

The Mathematical High School, Belgrade

THE QUALIFICATION TEST IN MATHEMATICS
for enrollment in 1st grade

9.06.2002.

1. If $\frac{1,2:0,375-0,2}{6\frac{4}{25}:15\frac{2}{5}+0,8} = \frac{6}{x}$, then:

A) $0 < x \leq 2$ B) $x > 5$ C) $2 < x \leq 3$ D) $4 < x \leq 5$ E) 6 N) I don't know

2. Which of the following equalities are correct for each positive number a and all natural numbers m and n :

I) $a^m + a^n = a^{m+n}$ II) $a^m - a^n = a^{m-n}$ III) $a^m + a^n = a^{m \cdot n}$ IV) $a^m - a^n = a^{m:n}$?

A) only (III) and (IV) are correct B) only (III) is correct C) only (I) and (II) are correct D) none of them is correct E) all of them are correct N) I don't know

3. The following sentences are given:

I) If α and β are two mutually perpendicular planes, then every line p which is perpendicular to the plane α is also perpendicular to the plane β .

II) If α and β are two mutually perpendicular planes, then every line p which is perpendicular to the plane α is parallel to the plane β .

III) If α and β are two mutually perpendicular planes, then every line p which is parallel to the plane α is perpendicular to the plane β .

Correct are the sentences:

A) all B) none C) only (I) D) only (I) and (II) E) only (II) N) I don't know

4. A circle is inscribed in the isosceles triangle ABC ($AB = AC = 27$ cm , $BC = 18$ cm) . The circle touches the sides AB and AC in points D and E . The length of the segment DE is:

A) $10\sqrt{2}$ cm B) 10,8 cm C) 24 cm D) 12 cm E) 15 cm N) I don't know

5. If x and y are real numbers the minimal value of the expression $x^2 - 8xy + 19y^2 - 6y + 3$ is:

A) 0 B) 3 C) 6 D) 19 E) -8 N) I don't know

6. In summation

$$\begin{array}{r} ABCDACE \\ BCDACE \\ CDACE \\ DACE \\ ACE \\ CE \\ E \\ \hline EEEEEEE2 \end{array}$$

A, B, C, D and E are different digits. The sum $A + B + C + D + E$ equals:

A) 25 B) 21 C) 28 D) 22 E) 17 N) I don't know

7. In two flower gardens roses and carnations are being grown. Roses cover 65% of the area of the first flower garden, 45% of the area of the second flower garden and 53% of the overall area of both gardens. Which percentage of the overall area of both gardens is covered by the first flower garden?

A) 55% B) 50% C) 45% D) 40% E) 35% N) I don't know

8. The area of the triangle ABC is 30 cm^2 . Point M belongs to the side AB , so that $AM = 2 \cdot MB$, and point N belongs to the side BC so that $BN = NC$. P is the intersection point of the segments AN and CM . Area of the quadrangle $MBNP$ is:

A) 11 cm^2 B) 8 cm^2 C) 9 cm^2 D) 7 cm^2 E) 10 cm^2 N) I don't know

9. How many four digit numbers divisible by 15 having the digit of ones equal to the digit of thousands are there?

A) 6 B) more than 32 C) 26 D) 31 E) 18 N) I don't know

10. The sum of all solutions of the equation $||2x - 3| - 4| = 6$ is:

A) 3 B) 6 C) 10 D) $-\frac{7}{2}$ E) $\frac{13}{2}$ N) I don't know

11. Regular tetrahedron $ABCD$ with an edge length a is given. If K, L, M and N are midpoints of the edges AB, BC, AC and AD respectively then the volume of the pyramid $KLMN$ equals:

A) $\frac{a^3\sqrt{3}}{96}$ B) $\frac{a^3\sqrt{2}}{96}$ C) $\frac{a^3\sqrt{2}}{48}$ D) $\frac{a^3\sqrt{3}}{48}$ E) $\frac{a^3\sqrt{3}}{12}$ N) I don't know

12. Number of the integer solutions of the inequality: $\frac{x^2-25}{(x-3)(x-6)} \leq 0$ is:

A) 11 B) 5 C) 7 D) 3 E) 9 N) I don't know

Solutions: 1-C ; 2-D ; 3- E ; 4 - D ; 5- A ; 6-D ; 7- D ; 8- D; 9-B ; 10-A; 11-B ; 12 - E.