CLASS: IX   **FULL MARKS: 80**
SUBJECT: MATHEMATICS [SET A]   **TIME: $2\frac{1}{2}$ HOURS**

Answers to this Paper must be written on a paper provided separately.

You will not be allowed to write during the first 15minutes.

This time is to be spent in reading the question paper.

The time given at the head of this Paper is the time allowed for writing the answers.

Attempt all questions from Section A and any four questions from Section B.

The intended marks for questions or parts of questions are given in brackets [ ].

This paper consists of 5 printed pages.

SECTION A
(*Attempt **all** questions from this section*)

Question1

Choose the correct answers to the questions from the given options. (Do not copy the question, Write the correct answer only.)   **[15]**

(i) A rational number between $\frac{5}{7}$ and $\frac{5}{11}$ is:

(a) $\left(\frac{5}{7} + \frac{5}{11}\right) \div 2$ **(b)** $(\frac{5}{7} + \frac{5}{11}) \times 2$ **(c)** $(\frac{5}{7} + \frac{5}{11}) + 2$ **(d)** $(\frac{5}{7} + \frac{5}{11})$

(ii) The Compound Interest on ₹ 1000 for two years at 5% per annum.is:

(a) ₹ 112.50   **(b)** ₹ 102.50   **(c)** ₹ 205   **(d)** ₹ 220.50

(iii) If $x^2 + y^2 = 12$ and $xy = 12$, then the value of x+ y is:

(a) 4   **(b) -4**   **(c) 0**   **(d) ±6**

(iv) Factorisation of 2r (y - x) + s (x - y) will be:

(a) (x - y) (s - 2r)   **(b) (x - y) (2r - s)**   **(c) (y - x) (s - 2r)**   **(d) (y – x)(x + 2)**

(v) If x = 1, y = 2 is a solution of the equation 2x + 3y = k, then the value of k is:

(a) 5   (b) 6   (c) 7   (d) 8

(vi) The value of n if $9^n + 9^n + 9^n = 3^{2013}$ will be:

(a) 1008   (b) 1006   (c) 2006   (d) 2009

(vii) If $\log_5(x - 7) = 1$, then the value of x is:

(a)15   (b) -15   (c) 12   (d) 2

(viii) If $\triangle ABC \cong \triangle PQR$, then the which one of the following is not true?

(a) AC = PR   (b) BC = PQ   (c) QR = BC   (d) AB = PQ

(ix) In $\triangle PQR$, $\angle R = \angle P$ and QR = 4 cm and PR = 5 cm. Then the length of PQ is:

(a) 2 cm   (b) 2.5 cm   (c) 4 cm   (d) 5 cm

(x) Two sides of a triangle are of lengths 5 cm and 1.5 cm. The length of the third side of the triangle cannot be:

(a) 3.4 cm   (b) 3.6 cm   (c) 3.8 cm   (d) 4.1 cm

(xi) The distance of the point (3, 5) from the origin is:

(a) $\sqrt{32}$ units   (b) 8 units   (c) $\sqrt{34}$ units   (d) 2 units

(xii) If cos A = 4/5, then the value of tan A is:

(a)3/5   (b) 3/4   (c)4/3   (d)5/3

(xiii) If $\sin A = \dfrac{\sqrt{3}}{2}$ and $\cos B = \dfrac{1}{2}$, then the value of A + B is:

(a) 120 °   (b) 90 °   (c) 60 °   (d) 30 °

(xiv) Assertion (A): Two angles measures (a – 60°) and (123º – 2a). If each one is opposite to equal sides of an isosceles triangle, then the value of a is 61°.
Reason (R): Sides opposite to equal angles of a triangle are equal.
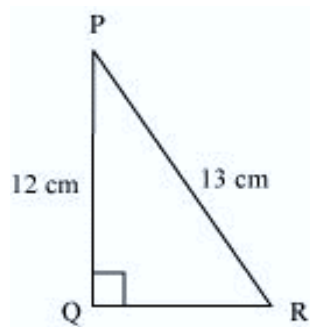
a) Both (A) and (R) are true.   b) Both (A) and (R) are false.
c) (A) is true but (R) is false.   d) (A) is false but (R) is true.

(xv) The number $(\sqrt{2} + 5)^2$ is:

(a) A natural number   (b) An integer   (c) A rational number
(d) An irrational number

Question 2

(i) In the given figure, find $\dfrac{sec\,P - cot\,R}{cosec\,R}.$ **[4]**

(ii) A man borrows ₹ 15000 at 14% p.a. compounded annually, calculate the amount he has to pay at the beginning of the 3rd year. **[4]**

(iii) If $4^{x-2} - 2^{x+1} = 0$, find the value of $2^x \div 3^{x-3}$ **[4]**

Question 3

(i) Factorise the following:

a) $x^2 + 13x - 168$
b) $a^2 + 2ab + b^2 - c^2$ **[2+2]**

**(ii) Which point on the y-axis is equidistant from the points (12, 3) and (-5, 10)?** **[4]**

(iii) Solve Graphically the equation $3x + 5y = 12$ and $3x - 5y + 18 = 0$. Also find the area of triangle formed by the two lines and x axis. **[5]**

SECTION B

*(Attempt **any four** questions from this section)*

Question 4

(i) If $a + b = 7$ and $ab = 10$; find $a - b$. **[3]**
(ii) In the given figure, AP = BQ, PR = QS also AP and BQ both perpendicular to PQ. Show that $\triangle$APS $\cong$ $\triangle$BQR **[3]**
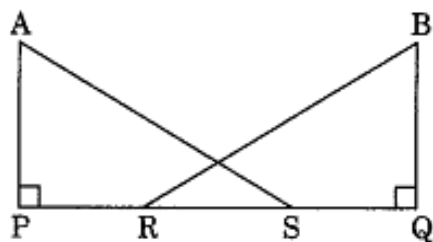
(iii) Solve for x: $\log_2(x + 2) + \log_2(x + 1) = \log_2 6$ **[4]**

Question 5

(i) If $x^{\frac{1}{a}} = y^{\frac{1}{b}} = z^{\frac{1}{c}}$ and $xyz = 1$ then show that a+ b+ c = 0   [3]

(ii) If $a^2 - 3a + 1 = 0$, and $a \neq 0$; find $a^2 + \dfrac{1}{a^2}$ [3]

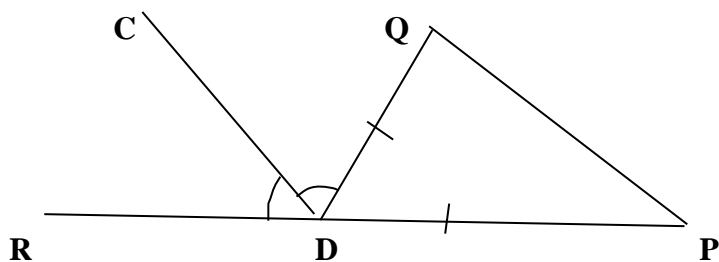(iii) Solve the following pairs of equations by the method of elimination:

$5x + \dfrac{4}{y} = 7$ and $4x + \dfrac{3}{y} = 5$ [4]

Question 6

(i) Factorize: $y^8 - x^8$ [3]

(ii) Simplify by rationalising the denominator: $\dfrac{3\sqrt{2} - 2\sqrt{3}}{3\sqrt{2} + 2\sqrt{3}} + \dfrac{\sqrt{12}}{\sqrt{3} - \sqrt{2}}$ [3]

(iii) DPQ is an isosceles triangle with DP = DQ. A straight-line CD bisects the exterior ∠QDR. Prove that DC is parallel to PQ.   [4]
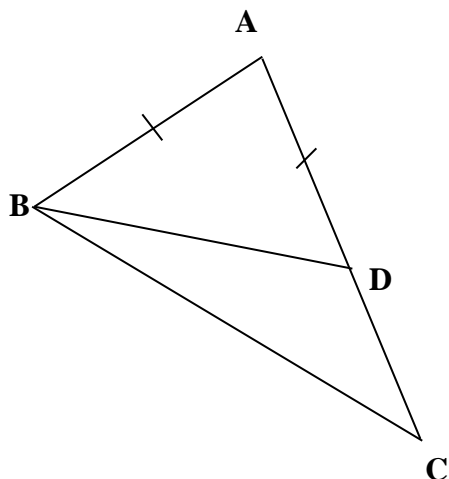

Question 7

(i) Find the value of: tan 10° tan 20° tan 30° tan 40° tan 50° tan 70° tan 80°   [3]

(ii) If log (x + 5) + log (x - 5) = 2 log 12, find the value of x.   [3]

(iii) In the given figure AC > AB and D is any point on AC such that AB = AD, show that BC > CD.   [4]
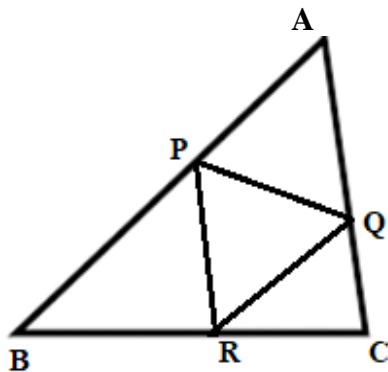
Question 8

(i) What sum invested at 4% per annum compounded semi-annually amounts to ₹ 7803 at the end of one year? [3]

(ii) Factorise $a^2 + b^2 + 2(ab + bc + ca)$ [3]

(iii) If $x = 2 + \sqrt{3}$, find the value of $x^3 + \dfrac{1}{x^3}$ [4]

Question 9

(i) Show by the method of contradiction that $\sqrt{11}$ is an irrational number. [3]

(ii) The population of a town was 423500 in the year 2020. It increases at the rate of 10% every year. What was its population in the year 2018? [3]

(iii) In Δ ABC, the points P, Q, R are on AB, AC and BC respectively, prove that AB + BC + AC > PQ + QR + PR. [4]

Question 10

(i) Show that the triangle formed by the points A (3, 3), B (8, -2) and C (-2, -2) is a right-angled isosceles triangle. (use distance formula) [3]

(ii) If $\tan\theta = \dfrac{a}{b}$ then find the value of $\dfrac{a\,\sin\theta + b\,\cos\theta}{a\,\sin\theta - b\cos\theta}$ [3]

(iii) Six years after a woman's age will be three times her daughter's age, and three years ago, she was nine times as old as her daughter. Find their present ages. [4]