INDIAN SCHOOL AL WADI AL KABIR

Mid-Term Examination (2022-23)

Class: X | Sub: MATHEMATICS (041) | Max Marks: 80

Date: 22-09-2022 | *(SET 2)* | Time: 3 hours

General Instructions:

1. This question paper is divided in to 2 sections- A and B
2. Section A : Part(1) comprises of 16 questions of 1 mark each,
   Part (2) comprises of 6 MCQ's of 1 mark each
   Part (3) comprises of 4 Case study-based questions of 4 marks each.
3. Section B : Part(1) comprises of 5 questions of 2 marks each.
   Part (2) comprises of 4 questions of 3 marks each.
   Part (3) comprises of 4 questions of 5 marks each.
4. Internal choice has been provided for certain questions.

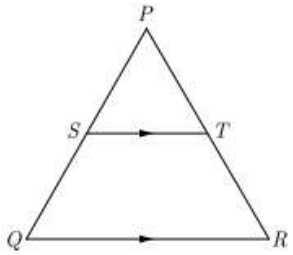
Section A Part – 1 (1 mark each)

Q.1. HCF of two numbers is 27 and their LCM is 162. If one of the numbers is 54, then find the other number.

Q.2. Find a quadratic polynomial, whose zeroes are - 4 and – 5.

Q.3. For what value of k, the pair of linear equations 2kx + 5y = 7 and 6x – 5y = 11 represents intersecting lines?

Q.4. In Δ PQR, ST ∥ QR, $\frac{PS}{SQ} = \frac{3}{5}$ PR = 24 cm. Find PT.



Q.5. If $x = 3\,sec^2\theta - 1$ and $y = 3\,tan^2\theta - 2$, where θ is an acute angle, then find the value of $(x - y)$.

OR

If $sec\theta + tan\theta = 7$, then find the value of $sec\theta - tan\theta$

Q.6. Find the centre of the circle, if the end points of the diameter are (3, - 10) and (1, 4).

Q.7. The decimal expansion of $\frac{23}{2^5 \times 5^2}$ will terminate after how many places of decimal?

OR

Write the decimal expansion of the rational number $\frac{33}{2^2 \times 5}$.

Q.8. What is the probability that a number selected at random from the numbers 1, 2, 3,…15 is a multiple of 4?

OR

Find the probability that a non-leap year chosen at random has 52 Sundays.

Q.9. If 2x + y = 23 and 4x – y = 19, then find the value of y.

Q.10. If α and β are the zeroes of the polynomial x^2 + 2x + 1, then find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$.

OR

What number should be added to the polynomial x^2 – 5x + 4, so that 3 is a zero of polynomial thus obtained?

Q.11. Find whether the pair of equations x + 2y + 5 = 0 and -3x – 6y + 1 = 0 have a unique solution, infinitely many solution or no solution.

Q.12. If two positive integers a and b are written as a = x^3y^2 and b = xy^3, where x, y are prime numbers, then find the HCF of a and b.

Q.13. ΔABC and ΔPQR are similar triangles such that ∠A = 32˚ and ∠R = 65˚, then find the measure of ∠B.

OR

If ΔABC and ΔDEF are similar triangles such that 2AB = DE and BC = 8cm, then find EF.

Q.14. A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, then how many tickets has she bought?

Q.15. If sum of the zeroes of the quadratic polynomial $3x^2$ - kx + 6 is 3, then find the value of k.

Q.16. Find the distance of the point (-12, 5) from the origin.

OR

If the distance between P(4, 0) and Q(0, x) is 5 units, then find the value of x

Section A Part – 2 MCQ (1 mark each)

Q.17. If a pair of linear equations is consistent, then the lines will be

A	parallel	**B**	always coincident	**C**	intersecting or coincident	**D**	always intersecting

Q.18. In triangles ABC and DEF, $\frac{AB}{DE} = \frac{BC}{EF}$, then the triangles will be similar if

A	∠B = ∠E	**B**	∠ A = ∠D	**C**	∠B = ∠ D	**D**	∠A = ∠F

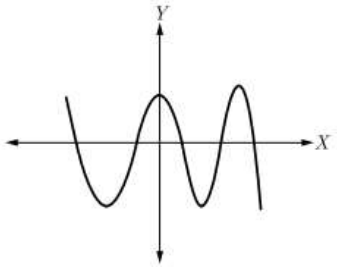
Q.19. Given the linear equation 3x + 4y = 9. Select another linear equation in these two variables such that the pair of equations so formed is dependent.

A	3x – 5y = 10	**B**	6x + 8y = 18	**C**	9x + 12y = 18	**D**	3x – 4y = 12

Q.20. The value of ($tan^2 60° + sin^2 45°$) is

A	2	**B**	1	**C**	$\frac{7}{2}$	**D**	$\frac{5}{2}$

Q.21. Find the number of zeroes in the graph of a polynomial shown in the given figure.



A	5	**B**	2	**C**	1	**D**	4

Q.22. If $\sin\theta = \frac{5}{13}$, then the value of $\tan\theta$ is

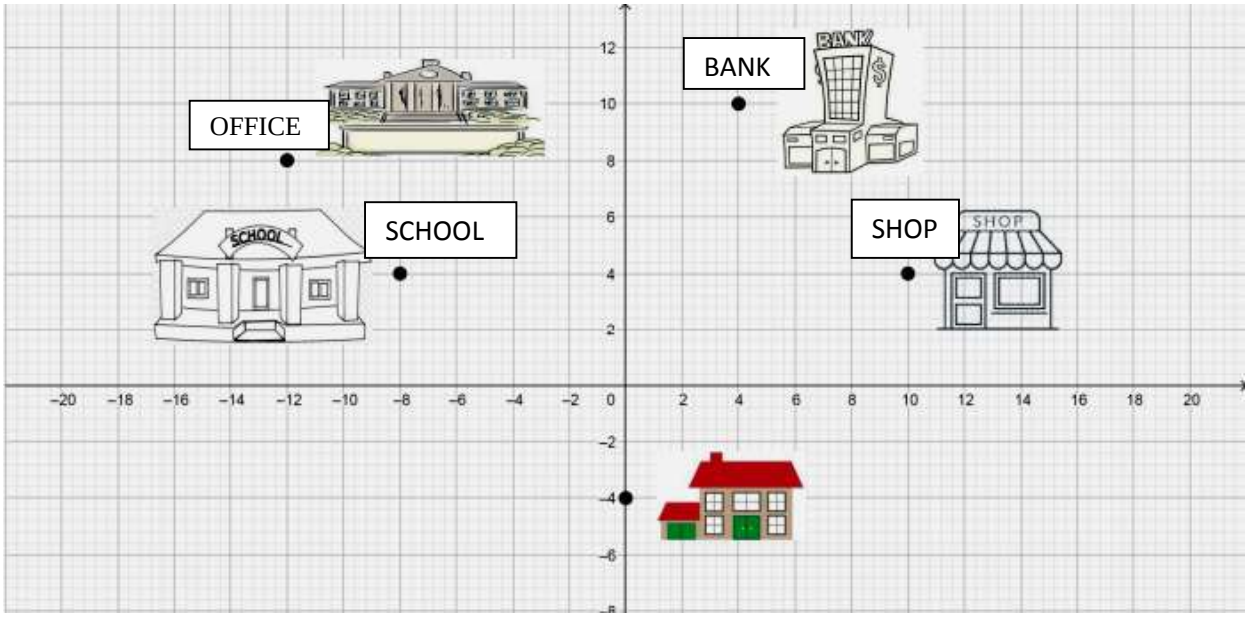
A $\frac{5}{12}$ **B** $\frac{12}{5}$ **C** $\frac{12}{13}$ **D** $\frac{8}{13}$

Section A

Part – 3 Case study-based (4 marks each)

Q.23. **<u>Case study-based – 1</u> (Read the situation below and answer any 4 questions)**

One day, while going to her office, Suchitra went to her son's school to attend PTM. Then she worked in the office and left early as some guests are arriving at her house in the evening. She went to the bank after the office and then to the shop to purchase some groceries to welcome the guests. The route of Suchitra has been shown in the Cartesian plane in the figure below. The location of Suchitra's house in Cartesian plane is (0,-4).



(i) Find the coordinates of her office in the given Cartesian plane.

A (-8, 12) **B** (-12, 8) **C** (-12, 10) **D** (-8, 10)

(ii) The coordinates of school divides the path of Suchitra from her house to office in the ratio

A 1 : 3 **B** 2 : 1 **C** 1 : 1 **D** 1 : 2

(iii) The route covered by Suchitra in the whole day is in the shape of a

A Rectangle **B** Square **C** Trapezium **D** Parallelogram

(iv) The farthest from Suchitra's house is

A Bank **B** School **C** Shop **D** Office

(v) If there is a temple in the middle of bank and house, then what are its coordinates?

A (2, 4) **B** (2, 3) **C** (3, 3) **D** (1, 3)

Q.24. **<u>Case study-based – 2</u> (Read the situation below and answer any 4 questions)**

In two dice game, the player take turns to roll both dice, they can roll as many times as they want in one turn. A player scores the sum of the two dice thrown and gradually reaches a higher score as they continue to roll. If a single number 1 is thrown on either die, the score for that whole turn is lost. Two dice are thrown simultaneously.

(i) What is the probability that the sum on two dice is 8?

A $\frac{5}{6}$ **B** $\frac{5}{36}$ **C** $\frac{3}{36}$ **D** $\frac{1}{6}$

(ii) What is the probability that 5 will come up at least once?

A $\frac{11}{36}$ **B** $\frac{25}{36}$ **C** $\frac{1}{6}$ **D** $\frac{5}{18}$

(iii) What is the probability of getting at least 10 as the sum on two dice?

A $\frac{5}{36}$ **B** $\frac{1}{18}$ **C** $\frac{3}{36}$ **D** $\frac{1}{6}$

(iv) What is the probability of getting a doublet of even number?

A $\frac{2}{5}$ **B** $\frac{1}{6}$ **C** $\frac{1}{12}$ **D** $\frac{1}{9}$

(v) What is the probability of getting a product of numbers greater than or equal to 25?

A $\frac{1}{12}$ **B** $\frac{2}{5}$ **C** $\frac{1}{9}$ **D** $\frac{1}{6}$

Q.25. **<u>Case study-based – 3</u> (Read the given situation and answer the questions that follow)**

Rahul has 54 football cards, 72 volleyball cards, and 63 basketball cards and he wants to put them in a binder. Each page of the binder should have cards from a single sport, and there should be the same number of cards on each page.

(i) What is the greatest number of cards, Rahul can put on a page?

(ii) How many pages will Rahul need for each sport?

Q.26. **<u>Case study-based – 4</u> (Read the given situation and answer the questions that follow)**

Mr. RK Agrawal is owner of a famous amusement park in Delhi. The ticket charge for the park is ₹150 for children and ₹ 400 for adult.

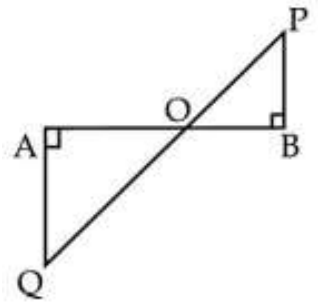
Generally he does not go to park and it is managed by team of staff. One day Mr Agrawal decided to random check the park and went there. When he checked the cash counter, he found that 480 tickets were sold and ₹ 134500 were collected.

(i) If the number of children visited the park be ***x*** and the number of adults visited be ***y***, then how many children visited the park?

(ii) How much amount is collected if 300 children and 350 adults had visited the park?

Section B Part-1(2 marks each)

Q.27. In the given figure, QA ⊥ AB and PB ⊥ AB. If AO = 20 cm, BO = 12 cm, PB = 18 cm find AQ.



OR

A vertical stick 12 m long casts a shadow 8 m long on the ground. At the same time a tower casts the shadow 40 m long on the ground. Determine the height of the tower.

Q.28. If sin (A + 2B) = $\frac{\sqrt{3}}{2}$ and cos (A + B) = $\frac{1}{2}$; A > B, A + 2B < 90°, find A and B.

Q.29. If α and β are the zeroes of the quadratic polynomial x^2 - 2x – 15, then form a quadratic polynomial whose zeroes are 2α and 2β.

OR

If α and β are the zeroes of the quadratic polynomial$p(x) = x^2$ – (k + 3) x + 2 (3k – 4), find k if $\alpha + \beta = \frac{1}{2}\alpha\,\beta$

Q.30. Find a relation between x and y such that the point P (x, y) is equidistant from the points A (-5, 3) and B (7, 2).

Q.31. One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting

(i) a non -face card (ii) a black king or a red queen.

Section B Part-2 (3 marks each)

Q.32. Find the zeroes of the quadratic polynomial $5x^2$ + 8x - 4 and verify the relationship between the zeroes and the coefficients of the polynomial.

Q.33. ABCD is a trapezium in which AB || DC and its diagonals intersect each other at the point O.

Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

Q.34. In ΔPQR, right-angled at Q, QR = 9 cm and PR − PQ = 1 cm. Determine the value of

sin R + cos R

OR

Prove that $\frac{\cos A}{1-\tan A} + \frac{\sin A}{1-\cot A}$ = sin A + cos A.

Q.35. Solve the pair of linear equations graphically:

x + 2y = 5 and 2x - 3y = - 4

Section B Part-3 (5 marks each)

Q.36. Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

Q.37. Prove that $\sqrt{2}$ is irrational and hence prove that 5 + 3 $\sqrt{2}$ is also irrational.

Q.38. Prove that $\frac{\sin\theta-\cos\theta+1}{\sin\theta+\cos\theta-1} = \frac{1}{\sec\theta-\tan\theta}$

OR

If tan θ + sin θ = m and tan θ - sin θ = n, then prove that $m^2 - n^2 = 4\sqrt{mn}$

Q.39. Find the co-ordinates of the points of trisection of the line segment joining the points A (1, -2) and B (-3, 4).