

42 Lecture - PHY101

Important Mcqs

Which of the following is not a postulate of special relativity?

- a) The laws of physics are the same in all inertial frames of reference
- b) The speed of light in vacuum is the same in all inertial frames of reference
- c) The laws of physics are the same in all non-inertial frames of reference
- d) The principle of relativity

Answer: c) The laws of physics are the same in all non-inertial frames of reference

According to special relativity, which of the following is not an absolute quantity?

- a) Energy
- b) Momentum
- c) Velocity
- d) Mass

Answer: c) Velocity

In special relativity, the factor that relates time and space intervals between two events is known as:

- a) The speed of light
- b) The Lorentz factor
- c) The Doppler effect
- d) The Michelson-Morley factor

Answer: b) The Lorentz factor

What is the proper length of an object?

- a) The length of the object measured in its rest frame
- b) The length of the object measured in a moving frame of reference

- c) The length of the object measured by an observer at rest relative to the object
- d) The length of the object measured by an observer moving with the object

Answer: a) The length of the object measured in its rest frame

Which of the following statements is true regarding time dilation in special relativity?

- a) Time dilation occurs only for objects moving at speeds close to the speed of light
- b) Time dilation occurs for all objects in motion
- c) Time dilation occurs only for objects at rest
- d) Time dilation occurs only for objects in free fall

Answer: b) Time dilation occurs for all objects in motion

According to special relativity, the faster an object moves:

- a) The slower its internal clocks run
- b) The faster its internal clocks run
- c) Its internal clocks do not change
- d) None of the above

Answer: a) The slower its internal clocks run

In special relativity, the principle of causality is maintained by:

- a) The relativity of simultaneity
- b) The equivalence principle
- c) The principle of least action
- d) The principle of locality

Answer: a) The relativity of simultaneity

The twin paradox in special relativity involves:

- a) Two twins who travel at different speeds and reunite to find that one has aged more than the other
- b) Two twins who travel in opposite directions and reunite to find that they have aged the same amount
- c) Two twins who travel at the same speed and age at the same rate

d) None of the above

Answer: a) Two twins who travel at different speeds and reunite to find that one has aged more than the other

According to special relativity, the mass of an object:

a) Increases as its velocity increases

b) Decreases as its velocity increases

c) Remains constant regardless of its velocity

d) None of the above

Answer: b) Decreases as its velocity increases

The formula $E=mc^2$ in special relativity relates:

a) Energy and momentum

b) Energy and mass

c) Mass and momentum

d) None of the above

Answer: b) Energy and mass