

# 43 Lecture - PHY101

## Important Subjective

**What is the postulate of special relativity?**

**Answer:** The postulate of special relativity states that the laws of physics are the same for all observers in uniform motion relative to each other.

**What is time dilation?**

**Answer:** Time dilation is a phenomenon where time appears to run slower for an object in motion relative to an observer, as compared to an object at rest.

**What is length contraction?**

**Answer:** Length contraction is a phenomenon where the length of an object in motion appears shorter to an observer as compared to an object at rest.

**What is the twin paradox in special relativity?**

**Answer:** The twin paradox refers to a situation where one twin travels to a distant star at near-light speeds while the other twin remains on Earth. The traveling twin experiences time dilation and returns to Earth younger than the twin who stayed on Earth.

**What is the mass-energy equivalence?**

**Answer:** The mass-energy equivalence, expressed by Einstein's famous equation  $E=mc^2$ , states that mass and energy are interchangeable and are two forms of the same thing.

**What is the Lorentz transformation?**

**Answer:** The Lorentz transformation is a set of equations that describe how space and time coordinates of events appear to observers in relative motion with respect to each other.

**What is the concept of simultaneity in special relativity?**

**Answer:** Simultaneity is relative in special relativity, meaning that two events that appear simultaneous to one observer may not appear simultaneous to another observer in relative motion.

**What is the meaning of the term "relativistic" in special relativity?**

**Answer:** The term "relativistic" refers to the fact that the laws of physics in special relativity are relative to the observer's motion, rather than being absolute.

**How does special relativity explain the constancy of the speed of light?**

**Answer:** Special relativity explains the constancy of the speed of light by postulating that the speed of light is the same for all observers in uniform motion relative to each other, regardless of the motion of the light source or the observer.

**What is the role of the Lorentz factor in special relativity?**

**Answer:** The Lorentz factor, represented by the symbol  $\gamma$ , appears in many equations of special relativity and accounts for time dilation, length contraction, and the mass-energy equivalence. It is a measure of how "relativistic" an object's motion is, and approaches infinity as the object approaches the speed of light.