



B.K. BIRLA CENTRE FOR EDUCATION

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



FIRST TERM EXAMINATION (2026-27)
MATHEMATICS — CLASS X— Subject Code: 041
SET - A

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

Maximum Marks : 80
Roll 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 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 $LCM(a, b)$ is : 1

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

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

- (A) 2
- (B) -2
- (C) $\frac{1}{2}$
- (D) 3

Q.3 If 2 and -3 are the zeroes of the polynomial $x^2 + (a + 1)x + b$, then : 1

- (A) $a = -7, b = -1$
- (B) $a = 5, b = -1$
- (C) $a = 0, b = -6$
- (D) $a = 2, b = -6$

Q.4 A quadratic polynomial, the sum of whose zeroes is 0 and one zero is 3, is : 1

- (A) $x^2 - 9$
- (B) $x^2 + 9$
- (C) $x^2 - 3$
- (D) $x^2 + 3$

Q.5 Two years ago, a father was five times as old as his son. Two years later, his age will be 8 years more than three times the age of his son. The present age of the father is : 1

- (A) 42 years
- (B) 40 years
- (C) 36 years
- (D) 32 years

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

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

Q.7 The value of k for which the pair of equations $2x + 3y = 5$ and $4x + ky = 10$ has infinitely many solutions is : 1

- (A) 3
- (B) 6
- (C) -6
- (D) 12

Q.8 The sum of a natural number and its reciprocal is $\frac{10}{3}$. If the natural number is x , then the quadratic equation representing this situation is : 1

- (A) $3x^2 - 10x + 3 = 0$
- (B) $3x^2 + 10x - 3 = 0$
- (C) $x^2 - 10x + 3 = 0$
- (D) $3x^2 - 10x - 3 = 0$

Q.9 The discriminant of the quadratic equation $2x^2 - 4x + 3 = 0$ is : 1

- (A) 8
- (B) -8
- (C) 40
- (D) -40

Q.10 If $x = \frac{1}{2}$ is a root of the equation $x^2 + kx - \frac{5}{4} = 0$, then the value of k is : 1

- (A) 2
- (B) -2
- (C) $\frac{1}{4}$
- (D) $\frac{1}{2}$

Q.11 In a city, the taxi fare is ₹ 15 for the first km and ₹ 8 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 10 km is : 1

- (A) ₹ 87
- (B) ₹ 95
- (C) ₹ 80
- (D) ₹ 92

Q.12 The 30th term of the AP : 10, 7, 4, ... is : 1

- (A) 97
- (B) 77
- (C) -77
- (D) -87

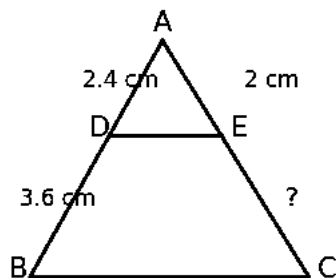
Q.13 A vertical pole of height 6 m casts a shadow 4 m long on the ground. At the same time, a tower casts a shadow 28 m long. The height of the tower is : 1

- (A) 36 m
- (B) 40 m
- (C) 42 m
- (D) 48 m

Q.14 It is given that $\triangle ABC \sim \triangle PQR$ with $\angle A = 30^\circ$ and $\angle Q = 90^\circ$. Then the measure of $\angle C$ is : 1

- (A) 30°
- (B) 60°
- (C) 90°
- (D) 120°

Q.15 In $\triangle ABC$, points D and E lie on sides AB and AC respectively such that $DE \parallel BC$. If $AD = 2.4$ cm, $DB = 3.6$ cm and $AE = 2$ cm, then EC is equal to : 1



- (A) 2 cm
- (B) 2.4 cm
- (C) 3 cm
- (D) 3.6 cm

Q.16 The distance of the point $(-6, 8)$ from the origin is : 1

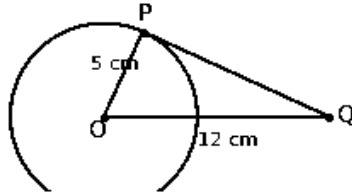
- (A) 6
- (B) 8
- (C) 10
- (D) 14

Q.17 The mid-point of the line segment joining the points $(2, -5)$ and $(-2, 9)$ is : 1

- (A) $(0, 2)$

- (B) (2, 0)
- (C) (0, 7)
- (D) (-2, 2)

Q.18 PQ is a tangent at a point P to a circle with centre O and radius 5 cm. If $OQ = 12$ cm, then the length PQ is : 1



- (A) 12 cm
- (B) 13 cm
- (C) $\sqrt{119}$ cm
- (D) 8.5 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) : $5 + 3\sqrt{2}$ is an irrational number.

Reason (R) : The sum of a rational number and an irrational number is always an irrational number.

- (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) : If two tangents drawn from an external point P to a circle with centre O touch the circle at A and B and are inclined to each other at an angle of 60° , then $\angle AOB = 120^\circ$.

Reason (R) : The angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended at the centre by the line segment joining the points 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

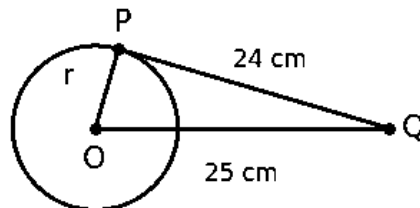
This section comprises very short answer (VSA) type questions of 2 marks each.

Q.21 Show that 6^n cannot end with the digit 0 for any natural number n . 2

OR

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

- Q.22 Using prime factorisation, find the HCF and the LCM of 404 and 96. Verify that $HCF \times LCM = 404 \times 96$. 2
- Q.23 Find the zeroes of the polynomial $p(x) = x^2 - 2x - 8$ and verify the relationship between the zeroes and the coefficients. 2
- Q.24 Find the value(s) of y for which the distance between the points $P(2, -3)$ and $Q(10, y)$ is 10 units. 2
- Q.25 From a point Q , the length of the tangent to a circle is 24 cm and the distance of Q from the centre O is 25 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 $\angle APB = 80^\circ$. 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 $p(x) = 6x^2 + x - 2$, find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$. 3
- Q.27 How many terms of the AP : 24, 21, 18, ... must be taken so that their sum is 78 ? Explain the reason for the double answer. 3

OR

Find the sum of the first 22 terms of the AP : 8, 3, -2, ...

- Q.28 Show that the points $A(1, 7)$, $B(4, 2)$, $C(-1, -1)$ and $D(-4, 4)$ are the vertices of a square $ABCD$. 3
- Q.29 Find the ratio in which the line segment joining the points $A(-1, 7)$ and $B(4, -3)$ is divided by the point $P(1, 3)$. 3
- Q.30 Prove that the tangents drawn at the ends of a diameter of a circle are parallel. Draw a neat diagram to support your proof. 3
- Q.31 A quadrilateral $ABCD$ is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$. Draw a neat diagram to support your proof. 3

OR

Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre.

SECTION D

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

- Q.32 An online coaching platform charges Class X students a fixed monthly subscription together with an additional charge for every live doubt-session attended. In the same month, Ravi attended 20 live sessions and paid ₹ 1,300 in all, while Sana attended 26 live sessions and paid ₹ 1,600 in all. (a) Find the fixed monthly subscription and the charge per live session. 5

(b) A student plans to attend 30 live sessions next month. How much should he expect to pay in all ?

Q.33 In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/h and consequently the time of flight increased by 30 minutes. Find the original average speed of the aircraft and the original duration of the flight.

5

OR

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 original speed of the train.

Q.34 Reshma took a loan of ₹ 1,18,000 from a self-help group. She agreed to repay it in monthly instalments, paying ₹ 1,000 in the first month and then increasing the instalment by ₹ 100 every month.

5

(a) Find the amount of her 30th instalment.

(b) Find the total amount she will have repaid at the end of 30 instalments.

(c) Will her loan be fully repaid after 30 instalments ? Justify your answer with calculation.

Q.35 State and prove the Basic Proportionality Theorem (Thales Theorem). Using the theorem, in $\triangle ABC$ with $DE \parallel BC$, if $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = x - 1$, find the value of x .

5

OR

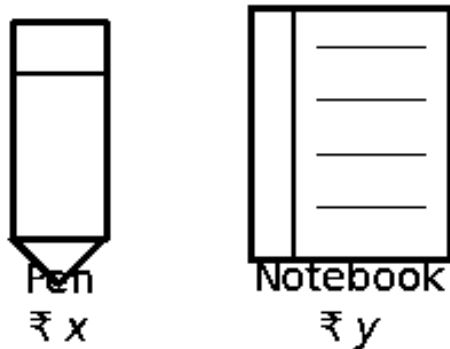
Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of another triangle PQR . Show that $\triangle ABC \sim \triangle PQR$.

SECTION E

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

Q.36 Case Study – 1 : A stationery shopkeeper sells pens and notebooks. Aditi bought 4 pens and 2 notebooks for ₹ 110, while her friend Rohan bought 3 pens and 4 notebooks for ₹ 170 from the same shop. Taking the cost of one pen as ₹ x and the cost of one notebook as ₹ y , answer the following questions :

1



(i) Represent the above situation as a pair of linear equations in x and y .

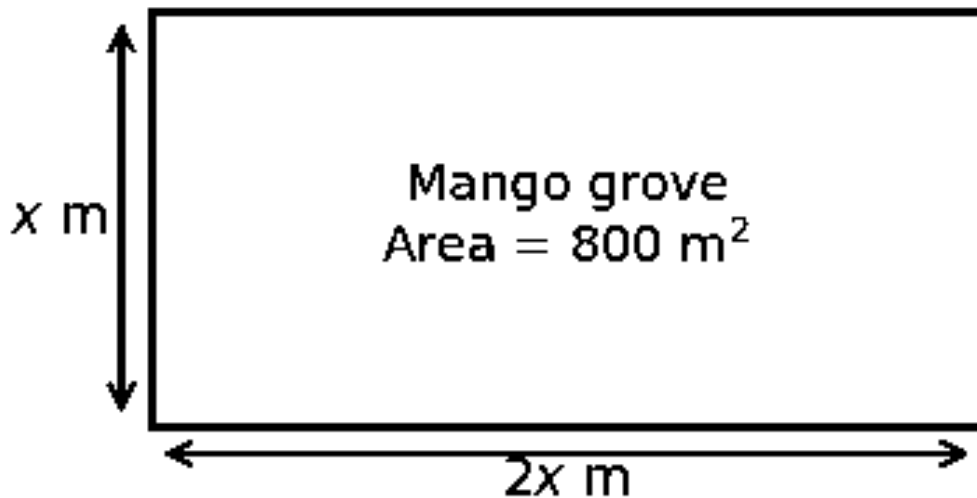
(ii) Find the cost of one pen.

(iii) Aditi has only ₹ 100 with her. Examine whether she can buy 3 pens and 2 notebooks with this amount. Justify your answer.

OR

(iii) How many notebooks can Rohan buy for ₹ 175 ?

Q.37 Case Study – 2 : The Residents' Welfare Association of a colony decided to plant a rectangular mango grove in a community park. The grove is to be designed such that its length is twice its breadth and its area is 800 m^2 . Taking the breadth of the grove as x metres, answer the following questions :

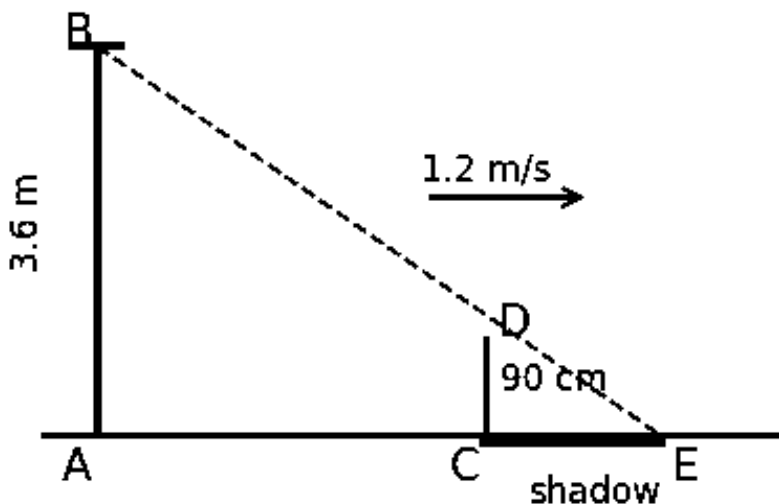


- (i) Represent the above situation as a quadratic equation in x .
- (ii) Without solving, comment on the nature of the roots of this equation.
- (iii) Find the length and the breadth of the grove.

OR

- (iii) If the association instead wants the area of the grove to be 1250 m^2 with the same condition on the sides, find the dimensions of the grove.

Q.38 Case Study – 3 : A street light is fitted at the top of a 3.6 m tall lamp-post. Ananya, a girl of height 90 cm , starts walking away from the base of the lamp-post along a straight path at a uniform speed of 1.2 m/s . Her shadow is formed ahead of her on the ground.



- (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 girl in simplest form.
- (iii) Find the length of her shadow 4 seconds after she starts walking.

OR

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