

## Gravitational Force Quiz Questions and Answers PDF

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#### Who formulated the law of universal gravitation?

- Albert Einstein
- Galileo Galilei
- Isaac Newton ✓
- Johannes Kepler

The law of universal gravitation was formulated by Sir Isaac Newton in the late 17th century. This law describes the gravitational attraction between masses and is fundamental to classical mechanics.

#### What are the implications of Einstein's theory of general relativity on our understanding of gravity?

- Gravity is a force between masses
- Gravity is the curvature of spacetime ✓
- Gravity affects the passage of time ✓
- Gravity is independent of mass

Einstein's theory of general relativity revolutionized our understanding of gravity by describing it not as a force, but as the curvature of spacetime caused by mass. This perspective has profound implications for cosmology, black holes, and the behavior of objects in gravitational fields.

#### What is the formula for calculating gravitational force between two masses?

- $F = ma$
- $F = G (m_1 * m_2) / r^2$  ✓
- $F = (k * q_1 * q_2) / r^2$
- $F = (1/2)mv^2$

The gravitational force between two masses is calculated using Newton's law of universal gravitation, which states that the force is directly proportional to the product of the two masses and inversely proportional to the square of the distance between their centers.

**What is the acceleration due to gravity on Earth?**

- 6.67 m/s<sup>2</sup>
- 9.81 m/s<sup>2</sup> ✓
- 3.00 m/s<sup>2</sup>
- 1.62 m/s<sup>2</sup>

The acceleration due to gravity on Earth is approximately 9.81 meters per second squared (m/s<sup>2</sup>). This value represents the rate at which objects accelerate towards the Earth when in free fall.

**What happens to the gravitational force if the distance between two objects is doubled?**

- It doubles
- It quadruples
- It halves
- It becomes one-fourth ✓

When the distance between two objects is doubled, the gravitational force between them decreases to one-fourth of its original value due to the inverse square law of gravitation.

**Calculate the gravitational force between two 5 kg masses that are 2 meters apart.**

Using  $F = G (m_1 * m_2) / r^2$ , the force is approximately  $4.17 \times 10^{-11}$  N.

**What would happen to the gravitational force if the distance between two objects is reduced to half? Explain your reasoning.**

**The gravitational force would increase by a factor of four because it is inversely proportional to the square of the distance.**

**Explain how the gravitational force between two objects changes if the mass of one object is tripled.**

**The gravitational force will triple because it is directly proportional to the product of the masses.**

**Describe how gravitational force is responsible for the orbits of planets around the sun.**

**Gravitational force acts as a centripetal force, keeping planets in a stable orbit around the sun by continuously pulling them towards it.**

**Discuss the significance of the gravitational constant  $G$  in the law of universal gravitation.**

The gravitational constant  $G$  determines the strength of the gravitational force and is essential for calculating the force between two masses.

What are the effects of gravitational force?

- Causes objects to fall towards Earth ✓
- Keeps planets in orbit ✓
- Determines the weight of an object ✓
- Increases the speed of light

Gravitational force affects the motion of objects, causing them to attract each other, influencing orbits, and contributing to phenomena such as tides and weight.

Which of the following is not affected by gravitational force?

- Planets
- Light
- Stars
- None of the above ✓

Gravitational force affects all objects with mass, but light, which has no mass, is not directly affected by gravitational force in the same way. However, light can be influenced by gravity through phenomena like gravitational lensing.

What is the approximate value of the gravitational constant  $G$ ?

- 9.81 m/s<sup>2</sup>
- $6.674 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$  ✓
- $3.00 \times 10^8 \text{ m/s}$
- $1.60 \times 10^{-19} \text{ C}$

The gravitational constant  $G$  is a fundamental physical constant that describes the strength of gravitational attraction between masses. Its approximate value is  $6.674 \times 10^{-11} \text{ N(m/kg)}^2$ .

According to Newton's law of universal gravitation, which of the following is true?

- Gravitational force is inversely proportional to the square of the distance ✓
- Gravitational force is directly proportional to the product of the masses ✓
- Gravitational force is independent of distance
- Gravitational force is a constant value

Newton's law of universal gravitation states that every point mass attracts every other point mass with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centers.

How does Einstein's theory of general relativity differ from Newton's law of universal gravitation in explaining gravity?

Einstein's theory describes gravity as the curvature of spacetime caused by mass, whereas Newton's law describes it as a force between masses.

Which of the following are factors that influence gravitational force?

- Mass of the objects ✓
- Distance between the objects ✓
- Speed of the objects
- Temperature of the objects

Gravitational force is influenced primarily by the masses of the objects involved and the distance between them. The greater the mass and the closer the distance, the stronger the gravitational force.

Which statements are true about gravitational fields?

- They are regions where a mass experiences a force ✓

- They are stronger closer to the mass creating them ✓
- They are unaffected by the mass of the object creating them
- They can be represented by field lines ✓

Gravitational fields are regions of space around a mass where other masses experience a force of attraction. They are characterized by their strength and direction, which can be represented by field lines.

#### What does the gravitational force depend on?

- Only the mass of one object
- Only the distance between objects
- Both the masses of the objects and the distance between them ✓
- Neither mass nor distance

The gravitational force depends on the masses of the objects involved and the distance between them. Specifically, it is directly proportional to the product of the masses and inversely proportional to the square of the distance separating them.

#### Which of the following best describes weight?

- Mass
- Gravitational force acting on an object ✓
- Volume
- Density

Weight is the force exertED on an object due to gravity, which depends on the object's mass and the acceleration due to gravity.

#### Which of the following can be considered as applications of gravitational force?

- Satellite orbits ✓
- Tides on Earth ✓
- Formation of galaxies ✓
- Nuclear fusion

Gravitational force is responsible for various phenomena, including the orbits of planets, the falling of objects towards the Earth, and the tides caused by the Moon's pull. These applications illustrate the fundamental role of gravity in shaping the universe and our daily experiences.