

Документ подписан простой электронной подписью
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Diagnostic testing

Discipline “Physics, Mathematics”

Term 1

Curriculum	31.05.01
Specialty	General Medecine
Form of education	Full-time
Designer Department	Experimental Physics
Graduate Department	Internal Diseases

Competence	Task	Answers	Type of complexity
GPC-4.1	<p><i>Choose one correct answer</i></p> <p>1. The limit of the ratio of the increment of the function at the point x_0 to the increment of the argument at the point x_0 as the latter approaches zero is:</p>	<p>a) the derivative of a function; b) function differential; c) the antiderivative of a function; d) the integral of the function.</p>	low
GPC-4.1	<p><i>Replace a gap in a sentence with one of the words below</i></p> <p>2. The function $F(x)$ is called _____ for the function $f(x)$ on a certain interval, if for all x values from this interval the equality $F'(x) = f(x)$ is satisfied.</p>	<p>a) a derivative b) a differential; c) an antiderivative function; d) an indefinite integral</p>	low
GPC-4.1	<p><i>Choose one correct answer</i></p> <p>3. The path traveled by the body is:</p>	<p>a) a vector drawn from the origin of the coordinates to the final position of the point; b) the length of the trajectory; c) the line that the material point draws when moving; d) a vector drawn from the initial position of a material point to its final position; e) the modulus of movement of the body.</p>	low
GPC-4.1	<p><i>Choose one correct answer</i></p> <p>4. The molar heat capacity of a substance is:</p>	<p>a) the amount of heat that must be transferred to one kilogram of a substance in order to change its temperature by one kelvin; b) the amount of heat that needs to be transferred to one cubic meter of a substance in order to</p>	low

		<p>change its temperature by one kelvin;</p> <p>c) the amount of heat that needs to be transferred to one mole of a substance in order to change its temperature by one kelvin;</p> <p>d) the amount of heat that must be transferred to one square meter of the surface of a substance in order to change its temperature by one kelvin.</p>	
GPC-4.1	<p><i>Choose one correct answer</i></p> <p>5. Let two thermodynamic systems (objects or bodies) A and B are in thermal contact and therefore can exchange energy with each other. The temperature of the first system is T_A and T_B is temperature of the second system. The temperatures of the systems are not equal. What is the direction of the heat transfer between this systems?</p>	<p>a) there is no heat transfer between these systems.</p> <p>b) the data in the problem statement is not enough to determine the direction of heat transfer;</p> <p>c) heat is transferred is from system A to system B;</p> <p>d) heat is transferred is from system B to system A.</p>	low
GPC-4.1	<p><i>Choose one correct answer</i></p> <p>6. Find the derivative of the function $y = \sqrt{x}\sqrt{x}\sqrt{x}$:</p>	<p>a) $\frac{1}{8\sqrt{x}}$;</p> <p>b) $\frac{7}{8\sqrt{x}}$;</p> <p>c) $\frac{7}{8\sqrt{x}}$;</p> <p>d) $\frac{7}{8\sqrt{x}}$.</p>	medium
GPC-4.1	<p><i>Choose all correct answers</i></p> <p>7. From the following formulas of basic indefinite integrals, choose those that are written correctly:</p>	<p>a) $\int x^n dx = \frac{x^{n+1}}{n+1} + C,$ ($n \neq -1$);</p> <p>b) $\int \frac{1}{x} = \ln x + C;$</p> <p>c) $\int ax = ax \ln a + C;$</p> <p>d) $\int \sin x = \cos x + C;$</p> <p>e) $\int \cos x = \sin x + C.$</p>	medium
GPC-4.1	<p><i>Calculate the answer to the problem</i></p> <p>8. The length of a simple pendulum is 9.8 m. What is corresponding approximate period of the motion? ($\pi=3.14$)</p>	Give a numerical answer	medium
GPC-4.1	<p><i>Match</i></p> <p>9. A current flows through a wire resistor. How will the thermal power released by the resistor and its electrical resistance change when the wire length is reduced by 4</p>	<p>1) thermal power released by the resistor</p> <p>2) electrical resistance</p> <p>a) increase</p> <p>b) decrease</p> <p>c) will not change</p>	medium

	times and the current doubled? For each value, determine the change.		
GPC-4.1	<i>Choose all correct answers</i> 10. What is the main characteristic of electric field?	a) electric charge q (SI units: coulombs); b) electric field vector E (SI units: volts per meter); c) Electrostatic (or Coulomb's) force F (SI units: newtons); d) permittivity constant ϵ_0 (SI units: $C^2/N \cdot m^2$)	medium
GPC-4.1	<i>Choose one correct answer</i> 11. With regard to blood viscosity, indicate the correct statement:	a) blood is a Newtonian fluid; b) blood is a non-Newtonian fluid; c) the dependence of blood viscosity on the speed of its movement in the vessel has not been established; d) the viscosity of the blood cannot be determined.	medium
GPC-4.1	<i>Calculate the answer to the problem</i> 12. What fraction of the initial large number of radioactive nuclei decays over a time interval equal to two half-lives?	Give a numerical answer	medium
GPC-4.1	<i>Replace a gap in a sentence with one of the words below</i> 13 Temperature is a way to describe the _____ of the gas molecules.	a) average translational kinetic energy; b) average potential energy; c) internal energy; d) volume; e) pressure.	medium
GPC-4.1	<i>Choose one correct answer</i> 14. Choose the mathematical notation of the Malus Law for polarization:	a) $I = \frac{1}{2} I_0 \cos^2 \varphi$ b) $I = I_0 \cos^2 \varphi$ c) $I = I_0 \sin^2 \varphi$ d) $I = \frac{1}{2} I_0 \cos^2 \varphi$	medium
GPC-4.1	<i>Choose one correct answer</i> 15. The law of refraction of geometric optics: α is the angle of incidence of the beam, β - angle of refraction, n_1, n_2 - refractive indices 1 and 2 of the medium	a) $\frac{\sin \alpha}{\sin \beta} = \frac{n_1}{n_2}$ b) $\frac{\sin \alpha}{\sin \beta} = \frac{n_2}{n_1}$ c) $\frac{\sin \alpha}{\sin \beta} = \frac{n_2}{n_1}$ d) $\frac{\sin \alpha}{\sin \beta} = n_1 \times n_2$	medium
GPC-4.1	<i>Choose all correct answers</i> 16. How is the cross product different from the dot product?	a) magnitude is calculated using sine of angle between vectors b) it indicates direction; c) resulting magnitude is calculated using cosine of angle between vectors;	high

		<p>d) it indicates neither magnitude nor direction;</p> <p>e) it indicates only magnitude.</p>	
GPC-4.1	<p><i>Choose one correct answer</i></p> <p>17. Calculate the integral $\int \sin x \cos 7x dx$.</p>	<p>a) $\cos^8 x - 7\sin^2 x \cos^6 x + C$;</p> <p>b) $-\frac{\cos^8 x}{8} + C$;</p> <p>c) $-\cos x \sin^7 x + C$;</p> <p>d) $\frac{1}{\sin 8x} + C$.</p>	high
GPC-4.1	<p><i>Choose all correct answers</i></p> <p>18. Suppose that the amount of water in a holding tank at t minutes is given by $V(t) = 2t^2 - 16t + 35$. What statements are correct?</p>	<p>a) the rate of change of the volume at $t=2$ equals to -8;</p> <p>b) the amount of water is decreasing at $t=2$;</p> <p>c) the volume of water is not changing at $t=4$;</p> <p>d) the amount of water is increasing at $t=3$;</p> <p>e) the rate of change of the volume at $t=2$ equals to -6;</p> <p>f) the volume of water is increasing at $t=4$;</p>	high
GPC-4.1	<p><i>Choose all correct answers</i></p> <p>19. Sources of magnetic fields are:</p>	<p>a) all conductors;</p> <p>b) some dielectrics;</p> <p>c) permanent magnets;</p> <p>d) moving electric charges;</p> <p>e) electric currents;</p> <p>f) constant electric fields;</p> <p>g) alternating electric fields.</p>	high
GPC-4.1	<p><i>Specify several correct answers</i></p> <p>20. What equations do not contradict the law of conservation of mass number in nuclear reactions?</p>	<p>a) ${}^{12}_7\text{N} \rightarrow {}^{12}_6\text{C} + {}^0_1\text{e}$;</p> <p>b) ${}^6_3\text{Li} + {}^1_1\text{p} \rightarrow {}^4_2\text{He} + {}^3_2\text{He}$;</p> <p>c) ${}^{12}_6\text{C} \rightarrow {}^{10}_6\text{N} + {}^0_1\text{e}$;</p> <p>d) ${}^9_4\text{Be} + {}^2_1\text{H} \rightarrow {}^{10}_5\text{B} + {}^1_0\text{n}$;</p> <p>e) ${}^{235}_{92}\text{U} + {}^1_0\text{n} \rightarrow {}^{92}_{38}\text{Sr} + {}^{139}_{54}\text{Xe} + {}^1_0\text{n}$.</p>	high