K.R. MANGALAM WORLD SCHOOL

G.K-I, New Delhi-110048

SAATVIK

General instructions:

1. This Question Paper has 5 sections A to E.
2. SECTION-A has 10 Multiple Choice Questions carrying one mark each.
3. SECTION-B has 5 Short Answer -1 (SA-1) type questions carrying 2 marks each.
4. SECTION-C has 4 Short Answer -II (SA-II) type questions carrying 3 marks each.
5. SECTION-D has 2 Long Answer (LA) type questions carrying 5 marks each.
6. SECTION-E has 2 source based/ case based/ passage based/ integrated units of assessment (4 marks each) with sub parts of the values of 1, 1 and 2 marks respectively.
7. All questions are compulsory. However an internal choice in 1Q of 2 marks, 1Q of 3 marks and 1Q of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

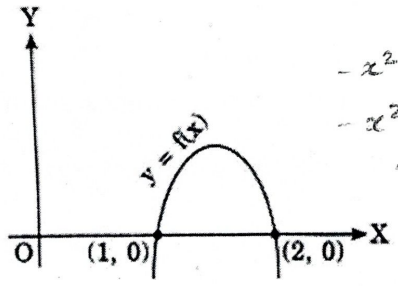
MID - TERM EXAMINATION 2026-27
CLASS – X
MATHEMATICS (041)

Time allowed: 2 Hours **Maximum Marks: 50**

Section-A **(1×20=20)**

Q1. If $1080 = 2^p \times 3^q \times 5$, then (p−q) is equal to
(a) 6 (b) 0 (c) −1 (d) 1

Q2. The given polynomial y = f(x) represented on the graph is



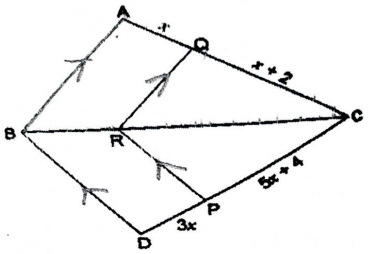
(a) $-x^2 + 3x - 2$
(b) $-2x^2 + x + 1$
(c) $x^2 + 3x + 2$
(d) $x^2 + x - 2$

Q3. For what value of α for the following pair of linear equations has infinitely many solutions?
$5x - 6y = 7$; $\alpha y - 15x + 21 = 0$
(a) – 8 (b) – 12 (c) – 8 or – 12 (d) 18

Q4. If one zero of the polynomial $p(x)=(p^2+4)x^2+65x+4p$ is reciprocal of the other; then the value of p is:

(a) -1 (b) 1 (c) -2 (d) 2

Q5. In the given figure, $QR \parallel AB, RP \parallel BD$,. If CQ=x+2, QA=x, CP=5x+4, PD=3x.then find the value of x.



(a) 3 (b) 1 (c) 6 (d) 9

Q6. If x is the LCM of 4, 6, 8 and y is the LCM of 3, 5, 7 and p is the LCM of x and y, then which of the following is true ?

(a) p = 35x (b) 1p = 4y (c) p = 8x (d) p = 16y

Q7. If $\frac{x}{12}-\frac{3}{x}=0$, then the values of x are :

(a) 6 (b) ±6 (c) ±12 (d) −6

Q8. Which of the following statements is **not true**?

(a) Criteria for similarity of triangles are AAA or AA, SSS and SAS.

(b) In a triangle a line drawn parallel to one side, to intersect the other sides at distinct point does not divide the two sides in the same ratio.

(c) All congruent triangles are similar but the similar triangles need not to be congruent.

(d) If a line divides any two sides of a triangle in the same ratio, the line must be parallel to the third side.

Q9. **Assertion (A)** : The HCF of two numbers is 5 and their product is 150. Then, their LCM is 40.

Reason (R) : for any two positive integers a and b, HCF(a,b)×LCM(a,b)=a×b.

(a) Both assertion (A) and reason (R) is the correct explanation of assertion (A).

(b) Both assertion (A) and reason (R) are true and 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

Q10. **Assertion (A)** : If $5+\sqrt{7}$ is a root of a quadratic equation with rational coefficients,then its other root is $5-\sqrt{7}$.

Reason (R) : Irrational roots of a quadratic equation with rational coefficients occur in conjugate pairs.

(a) Both assertion (A) and reason (R) is the correct explanation of assertion (A).

(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).

(c) Assertion (A) is true but reason (R) is false.

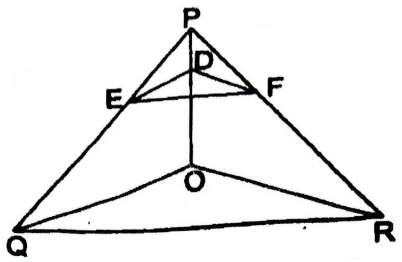
(d) Assertion (A) is false but reason (R) is true

Section – B

(2 × 5 = 10)

Q11. Prove that $5-3\sqrt{2}$ is an irrational number, given that $\sqrt{2}$ is an irrational number.

Q12. In the given figure, DE∥OQ and DF∥OR, show that EF∥QR.



Q13. If α and β are the zeroes of quadratic polynomial $3x^2 - 5x + 2$. Then find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ → $\frac{13}{4}$

Q14. Find the nature of the roots of the following equation. If the real roots exist, find them.
$3x^2 - 4\sqrt{3}x + 4 = 0$ $2/\sqrt{3}$ eq.

Q15. Solve the following pair of linear equations using algebraically.
$73x - 37y = 109$
$37x - 73y = 1$ 2, 1

OR

The sum of two numbers is 18 and the sum of their reciprocals is 9/40. Find the numbers.

Section – C

(3 × 4 = 12)

Q16. In a workshop, the number of teachers of English, Hindi and Science are 36, 60 and 84 respectively. Find the minimum number of rooms required, if in each room the same number of teachers is to be seated and all of them being of the same subject. (12)

Q17. The sum of the digits of a two digit number is 9. If 27 is subtracted from the number, its digits are interchanged. Find the number. 63

OR

Solve the following system of equations graphically:
$2x + y = 6$
$2x - y - 2 = 0$.
Find the area of the triangle so formed by two lines and x - axis.

Q18. Find the zeroes of the polynomial $4x^2 + 4x - 3$ and verify the relationship between zeroes and coefficients of the polynomial. 1/2 ; -3/2

Q19. If the roots of the equation $(a^2 + b^2)x^2 - 2(ac + bd)x + (c^2 + d^2) = 0$ are equal, prove that $\frac{a}{b} = \frac{c}{d}$.

Section – D

(5× 2 = 10)

Q20. 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.
Hence using BPT solve the given question:
A line ℓ intersects the sides PQ and PR of a ΔPQR at L and M respectively such that LM ∥ QR. If PL = 5cm, PQ=15cm and MR=8cm, then find the length of PM (in cm) (4)

Q21. A train travels at a certain average speed for a distance of 63km and then travels at a distance of 72km at an average speed of 6km/hr more than its original speed. If it takes 3 hours to complete the total journey, what is the original average speed? 42km/h

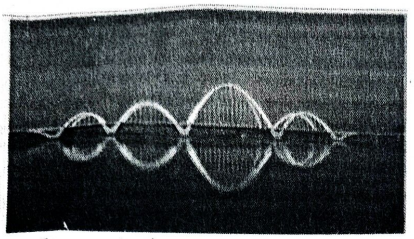
OR

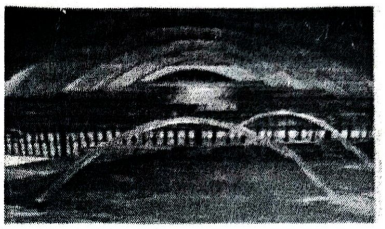
Express the equation $\frac{x-2}{x-3} + \frac{x-4}{x-5} = \frac{10}{3}, x \neq 3,5$ as a quadratic equation in standard form. Hence find the roots of the equation thus formed.

Section – E

(4× 2= 8)

Q22. The below picture are few natural examples of parabolic shape which is represented by a quadratic polynomial. A parabolic arch is an arch in the shape of a parabola. In structures, their curve represents an efficient method of load, and so can be found in bridges and in architecture in a variety of forms.





Based on above information, answer the following questions.

(i) If α and $\frac{1}{\alpha}$ are the zeroes of the polynomial $2x^2 - x + 8k$, then find the value of k.

(ii) Find the sum of the zeros of the polynomial $p(x) = 2x^2 - x + 2$.

(iii) If the sum of the zeroes is $-p$ and the product of the zeroes is $-\frac{1}{p}$, then find the quadratic polynomial.

OR

Find the zeros of the polynomial $p(x) = 4x^2 - 4x + 1$.

Q23. A school is organizing a grand cultural event to show the talent of its students. To accommodate the guests, the school plans to rent chairs and tables from a local supplier. It finds that rent for each chair is 50 and for each table is 200. The school spends 30,000 for renting the chairs and tables. Also, the total number of items (chairs and tables) rented are 300.

Based on the above information; answer the following questions:

(i) Write down the pair of linear equations representing the given information.

(ii) What is maximum number of tables that can be rented in 30,000 if no chairs are rented ?

(iii) Find the number of chairs and number of tables rented by the school.

OR

If the school wants to spend a maximum of 27,000 on 300 items (tables and chairs), then find the number of chairs and tables it can rent.