

# 43 Lecture - PHY101

## Important Mcqs

**What is the rest mass of a particle moving at a speed of  $0.6c$  if its relativistic mass is 2.5 times its rest mass?**

- A)  $1.8 m_0$
- B)  $1.4 m_0$
- C)  $2.0 m_0$
- D)  $2.5 m_0$

**Answer: B)  $1.4 m_0$**

**According to special relativity, what happens to time and length measurements as the speed of an object approaches the speed of light?**

- A) Time slows down and length contracts
- B) Time speeds up and length expands
- C) Time slows down and length expands
- D) Time speeds up and length contracts

**Answer: A) Time slows down and length contracts**

**What is the maximum speed limit in the universe according to special relativity?**

- A) The speed of sound
- B) The speed of light
- C) The speed of gravity
- D) The speed of time

**Answer: B) The speed of light**

**What is the formula for time dilation in special relativity?**

- A)  $t' = t / \sqrt{1 - v^2/c^2}$

B)  $t' = t \times \sqrt{1 - v^2/c^2}$

C)  $t' = t / (1 - v^2/c^2)$

D)  $t' = t \times (1 - v^2/c^2)$

**Answer: A)  $t' = t / \sqrt{1 - v^2/c^2}$**

**What is the name given to the phenomenon in which an object appears to be shorter when it is moving at a high speed relative to an observer?**

A) Time dilation

B) Length contraction

C) Relativistic acceleration

D) Mass increase

**Answer: B) Length contraction**

**What is the formula for the relativistic mass of a particle in motion?**

A)  $m = m_0 / \sqrt{1 - v^2/c^2}$

B)  $m = m_0 \times \sqrt{1 - v^2/c^2}$

C)  $m = m_0 / (1 - v^2/c^2)$

D)  $m = m_0 \times (1 - v^2/c^2)$

**Answer: B)  $m = m_0 \times \sqrt{1 - v^2/c^2}$**

**According to special relativity, what is the relationship between energy and mass?**

A) They are independent of each other

B) Energy and mass are equivalent and can be converted into each other

C) Energy can create mass but mass cannot create energy

D) Mass can create energy but energy cannot create mass

**Answer: B) Energy and mass are equivalent and can be converted into each other**

**What is the name given to the time dilation effect experienced by an object in motion due to gravity?**

A) Gravitational time dilation

B) Relativistic time dilation

C) Gravitational lensing

D) Frame dragging

**Answer: A) Gravitational time dilation**

**According to special relativity, what is the formula for relativistic momentum?**

A)  $p = mv$

B)  $p = m_0v$

C)  $p = m_0v / \sqrt{1 - v^2/c^2}$

D)  $p = m_0v \times \sqrt{1 - v^2/c^2}$

**Answer: D)  $p = m_0v \times \sqrt{1 - v^2/c^2}$**

**What is the name given to the phenomenon in which an object moving at a high speed experiences a decrease in its apparent mass?**

A) Time dilation

B) Length contraction

**C) Mass increase**

D