

Free Fall Quiz Questions and Answers PDF

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What is the initial velocity of an object that is simply dropped from a height?

- 0 m/s ✓
- 5 m/s
- 9.81 m/s
- 15 m/s

The initial velocity of an object that is simply dropped from a height is 0 m/s, as it starts from rest before falling due to gravity.

What is the acceleration due to gravity on Earth?

- 7.81 m/s²
- 9.81 m/s² ✓
- 10.81 m/s²
- 11.81 m/s²

The acceleration due to gravity on Earth is approximately 9.81 meters per second squared. This value represents the rate at which objects accelerate towards the Earth when in free fall.

Calculate the time it takes for an object to fall from a height of 20 meters on Earth.

Approximately 2.02 seconds.

Discuss the implications of free fall principles in designing safety equipment like parachutes.

The implications of free fall principles in designing safety equipment like parachutes include the need to calculate the optimal size and shape of the parachute to maximize drag and minimize descent speed, ensuring a safe landing for the user.

Describe how air resistance affects the motion of a free-falling object.

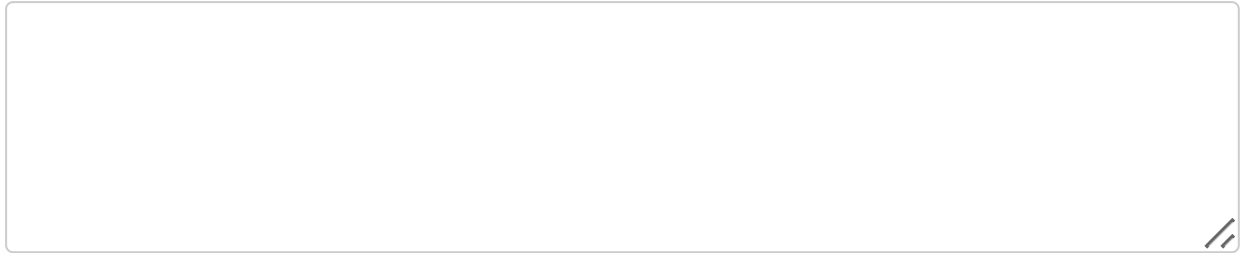
Air resistance affects the motion of a free-falling object by slowing it down as it falls, causing it to accelerate less than it would in a vacuum. Eventually, the object reaches a terminal velocity where the force of air resistance equals the gravitational force, resulting in no further acceleration.

Which scenarios describe a true free fall? (Select all that apply)

- A skydiver before opening the parachute ✓
- A satellite orbitin Earth
- A ball thrown upwards
- A stone dropped in a vacuum ✓

True free fall occurs when an object is only influenced by gravity, with no other forces acting on it. This typically happens in a vacuum or when air resistance is negligible.

Explain why objects of different masses fall at the same rate in a vacuum.



Objects of different masses fall at the same rate in a vacuum because the acceleration due to gravity is constant and unaffected by mass, and there is no air resistance to slow them down.

In the absence of air resistance, which of the following is true for two objects of different masses dropped from the same height? (Select all that apply)

- They will hit the ground at the same time. ✓**
- The heavier object will hit the ground first.
- They will have the same acceleration. ✓**
- The lighter object will hit the ground first.

In the absence of air resistance, both objects will fall at the same rate regardless of their masses, and they will hit the ground simultaneously if dropped from the same height.

What happens to the velocity of an object in free fall as it continues to fall?

- It decreases
- It remains constant
- It increases ✓**
- It stops

As an object continues to fall freely under the influence of gravity, its velocity increases due to the constant acceleration of gravity acting on it.

What is the primary force acting on an object in free fall?

- Friction
- Tension
- Gravity ✓**
- Air resistance

The primary force acting on an object in free fall is gravity, which pulls the object towards the center of the Earth.

Which scientist is known for demonstrating that objects of different masses fall at the same rate?

- Isaac Newton
- Albert Einstein
- Galileo Galilei ✓
- Nikola Tesla

Galileo Galilei is the scientist known for demonstrating that objects of different masses fall at the same rate, challenging the prevailing Aristotelian view that heavier objects fall faster than lighter ones.

Which factors can affect the motion of a free-falling object in the real world? (Select all that apply)

- Air resistance ✓
- Mass of the object
- Height from which it is dropped
- Shape of the object ✓

The motion of a free-falling object can be influenced by various factors such as air resistance, wind, and the object's shape and mass. These factors can alter the rate of acceleration and the overall trajectory of the object as it falls.

In a vacuum, which of the following objects will hit the ground first when dropped from the same height?

- A feather
- A hammer
- Both at the same time ✓
- Neither will hit the ground

In a vacuum, all objects fall at the same rate regardless of their mass or composition, so they will hit the ground simultaneously.

What is the term for the maximum speed reached by a falling object when air resistance equals gravitational force?

- Free fall speed
- Constant velocity
- Terminal velocity ✓
- Maximum velocity

The maximum speed reached by a falling object when the force of air resistance equals the force of gravity is known as terminal velocity. At this point, the object no longer accelerates and falls at a constant speed.

Explain the concept of terminal velocity and how it is achieved.

Terminal velocity is the maximum speed an object reaches when the force of gravity is balanced by air resistance, resulting in no further acceleration. It is achieved when the downward gravitational force equals the upward drag force, allowing the object to fall at a constant speed.

Which of the following best describes free fall?

- Motion with constant speed
- Motion under the influence of gravity alone ✓**
- Motion with air resistance
- Motion with constant acceleration

Free fall is the motion of an object under the influence of gravitational force only, without any other forces acting on it, such as air resistance.

What are the characteristics of terminal velocity? (Select all that apply)

- Constant speed ✓**
- No net force acting on the object ✓**
- Acceleration continues to increase
- Air resistance equals gravitational force ✓**

Terminal velocity is the constant speed that a freely falling object eventually reaches when the resistance of the medium prevents further acceleration. It occurs when the force of gravity is balanced by the drag force acting on the object.

How would the free fall experience differ on the Moon compared to Earth?

On the Moon, free fall would occur at a slower rate due to its weaker gravity, making the experience feel less intense compared to the rapid descent experienced on Earth.

Which of the following statements about free fall are true? (Select all that apply)

- Objects in free fall experience air resistance.
- The acceleration due to gravity is constant. ✓
- Mass affects the rate of free fall in a vacuum.
- Free fall only occurs in a vacuum. ✓

Free fall occurs when the only force acting on an object is gravity, resulting in a constant acceleration towards the Earth. In free fall, all objects, regardless of their mass, accelerate at the same rate in a vacuum, demonstrating the principle of uniform acceleration due to gravity.

Which of the following equations are used to describe the motion of an object in free fall? (Select all that apply)

- $v = u + gt$ ✓
- $s = ut + \frac{1}{2}gt^2$ ✓
- $F = ma$
- $v^2 = u^2 + 2gs$ ✓

The equations that describe the motion of an object in free fall include the kinematic equations, which relate displacement, velocity, acceleration, and time under the influence of gravity. Specifically, the equations that account for constant acceleration due to gravity are applicable in this scenario.