

Physics Pub Trivia Review (1 Hour)

Final Exam Topics: E&M, Circuits, Optics, SHM, Waves

Rules

- Teams of 3–4 students
- Questions given in groups of three
- No notes or phones during rounds
- Winning team earns **+1 point on the final exam**

Round 1 (Easy) — 1 point each

1. In simple harmonic motion, where is the acceleration greatest?
2. What happens to current in a series circuit?
3. If the frequency of a wave increases, what happens to its wavelength (wave speed constant)?

Round 2 (Easy–Medium) — 2 points each

1. A positive charge is placed in an electric field. In what direction does it accelerate?
2. What happens to the resistance of a circuit if resistors are added in parallel?
3. In a concave mirror, what type of image is formed when the object is inside the focal length?

Round 3 (Medium) — 3 points each

1. A charged particle moves parallel to a magnetic field. What is the magnetic force?
2. If the distance between two charges is doubled, what happens to the force?
3. What physical quantity is represented by the slope of a graph of electric potential vs position?

Round 4 (Medium–Hard) — 4 points each

1. A loop sits in a constant magnetic field. Under what condition is an emf induced?
2. Two identical springs: one has twice the spring constant. Which oscillates faster?
3. In a parallel circuit, which quantity is the same across each branch: current or voltage?

Round 5 (Hard) — 5 points each

1. A moving charge experiences a magnetic force that is always perpendicular to its velocity. What type of motion results?
2. If the magnetic field through a loop increases into the page, what direction is the induced current?
3. If the speed of a wave is constant, what relationship must hold between frequency and wavelength?

Final Round (Wager Round)

Teams may wager up to their total points.

1. A wave source is moving toward an observer. The observed frequency is higher than the emitted frequency.
 - (a) Is the wavelength in front of the source longer or shorter than behind it?
 - (b) What happens to the observed frequency if the source stops moving?
 - (c) Explain qualitatively why the Doppler effect occurs.

Answer Key

Round 1

1. At maximum displacement
2. Same everywhere
3. Decreases

Round 2

1. In direction of electric field
2. Decreases
3. Virtual and upright

Round 3

1. Zero
2. Decreases by factor of 4
3. Electric field ($E = -dV/dx$)

Round 4

1. When magnetic flux changes
2. The stiffer spring oscillates faster
3. Voltage

Round 5

1. Circular motion
2. Counterclockwise
3. $v = f\lambda$

Final Round

1. (a) Shorter
(b) Returns to original frequency
(c) Wavefronts compress in front and spread behind due to motion of source