

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Answer Key: Cosmic Pizza Party: A 6th Grade Physics Quest

Can a clock actually tick slower? Challenge students to apply relativity and quantum concepts to real-world scenarios in this high-engagement formative assessment.

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**1. Imagine you are an astronaut on a ultra-fast 'Galactic Express' ship. If you travel at nearly the speed of light for what feels like one year to you, what would happen when you return to your friends on Earth?**

**Answer:** B) Your friends would be much older than you.

According to Special Relativity, time moves slower for objects traveling at very high speeds. This effect, called time dilation, means the astronaut ages slower than people staying on Earth.

**2. Albert Einstein's famous equation  $E=mc^2$  tells us that \_\_\_\_\_ and energy are actually two different forms of the same thing.**

**Answer:** C) Mass

The 'm' in  $E=mc^2$  stands for mass. This equation revolutionized physics by showing that mass can be converted into energy and vice versa.

**3. General Relativity suggests that massive objects like planets and stars do not just pull on things, but actually 'dent' or curve the fabric of space and time around them.**

**Answer:** A) True

Einstein's Theory of General Relativity describes gravity not as a mysterious tug, but as a geometric curvature of spacetime caused by mass.

**4. In the world of Quantum Mechanics, scientists use the 'Double Slit Experiment' to show that tiny particles like electrons can act like both solid marbles and what other form?**

**Answer:** B) Waves

Wave-particle duality is a core quantum concept where subatomic particles exhibit characteristics of both particles (localized points) and waves (interference patterns).

**5. If you were to fall into a \_\_\_\_\_, gravity would be so strong that not even light—the fastest thing in the universe—could escape.**

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**Answer:** D) Black Hole

Black holes are regions of spacetime where gravity is so intense that the escape velocity exceeds the speed of light.

**6. According to the Uncertainty Principle, it is impossible to know both the exact position and the exact speed of a particle at the same time.**

**Answer:** A) True

Heisenberg's Uncertainty Principle states that the more precisely you measure a particle's position, the less precisely you can know its momentum (speed and direction).

**7. Modern physics technology is in your pocket! Which of these common devices relies on Einstein's theory of relativity to give you accurate directions?**

**Answer:** C) GPS (Global Positioning System)

GPS satellites move fast and are further from Earth's gravity. Engineers must program them to adjust for time dilation effects predicted by both Special and General Relativity.

**8. The tiny 'packets' or particles of light that hit a solar panel to create electricity are called \_\_\_\_\_.**

**Answer:** B) Photons

Photons are the fundamental particles of light. When they strike a surface, they can knock electrons loose, which is how solar cells generate power.

**9. If you could observe a 10-meter long rocket flying past you at 90% the speed of light, what would happen to its appearance due to 'Length Contraction'?**

**Answer:** A) It would look much shorter than 10 meters.

Length contraction is a phenomenon in Special Relativity where an object in motion is measured to be shorter than its proper length by a stationary observer.

**10. Quantum physics and classical physics (like Newton's laws) follow the exact same rules for how objects move.**

**Answer:** B) False

Classical physics works for everyday objects, but it fails at the atomic level. Quantum physics introduces new rules like probability and superposition that don't apply to large objects.