DAV PUBLIC SCHOOLS, BHUBANESWAR
PERIODIC ASSESSMENT -I (2022-23)

- Check that this question paper contains **4** printed pages.
- Check that the question paper contains **17** questions.
- Write down the Serial Number of the question in the left side of the margin before attempting it.
- 15minutes time has been allotted to read this question paper. The question paper will be distributed 15 minutes prior to the commencement of the examination. The students will read the question paper only and will not write any answer on the script during this period.

CLASS-X
SUB: MATHEMATICS

Time Allowed: 1½ Hours   **Maximum Marks : 40**

General Instructions:

1. All questions are compulsory.
2. The question paper consists of 17 questions divided into four sections A , B, C and D.
3. Section A contains 6 questions of 1 mark each. Section B contains 3 questions of 2 marks each. Section C contains 4 questions of 3 marks each. Section D contains 4 questions of 4 marks each including two case study questions.
4. There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, 1question of 2 marks each, 1 question of 3 marks each and 1 question of 4 marks each. You have to attempt only one of the alternatives in *all such questions*.

SECTION -A
(Question numbers 1 to 6 carry 1 mark each)

Q1. Find the ratio of LCM and HCF of the least composite number and the least prime number.

OR

If $a = 2^3 \times 3$, $b = 2 \times 3 \times 5$, $c = 3^n \times 5$ and LCM$(a,b,c) = 2^3 \times 3^2 \times 5$, then find the value of $2n + 4$.

Q2. If one root of the quadratic polynomial $(k - 1) x^2 - 10x + 3$ is the reciprocal of the other then find the value of k.
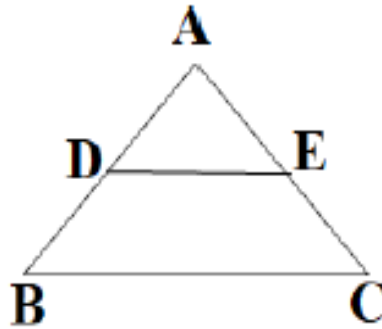
OR

Find the quadratic polynomial, the sum of whose zeroes is -5 and their product is 6.

Q3. Find the number of solutions of $3^{x+y} = 243$ and $243^{x-y} = 3$.

Q4. If $217x + 131y = 913$, $131x + 217y = 827$, then find $x + y$

Q5. In the figure, if DE∥ BC, AD = 3cm, BD = 4cm and BC= 14 cm, then find DE .

Q6. If the angles of ∆ABC are in ratio 1:1:2, respectively (the largest angle being angle C), then the value of $\dfrac{secA}{cosecB} - \dfrac{tanA}{cotB}$.

SECTION -B

(Question numbers 7 to 9 carry 2 marks each)

Q7. State Fundamental theorem of Arithmetic. Is it possible that HCF and LCM of two numbers be 24 and 540 respectively. Justify your answer.

Q8. If $bx + ay = a^2 + b^2$ and $ax - by = 0$, then the value of $x - y$.

Q9. Evaluate: $4(\sin^4 30° + \cos^4 60°) - 3(\cos^2 45^0 - \sin^2 90°)$

OR

If tan $(A + B) = \sqrt{3}$, tan $(A - B) = \dfrac{1}{\sqrt{3}}$ $0^0 < A + B \le 90^0$, then find A and B.
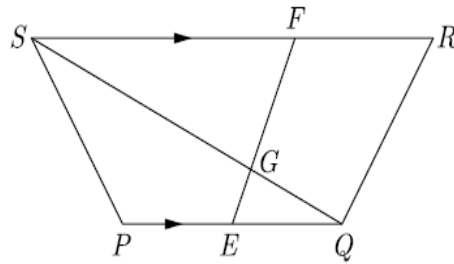
SECTION-C

(Question numbers 10 to 13 carry 3 marks each)

Q10. Prove that $\sqrt{3}$ is an irrational number.

Q11. Find a quadratic polynomial, the sum and product of whose zeroes are $\sqrt{2}$ and $-\dfrac{3}{2}$, respectively. Also find its zeroes.
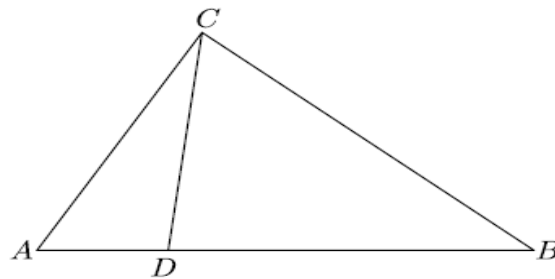
Q12. If $5 \tan \theta = 3$, then what is the value of $\left(\dfrac{5\sin\theta - 3\cos\theta}{4\sin\theta + 3\cos\theta}\right)$?

Q13. In the figure, PQRS is a trapezium in which PQ || RS. On PQ and RS, there are points E and F respectively such that EF intersects SQ at G. Prove that EQ×GS = GQ×FS.

OR

In the given figure, if $\angle ACB = \angle CDA$, $AC = 6$ cm and $AD = 3$ cm, then find the length of AB.

SECTION-D

(Question numbers 14 to 17 carry 4 marks each, including two case study questions.)

Q14. The Present age of the father is twice the sum of the ages of his 2 children. After 20 years, his age will be equal to the sum of the ages of his children. Find the age of the father.

OR

Determine graphically the coordinates of the vertices of triangle, the equations of whose sides are given by $2y - x = 8$, $5y - x = 14$ and $y - 2x = 1$.

Q15. If $a\cos\theta - b\sin\theta = c$, prove that $a\sin\theta + b\cos\theta = \pm\sqrt{a^2 + b^2 - c^2}$

Q16. Case Study -1

Polynomials are everywhere. They play a key role in the study of algebra, in analysis and on the whole many mathematical problems involve them. Polynomials are used to describe curves of various types. While playing in garden, Rohit saw a Nest and asked his elder brother what is that? He replied that it's a nest made by bird to live themselves. Also he told about the shape of the nest formed. The mathematical representation of the nest structure is shown in the graph
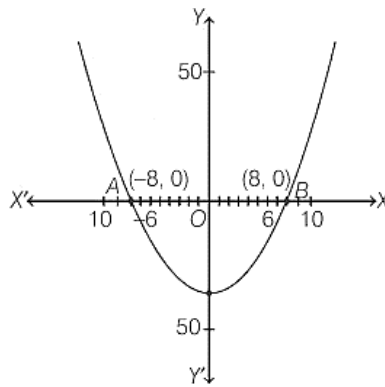
(i) Graph of the above polynomial is _____ in shape.

a) Straight line   b) Parabolic   c) Circular   d) None of these

(ii) The expression of the polynomial represented by the graph is

a) $x^2 - 49$ b) $x^2 - 64$ c) $x^2 - 36$ d) $x^2 - 81$

(iii) Find the value of the polynomial represented by the graph when x = 11

a) 75   b) -57   c) +57   d) -75

(iv) The sum of zeroes of the polynomial $x^2 - 4x + 4$

a) -1   b) -2   c) 2   d) 4

(v)   If the sum of zeros of a polynomial $ax^2 + 5x - 3a$ is equal to their Product, then find the value of a

a) -5   b) -3   c) $-\dfrac{5}{3}$ d) $\dfrac{5}{3}$

Q17. Case Study 2 (Answer both the question with the process)
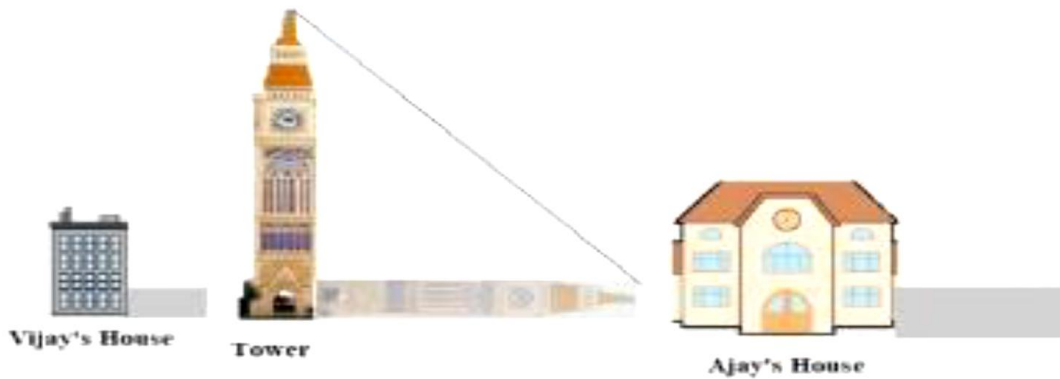
Vijay is trying to find the average height of a tower near his house. He is using the properties of similar triangles. The height of Vijay's house is 20m when Vijay's house casts a shadow 10m long on the ground. At the same time, the tower casts a shadow 50m long on the ground and the house of Ajay casts 20m shadow on the ground

(i) What will be the length of the shadow of the tower when Vijay's house casts a shadow of 12m?

(ii) When the tower casts a shadow of 40m, same time what will be the length of the shadow of Ajay's house?