

- 1) **D** For a particle trapped in an infinite one-dimensional box, the wave amplitude ψ can:
- A) have only one possible shape.
 - B) be either a sin wave or an exponential.
 - C) consist of several sin waves at the same energy.
 - D) consist of a specific frequency sin wave for each possible energy.
 - E) only be determined approximately.
- 2) **B** The *Correspondence Principle* says that:
- A) Quantum systems and classical systems cannot correspond to each other.
 - B) Quantum systems with large quantum numbers must approach classical physics.
 - C) ψ must correspond to a classical variable.
 - D) Quantum systems with only one quantum number must be classical.
 - E) Classical physics always corresponds to situations where ψ^2 is small.
- 3) **A** If you integrate any ψ^2 -function over all of space, you will get:
- A) One.
 - B) It depends on the exact ψ .
 - C) $(2/L)^{1/2}$
 - D) The probability that it has zero energy.
- 4) **C** If a photon is directed towards a quantum system, then the photon:
- A) will always be absorbed.
 - B) will be absorbed only if it has the exact energy of a quantum level.
 - C) may be absorbed if its energy can excite the particle to any higher level.
 - D) can have part of its energy absorbed by a particle.
 - E) can only excite the particle to the next-highest level.
- 5) **E** So-called “barrier penetration” comes about in quantum mechanics because:
- A) quantum mechanics cannot take barriers into account.
 - B) quantum particles never have constant energies.
 - C) ψ -functions always have long exponential tails.
 - D) electrons are very small and can burrow into barriers.
 - E) quantum particles have a certain probability of appearing in regions that they cannot reach classically.