

DELHI POLICE PUBLIC SCHOOL
HALF YEARLY EXAMINATION (2025-26)
MATHEMATICS- STANDARD (041)

Class: X

Time - 3 hours

Date: 19/9/25

M. M. - 80

No. of pages - 4

General Instructions:

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.

SECTION A

- 1) The value of k for which the system of equations $3x - ky = 7$ and $6x + 10y = 3$ is inconsistent, is
A) -10 B) -5 C) 5 D) 7
- 2) The roots of the quadratic equation $x^2 + x - 1 = 0$ are
A) Irrational and distinct B) not real
C) rational and distinct D) real and equal
- 3) A point on the x -axis divides the line segment joining the points $A(2, -3)$ and $B(5, 6)$ in the ratio 1:2. The point is
A) (4, 0) B) $(\frac{7}{2}, \frac{3}{2})$ C) (3, 0) D) (0, 3)
- 4) If $\triangle ABC \sim \triangle DEF$, $AB = 6\text{cm}$, $DE = 9\text{cm}$, $EF = 6\text{cm}$ and $FD = 12\text{cm}$, then the perimeter of $\triangle ABC$ is
(A) 28cm (B) 28.5cm (C) 18cm (D) 23cm
- 5) A pair of dice is tossed. The probability of not getting the sum eight is
(A) $\frac{5}{36}$ (B) $\frac{31}{36}$ (C) $\frac{5}{18}$ (D) $\frac{5}{9}$
- 6) If the lines given by $3x + 2ky = 2$ and $2x + 5y + 1 = 0$ are not parallel, then k has to be
(A) $\frac{15}{4}$ (B) $\neq \frac{15}{4}$ (C) any rational number (D) any rational number having 4 as denominator
- 7) If the probability of the letter chosen at random from the letters of the word "Mathematics" to be a vowel is $\frac{2}{(2x+1)}$, then x is equal to
(A) $\frac{4}{11}$ (B) $\frac{9}{4}$ (C) $\frac{11}{4}$ (D) $\frac{4}{9}$
- 8) The points $A(9, 0)$, $B(9, -6)$, $C(-9, 0)$ and $D(-9, 6)$ are the vertices of a
(A) Square (B) Rectangle (C) Parallelogram (D) Trapezium
- 9) If $\theta = 30^\circ$ then the value of $3\tan\theta$ is
A) 1 B) $\frac{1}{\sqrt{3}}$ C) $\sqrt{3}$ (D) not defined
- 10) If n th term of an A.P. is $7n - 4$ then the common difference of the A.P. is
A) 7 B) $7n$ C) -4 D) 4
- 11) If $a^2 = \frac{43}{225}$, then a is
(A) rational (B) irrational (C) whole number (D) integer
- 12) What is the ratio in which the line segment joining $(2, -3)$ and $(5, 6)$ is divided by x -axis?
(A) 1:2 (B) 2:1 (C) 2:5 (D) 5:2

- 13) In $\triangle ABC$ right angled at B, if $\tan A = \sqrt{3}$, then $\cos A \cos C - \sin A \sin C$ is
 (A) -1 (B) 0 (C) 1 (D) $\sqrt{3}/2$
- 14) Two cards of hearts and 4 cards of spades are missing from a pack of cards. A card is drawn at random from the remaining pack. What is the probability of getting a black card?
 A) $22/52$ (B) $24/52$ (C) $22/46$ (D) $24/46$
- 15) The graph of the quadratic polynomial is
 (A) straight line (B) ellipse (C) parabola (D) circle
- 16) A pair of dice is thrown once. Find the probability of getting a sum of 9.
 (A) $4/9$ (B) $3/36$ (C) $1/9$ (D) None of these
- 17) $(\sqrt{3} + \sqrt{5})(\sqrt{3} - \sqrt{5})$ is :
 (A) rational (B) irrational (C) whole number (D) None of these
- 18) $(\sec A + \tan A)(1 - \sin A)$ equals:
 (A) $\sec A$ (B) $\sin A$ (C) $\operatorname{cosec} A$ (D) $\cos A$

DIRECTION: In question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option

19 **Statement A (Assertion):** $\sqrt{11}$ is an irrational number.

Statement R (Reason): If p is a Prime number then \sqrt{p} is 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 and (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 **Statement A (Assertion):** $4x + 3y = 5$ is a line parallel to x-axis.

Statement R (Reason): The graph of the linear equation $ax = b$ where a is not equal to zero is parallel to y-axis.

- (a) Both assertion (A) and reason (R) are true and (R) is the correct explanation of assertion (A)
 (b) Both assertion (A) and reason (R) are true & (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

Section B consists of 5 questions of 2 marks each.

21 Two numbers are in the ratio 2:3 and their LCM is 180, what is the HCF of these numbers?

OR

Can two numbers have 18 as their HCF and 380 as their LCM? Give reasons.

22 Verify that: $(1 + \tan A + \sec A)(1 + \cot A - \operatorname{cosec} A) = 2$

23 The A.P 8, 10, 12, has 60 terms. Find the sum of last 10 terms.

OR

Find the middle term of the AP: 6, 13, 20, 216.

24 Show that the points A(-5,6), B(3, 0) and C(9, 8) are the vertices of an isosceles triangle.

25 Divide 27 into two parts such that the sum of their reciprocal is $3/20$.

SECTION C

Section C consists of 6 questions of 3 marks each.

26 Given that $\sqrt{3}$ is irrational, prove that $2 + 7\sqrt{3}$ is irrational.

27 Evaluate:

$$2\tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$$

28 If α and β are zeroes of a polynomial $6x^2 - 5x + 1$ then form a quadratic polynomial whose zeroes are α^2 and β^2 .

29 Sum of a two digit number and the number obtained by reversing the digits is 66, if the digits differ by 2, find the number, how many such numbers are there?

OR

Three years ago, Rashmi was thrice as old as Nazma. Ten years later, Rashmi will be twice as old as Nazma. How old are Rashmi and Nazma now?

30 Savita and Amita are friends, what is the probability that both will have

i) different birthdays?

ii) same birthday?

31 If $\cos\theta + \sin\theta = 1$, then prove that $\cos\theta - \sin\theta = \pm 1$

SECTION D

Section D consists of 4 questions of 5 marks each.

32 (A) Solve the following system of linear equations graphically: $x + 2y = 3$, $2x - 3y + 8 = 0$

OR

(B) Places A and B are 180 km apart on a highway. One car starts from A and another from B at the same time. If the car travels in the same direction at different speeds, they meet in 9 hours. If they travel towards each other with the same speeds as before, they meet in an hour. What are the speeds of the two cars?

33 Prove that:

$$\frac{1 + \tan^2 A}{1 + \cot^2 A} = \left(\frac{1 - \tan A}{1 - \cot A} \right)^2 = \tan^2 A.$$

34 (a) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.

(b) If D is a point on the side BC of triangle ABC such that $\angle ADC = \angle BAC$, then prove that $CA^2 = CB \cdot CD$

35 A train travels at a certain average speed for a distance of 54 km and then travels a distance of 63 km at an average speed of 6 km/hr more than the first speed. If it takes 3 hours to complete the journey, what was its first average speed?

SECTION E

Section E consists of 3 questions of 4 marks each.

CASE STUDY 1

36 A ball is thrown in the air so that t seconds after it is thrown, its height h metre above its starting

point is given by the polynomial

$$h = 25t - 5t^2$$

Observe the given polynomial and answer the following questions:

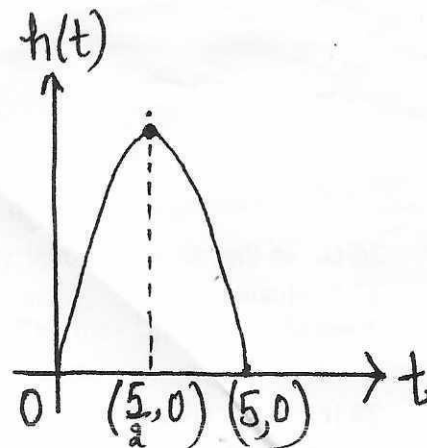
i) Write zeroes of the given polynomial.

ii) Find the maximum height achieved by the ball.

iii) (A) After throwing upward, how much time did the ball take to reach to the height of 30 m.

OR

(B) Find the two different values of t when the height of the ball was 20 m.



CASE STUDY 2

37 Ramesh places a mirror on level ground to determine the height of a pole (with traffic light fixed on it). He stands at a certain distance so that he can see the top of the pole reflected from the mirror. Ramesh's eye level is 1.5m above the ground. The distance of Ramesh and the pole from the mirror are 1.8m and 6m respectively. On the basis of above information, answer the following questions-

A) Which criterion of similarity is applicable to similar triangles?

B) What is the height of the pole?

Ramesh moves behind such that the distance between pole and Ramesh is 13m. He placed a mirror between him and the pole to see the reflection of light in the right position.

C) What is the distance between mirror and Ramesh?

OR

What is the distance between mirror and pole?

CASE STUDY 3

38. Ms. Sheela visited a store near her house and found that the glass jars are arranged one above the other in a specific pattern. On the top layer there are 3 jars. In the next layer there are 6 jars. In the 3rd layer from the top there are 9 jars and so on till the 8th layer. On the basis of the above situation answer the following questions.

(i) Write an A.P whose terms represent the number of jars in different layers starting from top. Also, find the common difference.

(ii) Is it possible to arrange 34 jars in a layer if this pattern is continued? Justify your answer.

(iii) (A) If there are 'n' number of rows in a layer then find the expression for finding the total number of jars in terms of n. Hence find S_8 . OR

(iii) (B) The shopkeeper added 3 jars in each layer. How many jars are there in the 5th layer from the top?