# Relativity Quiz Answer Key PDF

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**How does general relativity explain the phenomenon of gravitational lensING?**

**General relativity explains gravitational lensING as the bending of light around massive objects due to the curvature of spacetime, acting like a lens.**

**What are gravitational waves, and why was their detection significant for physics?**

**Gravitational waves are ripples in spacetime caused by accelerating masses. Their detection confirmed a major prediction of general relativity and opened a new way of observing the universe.**

**What role does the speed of light play in the theory of special relativity?**

**The speed of light is a constant in all inertIAL frames of reference, serving as a fundamental limit and a basis for the theory's postulates.**

**Discuss the significance of the Michelson-Morley experiment in the development of modern physics.**

**The Michelson-Morley experiment demonstrated the constancy of the speed of light, leading to the rejection of the ether theory and paving the way for Einstein's theory of special relativity.**

**Who formulated the theory of special relativity?**

A. Isaac Newton

**B. Albert Einstein ✓**

C. Niels Bohr

D. Galileo Galilei

**Which prediction of general relativity involves ripples in spacetime?**

A. Photoelectric Effect
**B. Gravitational Waves ✓**
C. Quantum Entanglement
D. Uncertainty Principle

**What must GPS technology account for to maintain accuracy?**

A. Quantum Mechanics
**B. Special and General Relativity ✓**
C. Classical Mechanics
D. Electromagnetism

**What is the speed of light in a vacuum?**

A. 3,000 km/s
B. 30,000 km/s
**C. 300,000 km/s ✓**
D. 3,000,000 km/s

**What is the term for the path followed by objects in curved spacetime?**

A. Trajectory
B. Orbit
**C. Geodesic ✓**
D. Vector

**Explain the concept of time dilation and provide an example of where it might be observed.**

**Time dilation is the effect where time passes slower for an object in motion relative to a stationary observer. An example is astronauts on the International Space Station experiencing slightly less time than people on Earth.**

**Describe how general relativity has changed our understanding of gravity compared to Newtonian physics.**

**General relativity describes gravity not as a force but as the curvature of spacetime caused by mass, unlike Newtonian physics which treats gravity as a force between masses.**

**What phenomena are predicted by the Schwarzschild solution? (Select all that apply)**

**A. Black Holes ✓**
B. Neutron Stars
C. White Dwarfs
**D. Gravitational Lensing ✓**

**Which are components of general relativity? (Select all that apply)**

**A. Spacetime Curvature ✓**
**B. Gravitational Waves ✓**
C. Quantum Fluctuations
**D. Geodesics ✓**

**What are effects of special relativity on moving objects? (Select all that apply)**

**A. Time Dilation ✓**
**B. Length Contraction ✓**
**C. Increased Mass ✓**
D. Constant Velocity

**Which are core postulates of special relativity? (Select all that apply)**

**A. The speed of light is constant for all observers. ✓**
B. Gravity is a force between masses.
**C. The laws of physics are the same for all observers in uniform motion. ✓**
D. Time is absolute.

**Which equation represents mass-energy equivalence?**

A. $F=ma$
**B. $E=mc^2$ ✓**
C. $a^2+b^2=c^2$

D. pV=nRT

**Which are implications of general relativity? (Select all that apply)**

**A. Black Holes ✓**
B. Time Travel
**C. Gravitational Time Dilation ✓**
**D. Expanding Universe ✓**

**Which experiment supported the constancy of the speed of light?**

A. Eddington's Solar Eclipse Experiment
**B. Michelson-Morley Experiment ✓**
C. Rutherford's Gold Foil Experiment
D. Young's Double-Slit Experiment

**What phenomenon describes the slowing of time in a strong gravitational field?**

A. Time Dilation
B. Length Contraction
C. Mass-Energy Equivalence
**D. Gravitational Time Dilation ✓**

**Which experiments confirmed general relativity? (Select all that apply)**

**A. Eddington's Solar Eclipse Experiment ✓**
**B. LIGO's Detection of Gravitational Waves ✓**
C. Michelson-Morley Experiment
D. Double-Slit Experiment