

普通物理學 試題 (限用答案本作答)

Physics Portion of MCU Entrance Exam
(4 points per question)

(Write ALL answers in English)

- 1) What is the vertical acceleration of a projectile if the vertical component of its velocity vector is zero?
- 2) What is the weight of an object having mass 3 kg? ($a = 9.8 \text{ m/(s}^2\text{)}$)
- 3) If a 80 kg man stands still on a surface, what is the force acting on the man from the surface? What force, from the man, acts upon the surface? ($a = 9.8 \text{ m/(s}^2\text{)}$)
- 4) Which requires less work: Pushing a wheel barrel 10 m or pulling it 10 m? Explain.
- 5) Frictional forces act in the direction of motion? (True or False) Explain.
- 6) Is Earth's surface an inertial reference frame? Explain.
- 7) If K is kinetic energy and U is potential energy, then write the formula for energy conservation. Assume a perfectly conservative system.
- 8) During a perfectly elastic collision, kinetic energy and momentum are completely conserved. (True or False)
- 9) A solid cylinder and a hollow cylinder (of equal outer radii) are made of two different materials, so that they have equal masses, are held at rest at the top of an incline and then released. Which will reach the bottom first? Why?
- 10) How does water get to the top of very tall trees?
- 11) If a cork has density of $200 \text{ kg/(meter cubed)}$ what fraction of the cork's volume is submerged when it is floating in water? The density of water is $1000 \text{ kg/(meter cubed)}$.
- 12) What type of interference occurs when two waves meet while being 180 degrees out of phase with each other? (Constructive or Destructive) Draw a picture.
- 13) Moving at a rapid speed toward a sound source will cause the sound to appear to have a higher frequency or lower frequency? Explain.
- 14) Temperature is a measure of what average property of an ideal gas?
- 15) According the second law of thermodynamics an isolated system always moves toward a state of greater? Fill in the blank.
- 16) Draw the electric field of a positive point charge.
- 17) Draw the electric field of a positive and negative point charge separated by a small distance.

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- 18) Using Ohm's Law find the current through a 10 kOhm resistor attached to a 10 V battery. Neglect any internal resistance in the battery.
- 19) How do resistors in series add to make an equivalent resistance? Write an equation.
- 20) How do capacitors in series add to make an equivalent capacitance? Write an equation.
- 21) The time constant for an RC circuit is determined by what two values? Write an equation.
- 22) A current loop, in which the current moves in the clockwise direction, in the plane of this page will create a magnetic field which points into or out of the paper?
- 23) If a magnet moves through a loop of conducting material, it will induce a current to flow within that loop. Qualitatively speaking, what is the magnitude of the current?
- 24) Is the speed of light the same in all mediums? (Think about Snell's law and the index of refraction.) If you are on a train moving at .99 times the speed of light and the shine a flashlight out of the front of the train, how fast will the wave front of the flashlight propagate?
- 25) Is light a particle or a wave? Explain. What about electrons?

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