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	*Choose one correct answer* 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:	a) the derivative of a function; b) function differential; c) the antiderivative of a function; d) the integral of the function.	low
GPC-4.1	*Replace a gap in a sentence with one of the words below* 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.	a) a derivative b) a differential; c) an antiderivative function; d) an indefinite integral	low
GPC-4.1	*Choose one correct answer* 3. The path traveled by the body is:	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.	low
GPC-4.1	*Choose one correct answer* 4. The molar heat capacity of a substance is:	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	low

		change its temperature by one kelvin; 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; 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.	
GPC-4.1	*Choose one correct answer* 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?	a) there is no heat transfer between these systems. b) the data in the problem statement is not enough to determine the direction of heat transfer; c) heat is transferred is from system A to system B; d) heat is transferred is from system B to system A.	low
GPC-4.1	*Choose one correct answer* 6. Find the derivative of the function $y = \sqrt{x\sqrt{x\sqrt{x}}}$:	a) $\frac{1}{8\sqrt{x}}$; b) $\frac{7}{8\sqrt{x}}$; c) $\frac{7}{8\sqrt[8]{x}}$; d) $\frac{8}{\sqrt[8]{x}}$.	medium
GPC-4.1	*Choose all correct answers* 7. From the following formulas of basic indefinite integrals, choose those that are written correctly:	a) $\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$, $(n \neq -1)$; b) $\int \frac{dx}{x} = ln|x| + C$; c) $\int a^x = a^x lna + C$; d) $\int sinx = cosx + C$; e) $\int cosx = sinx + C$.	medium
GPC-4.1	*Calculate the answer to the problem* 8. The length of a simple pendulum is 9.8 m. What is corresponding approximate period of the motion? (π=3.14)	Give a numerical answer	medium
GPC-4.1	*Match* 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	1) thermal power released by the resistor 2) electrical resistance a) increase b) decrease c) will not change	medium

	times and the current doubled? For each value, determine the change.		
GPC-4.1	*Choose all correct answers* 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	*Choose one correct answer* 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	*Calculate the answer to the problem* 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	*Replace a gap in a sentence with one of the words below* 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	*Choose one correct answer* 14. Choose the mathematical notation of the Malus Law for polarization:	a) $I = \frac{1}{2} I_{ecm} \cos \varphi$ 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	*Choose one correct answer* 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) $\frac{\sin \beta}{\sin \alpha} = \frac{n_1}{n_2}$ c) $\frac{\sin \beta}{\sin \alpha} = \frac{n_2}{n_1}$ d) $\frac{\sin \alpha}{\sin \beta} = n_1 \times n_2$	medium
GPC-4.1	*Choose all correct answers* 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

		d) it indicates neither magnitude nor direction; e) it indicates only magnitude.	
GPC-4.1	*Choose one correct answer* 17. Calculate the integral $\int sinx cos^7 x dx$.	a) $cos^8 x - 7sin^2 x cos^6 x + C$; b) $-\frac{cos^8 x}{8} + C$; c) $-cosx sin^7 x + C$; d) $\frac{sin8x}{8} + C$.	high
GPC-4.1	*Choose all correct answers* 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?	a) the rate of change of the volume at $t=2$ equals to -8; b) the amount of water is decreasing at $t=2$; c) the volume of water is not changing at $t=4$; d) the amount of water is increasing at $t=3$; e) the rate of change of the volume at $t=2$ equals to -6; f) the volume of water is increasing at $t=4$;.	high
GPC-4.1	*Choose all correct answers* 19. Sources of magnetic fields are:	a) all conductors; b) some dielectrics; c) permanent magnets; d) moving electric charges; e) electric currents; f) constant electric fields; g) alternating electric fields.	high
GPC-4.1	*Specify several correct answers* 20. What equations do not contradict the law of conservation of mass number in nuclear reactions?	a) $^{12}_{7}N \rightarrow {}^{12}_{6}C + {}^{0}_{1}e$; b) $^{6}_{3}Li + {}^{1}_{1}p \rightarrow {}^{4}_{2}He + {}^{3}_{2}He$; c) $^{11}_{6}C \rightarrow {}^{10}_{7}N + {}^{0}_{-1}e$; d) $^{9}_{4}Be + {}^{2}_{1}H \rightarrow {}^{10}_{5}B + {}^{1}_{0}n$; e) $^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{95}_{38}Sr + {}^{139}_{54}Xe + 3{}^{1}_{1}p$.	high