x + 6y - 18 = 0$ has : 1

- (A) a unique solution
- (B) exactly two solutions
- (C) infinitely many solutions
- (D) no solution

Q.6 Seven years ago, a father was seven times as old as his son. Three years from now, he will be three times as old as his son. The present age of the father is : 1

- (A) 36 years
- (B) 42 years
- (C) 45 years
- (D) 49 years

Q.7 The value of k for which the pair of equations $x + 2y = 3$ and $5x + ky = 15$ has infinitely many solutions is : 1

- (A) 5
- (B) 10
- (C) -10
- (D) 15

Q.8 The discriminant of the quadratic equation $2x^2 - 6x + 3 = 0$ is : 1

- (A) 12
- (B) -12
- (C) 60
- (D) 24

Q.9 The sum of a natural number and its reciprocal is $\frac{26}{5}$. If the natural number is x , then the quadratic equation representing this situation is : 1

- (A) $5x^2 + 26x - 5 = 0$
- (B) $5x^2 - 26x + 5 = 0$
- (C) $x^2 - 26x + 5 = 0$
- (D) $5x^2 - 26x - 5 = 0$

Q.10 If $x = -\frac{1}{2}$ is a root of the equation $x^2 + kx - \frac{3}{4} = 0$, then the value of k is : 1

- (A) -1
- (B) 1
- (C) 2
- (D) -2

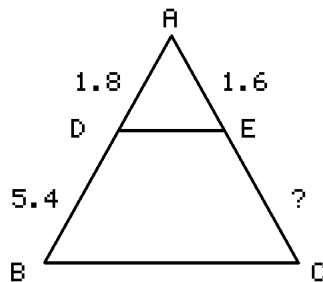
- Q.11 If the common difference of an AP is 5, then the value of $a_{18} - a_{13}$ is : 1
- (A) 10
(B) 20
(C) 25
(D) 30

- Q.12 In a city, the auto-rickshaw fare is ₹ 20 for the first km and ₹ 6 for each additional km. The total fares for journeys of 1 km, 2 km, 3 km, ... form an AP. The fare for a journey of 12 km is : 1
- (A) ₹ 86
(B) ₹ 92
(C) ₹ 78
(D) ₹ 96

- Q.13 It is given that $\triangle ABC \sim \triangle DEF$ with $\angle A = 40^\circ$ and $\angle E = 90^\circ$. Then the measure of $\angle C$ is : 1
- (A) 40°
(B) 50°
(C) 90°
(D) 60°

- Q.14 A vertical pole of height 8 m casts a shadow 6 m long on the ground. At the same time, a tower casts a shadow 30 m long. The height of the tower is : 1
- (A) 40 m
(B) 36 m
(C) 45 m
(D) 48 m

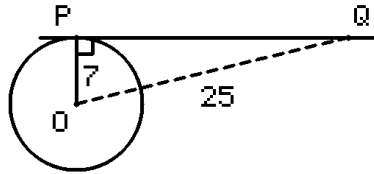
- Q.15 In $\triangle ABC$, points D and E lie on sides AB and AC respectively such that $DE \parallel BC$. If $AD = 1.8$ cm, $DB = 5.4$ cm and $AE = 1.6$ cm, then EC is equal to : 1



- (A) 3.2 cm
(B) 4.8 cm
(C) 5.4 cm
(D) 4.2 cm
- Q.16 The distance of the point $P(2, -2)$ from the origin is : 1
- (A) 2
(B) -2
(C) 0
(D) $2\sqrt{2}$
- Q.17 The mid-point of the line segment joining the points $(4, -7)$ and $(-4, 11)$ is : 1
- (A) $(0, 2)$

- (B) (2, 0)
 (C) (4, 2)
 (D) (0, -2)

Q.18 PQ is a tangent at a point P to a circle with centre O and radius 7 cm. If $OQ = 25$ cm, then the length PQ is : 1



- (A) 24 cm
 (B) 25 cm
 (C) $\sqrt{674}$ cm
 (D) 18 cm

Q.19 Directions : In the question below, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option. 1

Assertion (A) : If the HCF of two numbers is 5 and their product is 150, then their LCM is 30.

Reason (R) : For any two positive integers a and b , $HCF(a, b) \times LCM(a, b) = a \times b$.

- (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.

Q.20 Directions : In the question below, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option. 1

Assertion (A) : The tangents drawn at the ends of a diameter of a circle are parallel.

Reason (R) : The tangent at any point of a circle is perpendicular to the radius through the point of contact.

- (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

This section comprises very short answer (VSA) type questions of 2 marks each.

Q.21 Show that 12^n cannot end with the digit 0 for any natural number n . 2

OR

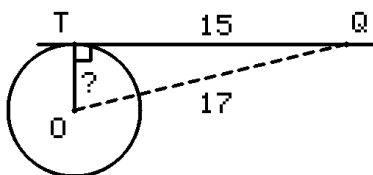
Given that $\sqrt{5}$ is irrational, show that $3 + 2\sqrt{5}$ is an irrational number.

Q.22 Using prime factorisation, find the HCF and the LCM of 336 and 54. Verify that $HCF \times LCM = 336 \times 54$. 2

Q.23 Find the zeroes of the polynomial $p(x) = x^2 + 7x + 10$ and verify the relationship between the zeroes and the coefficients. 2

Q.24 Find the value(s) of x for which the distance between the points $P(x, 7)$ and $Q(1, -5)$ is 13 units. 2

Q.25 From a point Q , the length of the tangent to a circle is 15 cm and the distance of Q from the centre O is 17 cm. Find the radius of the circle. 2



OR

Two tangents PA and PB are drawn to a circle with centre O from an external point P such that $\angle APB = 70^\circ$. Find the measure of $\angle POA$.

SECTION C

This section comprises short answer (SA) type questions of 3 marks each.

Q.26 If α and β are the zeroes of the polynomial $p(x) = 3x^2 - 5x + 2$, find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$. 3

Q.27 How many terms of the AP : 63, 60, 57, ... must be taken so that their sum is 693 ? Explain the reason for the double answer. 3

OR

Find the sum of the first 25 terms of the AP : 7, 2, -3, ...

Q.28 Show that the points $A(3, 0)$, $B(6, 4)$ and $C(-1, 3)$ are the vertices of a right-angled isosceles triangle. 3

Q.29 Find the ratio in which the line segment joining the points $A(1, -5)$ and $B(-4, 5)$ is divided by the x-axis. Also find the coordinates of the point of division. 3

Q.30 Prove that the lengths of the tangents drawn from an external point to a circle are equal. Draw a neat diagram to support your proof. 3

Q.31 Prove that the parallelogram circumscribing a circle is a rhombus. Draw a neat diagram to support your proof. 3

OR

Prove that the chord of the larger of two concentric circles which touches the smaller circle is bisected at the point of contact.

SECTION D

This section comprises long answer (LA) type questions of 5 marks each.

Q.32 A lending library has a fixed charge for the first three days and an additional charge for each day thereafter. Rhea paid ₹ 27 for a book kept for 7 days, while Vikram paid ₹ 21 for a book kept for 5 days. 5

- (a) Find the fixed charge and the charge for each extra day.
(b) How much will a reader have to pay for keeping a book for 10 days ?

Q.33 A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream. 5

OR

A train covers a distance of 300 km at a uniform speed. If its speed had been 5 km/h more, it would have taken 2 hours less for the same journey. Find the original speed of the train.

Q.34 In a flower bed, there are 23 rose plants in the first row, 21 in the second, 19 in the third, and so on, with 5 rose plants in the last row. 5

- (a) How many rows are there in the flower bed ?
(b) Find the total number of rose plants in the bed.
(c) Which row contains exactly 11 rose plants ?

Q.35 State and prove the Basic Proportionality Theorem (Thales Theorem). Using the theorem, in $\triangle ABC$ with $DE \parallel BC$, if $AD = 4x - 3$, $DB = 3x - 1$, $AE = 8x - 7$ and $EC = 5x - 3$, find the value of x . 5

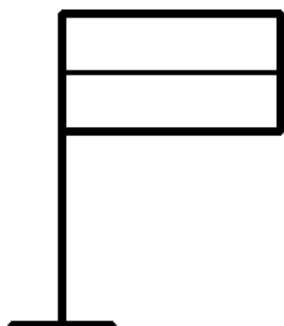
OR

If AD and PM are medians of triangles ABC and PQR respectively, where $\triangle ABC \sim \triangle PQR$, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.

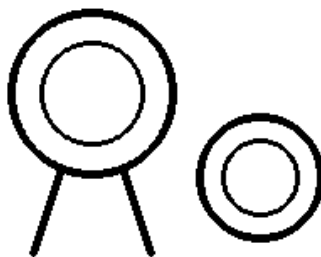
SECTION E

This section comprises 3 case study based questions of 4 marks each.

Q.36 Case Study – 1 : For the Independence Day celebration, Class X-A bought 5 flags and 3 badges for ₹ 130, while Class X-B bought 3 flags and 5 badges for ₹ 110 from the same shop. Taking the cost of one flag as ₹ x and the cost of one badge as ₹ y , answer the following questions : 1 2



FLAG



BADGE

- (i) Represent the above situation as a pair of linear equations in x and y .
(ii) Find the cost of one flag.

(iii) Class X-C has only ₹ 100 with it. Examine whether it can buy 2 flags and 6 badges with this amount. Justify your answer.

OR

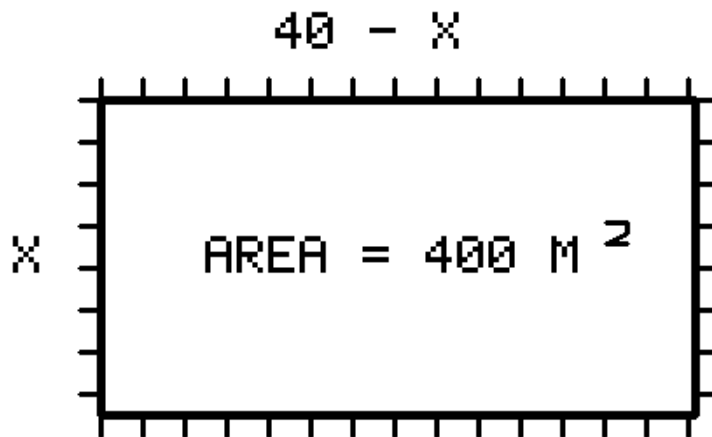
(iii) How many badges can Class X-D buy for ₹ 90 ?

Q.37 Case Study – 2 : The Sports Committee of a school wants to fence a rectangular playground whose perimeter is 80 m and whose area must be 400 m². Taking the breadth of the playground as x metres, answer the following questions :

1

1

2



(i) Represent the above situation as a quadratic equation in x .

(ii) Without solving, comment on the nature of the roots of this equation. Is such a playground possible ?

(iii) Find the length and the breadth of the playground.

OR

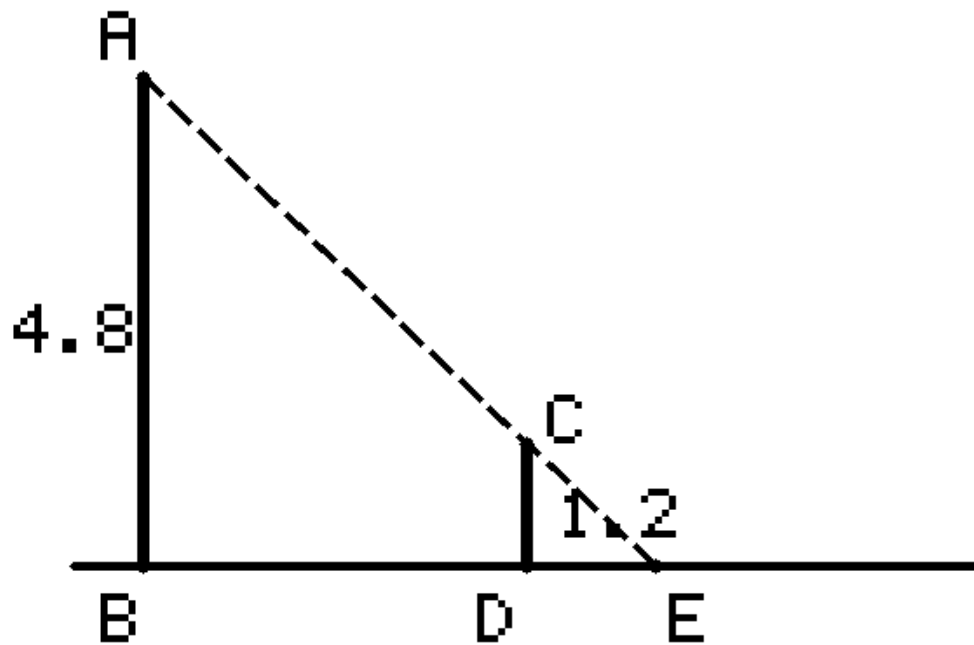
(iii) If the committee instead wants the area to be 375 m² with the same perimeter, find the dimensions of the playground.

Q.38 Case Study – 3 : A street light is fitted at the top of a 4.8 m tall lamp-post. Aarav, a boy of height 1.2 m, starts walking away from the base of the lamp-post along a straight path at a uniform speed of 0.9 m/s. His shadow is formed ahead of him on the ground.

1

1

2



- (i) Name the pair of similar triangles formed in this situation and state the criterion of similarity used.
- (ii) Write the ratio of the height of the lamp-post to the height of the boy in simplest form.
- (iii) Find the length of his shadow 4 seconds after he starts walking.

OR

- (iii) Show that the length of his shadow increases at a uniform rate as he walks, and find that rate in m/s.
