

This mathematics test contains 15 problems. In all problems only one answer is correct and worth 2 points. Wrong answer brings -0.2 points. Answer N brings 0 points. The case of more than one answer, as well as the case of no answer, brings -0.3 points.

1. The value of the expression

$$\frac{2 \cdot \left(0, 2 + \frac{1}{4}\right) + 0, 63 : 0, 3}{0, 125 + \left(2^{-2} - \frac{1}{6} : \frac{4}{3}\right) : \frac{1}{2}}$$

is equal to:

- 1) 3; 2) $\frac{3}{8}$; 3) $\frac{8}{3}$; 4) 8; 5) 12; N) I don't know.

2. The real number m ($m \neq 5$), for which $(5 - m)x^2 + (m - 5)x + 1 > 0$ is true for all x , satisfies:

- 1) $-2 < m < 1$; 2) $1 < m < 5$; 3) $-3 < m < -2$;
4) $m > 5$; 5) $m < -3$; N) I don't know.

3. The product of all solutions of the equation

$$\left(\frac{5}{6}\right)^{x^2+3x-5} = \frac{\log 64}{\log 32}$$

is:

- 1) -3 ; 2) -4 ; 3) -5 ; 4) 1; 5) 4; N) I don't know.

4. Amount of water that should be added to 60g of 80% alcohol solution to get 60% alcohol solution is:

- 1) 40g; 2) 12g; 3) 20g; 4) 18g; 5) 45g; N) I don't know.

5. The value of the expression

$$\frac{\sin 15^\circ - \cos 15^\circ}{\sin 15^\circ + \cos 15^\circ} - \frac{\sin 15^\circ + \cos 15^\circ}{\sin 15^\circ - \cos 15^\circ}$$

is:

- 1) 1; 2) $\frac{2\sqrt{3}}{3}$; 3) $\frac{\sqrt{3}}{2}$; 4) $-\frac{2\sqrt{3}}{3}$; 5) $-\frac{4\sqrt{3}}{3}$; N) I don't know.

6. The sum of all solutions of the equation $\sqrt{3x^2 - 2x} = 2 - x$ is:

- 1) 1; 2) 2; 3) -2 ; 4) -1 ; 5) 0; N) I don't know.

7. The solution of the inequality $\log_3 2x > \log_{\sqrt{3}}(x - 4)$ is:

- 1) $2 < x < 8$; 2) $x > 8$; 3) $x < 2$ or $x > 8$;
4) $x > 4$; 5) $4 < x < 8$; N) I don't know.

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8. The equation $2 \cos^2 x + 3 \cos x - 2 = 0$ on the interval $[0, 2\pi]$:
- 1) has no solution; 2) has exactly one solution; 3) has exactly two solutions;
4) has exactly three solutions; 5) has exactly four solutions; N) I don't know.
9. In the arithmetic progression the second member is two times greater than the sum of the first and the second member. The seventh member is equal to 17. The sum of the first seven members is equal to:
- 1) -39 ; 2) -56 ; 3) 56 ; 4) 39 ; 5) 63 ; N) I don't know.
10. Measure of an angle between the line $y = 2$ and the parabola $y^2 = 4x$ is equal to:
- 1) $\frac{\pi}{6}$; 2) $\frac{\pi}{3}$; 3) $\arctg 2$; 4) $\arctg \frac{3}{2}$; 5) $\frac{\pi}{4}$; N) I don't know.
11. If $f\left(\frac{x+1}{3}\right) = \frac{x+4}{9}$, then $f(f(x))$ is equal to:
- 1) $3x - 1$; 2) $\frac{x+1}{3}$; 3) $\frac{x+4}{9}$; 4) $\frac{3x+1}{3}$; 5) x ; N) I don't know.
12. Numbers $-27, x_1, x_2, 1$ are successive members of geometric progression. The sum of these four numbers is:
- 1) -40 ; 2) 81 ; 3) 27 ; 4) 40 ; 5) -20 ; N) I don't know.
13. Lines $y = 2x$ and $y = -2x$ are asymptotes of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. If the point $(-2\sqrt{2}, 4)$ lies on that hyperbola, then $a^2 + b^2$ is equal to:
- 1) 45 ; 2) 40 ; 3) 30 ; 4) 20 ; 5) 10 ; N) I don't know.
14. If $f(x) = \frac{x-3}{2}$ and $g(x) = 2 - x$, then $g^{-1}(f^{-1}(g(x)))$ is equal to:
- 1) $2 - x$; 2) $2x - 5$; 3) $x - 1$; 4) $2x + 3$; 5) $7 - 2x$; N) I don't know.
15. The polynomial $P(x) = ax^3 + bx^2 + 2x$ for which $P(x-1) = P(x) - 6x^2 + 10x - 6$ is true, is:
- 1) $2x^3 - 2x^2 + 2x$; 2) $3x^3 + x^2 + 2x$; 3) $2x^3 - x^2 + 2x$;
4) $x^3 + x^2 + 2x$; 5) $x^3 - x^2 + 2x$; N) I don't know.