

10th KVS Junior Mathematics Olympiad (JMO) – 2007

M.M. 100

Time : 3 hours

Note : Attempt all questions.

1. Solve

$$|x-1| + |x| + |x+1| = x + 2$$

2. Find the greatest number of four digits which when divided by 3,

5, 7, 9 leaves remainders 1, 3, 5, 7 respectively.

3. A printer numbers the pages of a book starting with 1. He uses

3189 digits in all. How many pages does the book have ?

4. ABCD is a parallelogram. P, Q, R and S are points on sides AB, BC, CD and DA respectively such that AP=DR. If the area of the parallelogram is 16 cm², find the area of the quadrilateral PQRS.

5. ABC is a right angle triangle with B = 90°. M is the mid point of AC and BM = $\sqrt{117}$ cm. Sum of the lengths of sides AB and BC is 30 cm. Find the area of the triangle ABC.

6. Solve :

$$\frac{\sqrt{a+x} + \sqrt{a-x}}{\sqrt{a+x} - \sqrt{a-x}} = \frac{a}{x}$$

7. Without actually calculating, find which is greater :

31^{11} or 17^{14}

8. Show that there do not exist any distinct natural numbers a, b, c, d such that

$$a^3 + b^3 = c^3 + d^3 \text{ and } a + b = c + d$$

9. Find the largest prime factor of :

$$3^{12} + 2^{12} - 2 \cdot 6^6$$

10. If only downward motion along lines is allowed, what is the total number of paths from point P to point Q in the figure below ?

