

VARIANT 191

1 Calculate the value of expression $\log_{128} 125 \cdot \log_{25} 32$.

- 1) $15/11$ 2) $15/14$ 3) $15/13$ 4) $15/17$

2 Solve the inequality $\frac{x^2 - |x| - 12}{|x|} \leq 0$.

- 1) $[-4; 0) \cup (0; 4]$ 2) $[-3; 0) \cup (0; 4]$ 3) $[-4; 0) \cup (0; 3]$ 4) $[-3; 0) \cup (0; 3]$

3 Solve the equation $\frac{5x^2}{x+2} - \frac{x+5}{x^2} = \frac{4x^2-3}{x^2}$. Write down the answer as the sum of roots.

- 1) 4 2) 2 3) 3 4) 1

4 Calculate the value of expression $\operatorname{tg} \frac{19\pi}{4} \cdot \sin \frac{13\pi}{6}$.

- 1) $-0,25$ 2) $-0,45$ 3) $-0,6$ 4) $-0,5$

5 What is the angle between tangent to the graph of the function $y = -6\sqrt{x} + 7$ and abscissa axis at the point $x = 3$?

- 1) 150° 2) 120° 3) 90° 4) 45°

6 Solve the system of equations $\begin{cases} 3x^2 - 4xy + 2y^2 = 17, \\ x^2 - y^2 + 16 = 0. \end{cases}$ Write down the answer $\Sigma(x_i^2 + y_i^2)$, where (x_i, y_i) - system of equations solutions.

- 1) $1400/9$ 2) $1300/9$ 3) $1000/9$ 4) $1700/9$

7 Find all values of the parameter a for which the equation $3\sin x - 4\cos x = a$ has a solution.

- 1) $[-5; 5]$ 2) $[-3; 3]$ 3) $[-4; 4]$ 4) $[-5; 4]$

8 The bisector of the angle A at the base of the trapezoid $ABCD$ is perpendicular to its diagonal and crosses the side CD at the point E and $CE:ED = 2:3$. Find the ratio of $BC:CK$, where K is the intersection point of bisector with line BC .

- 1) $2:3$ 2) $1:2$ 3) $3:4$ 4) $1:3$

9 Solve the inequality $\log_3(x^2 + 6x + 10) + 0,5 \log_{\frac{1}{9}}(x + 2) \leq 0,5 \log_{\sqrt{3}} 7$.

- 1) $(-2; 4]$ 2) $(-2; 3,5]$ 3) $(-2; 3]$ 4) $(-2; 5]$

10 $SABCD$ is a regular quadrangle pyramid, all edges of pyramid have length of 1. Point E is a middle of SF . Find the angle between ED and plane ACS

- 1) $\arcsin(0,15\sqrt{30})$ 2) $\arcsin(0,2\sqrt{30})$ 3) $\arcsin(0,1\sqrt{30})$ 4) $\arcsin(0,1\sqrt{30})$

You can provide your own version of the answer to any problem.

«Approved by»

Admission director



In the task №№ 2, 5, 6, 8, 10 select the correct answer.

In the task №№ 1, 3, 4, 7, 9 get an answer.

Variant №7

1. A cargo was dropped down a helicopter which hovered at height of $h = 125$ m. When will the cargo reach the land? Free fall acceleration is $g = 10$ m/s². Air resistance must be ignored.

Answer: _____ s

2. A body was lifted from the Earth surface to the height of $H = 12$ m and its potential energy increased by $\Delta E = 600$ J. What is the mass of the body? Free fall acceleration is $g = 10$ m/s².

2 kg 5 kg 15 kg 50 kg

3. A wave with frequency $\nu = 2$ Hz is diffusing along a rubber cord with the speed $v = 3$ m/s. At what distance are the nearest points of the wave oscillating together in one phase?

Answer: _____ m

4. In isobaric process, gas did $A = 270$ J of work. By how much will the volume increase in this process if gas pressure is $P = 4,5 \cdot 10^4$ Pa?

Answer: _____ l

5. What is the amount of heat generated during the freezing of $m = 10$ kg of water taken at temperature $t = 0^\circ\text{C}$? The heat of ice melting is $\lambda = 3,3 \cdot 10^4$ J/kg.

330 J 33 kJ 3,3 MJ 33 MJ

6. The charge of a particle of dust is $q = -3,2 \cdot 10^{-12}$ C. How many excessive electrons are there on the particle of dust? The charge of the electron is $e = -1,6 \cdot 10^{-19}$ C.

$2 \cdot 10^3$ $2 \cdot 10^5$ $2 \cdot 10^7$ $2 \cdot 10^9$

7. When a charge of $q = 6 \cdot 10^{-5}$ C passes through a capacitor, the difference in potentials on its plates is $U = 10$ V. What is the capacity of the capacitor?

Answer: _____ μF

8. The current density of a conductor with the cross section of $S = 2$ mm² is $j = 3$ A/mm². What is the current rate in the capacitor?

6 μA 6 mA 6 A 60 A

9. One laser emits monochrome light for which the wave length is $\lambda_1 = 700$ nm, another laser's wave length is $\lambda_2 = 350$ nm. What is the coefficient of photons impulses emitted by the laser?

Answer: _____

10. The nucleus of Thorium isotope ${}_{90}^{234}\text{Th}$ undergoes three consecutive alpha-decays. Determine the charge number of the resulting isotope.

84 78 144 222