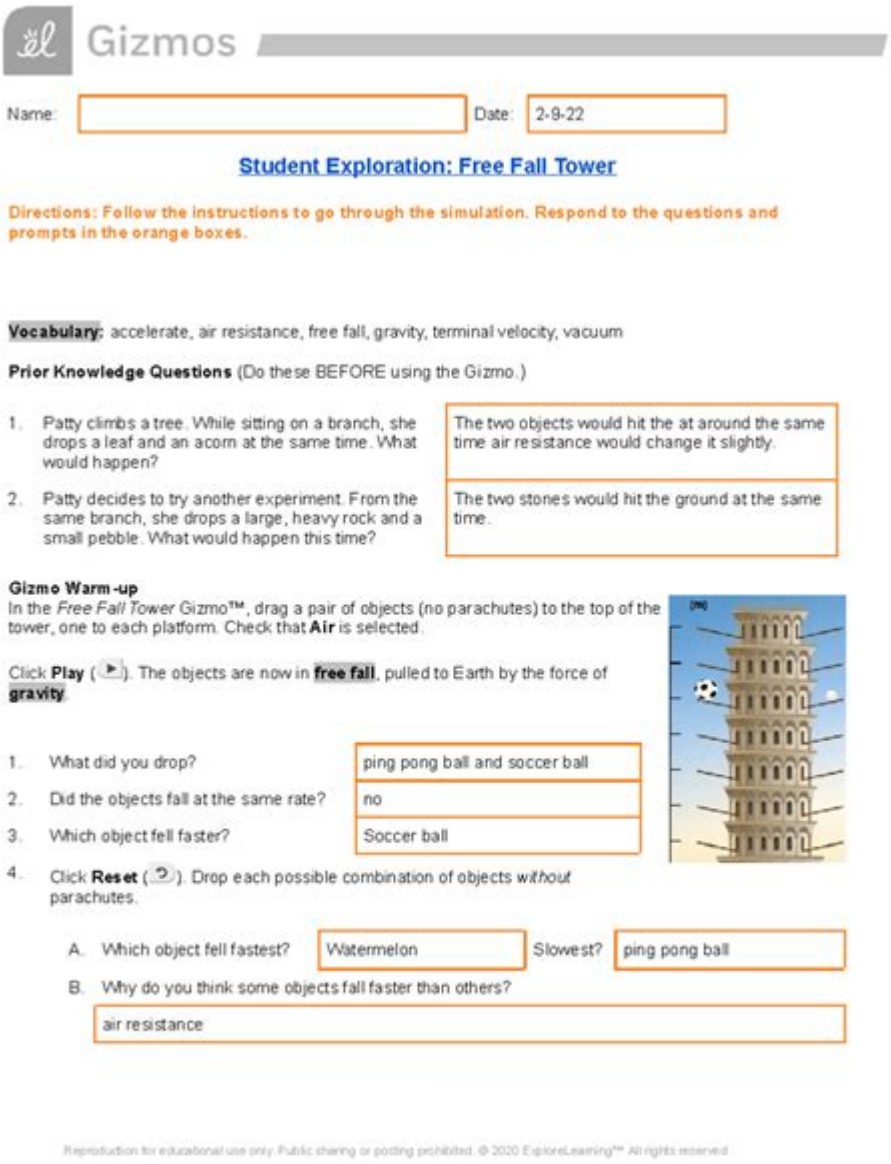
Free Fall Tower Gizmo Answer Key



Gizmos

Name: Date: 2-9-22

Student Exploration: Free Fall Tower

Directions: Follow the instructions to go through the simulation. Respond to the questions and prompts in the orange boxes.

Vocabulary: accelerate, air resistance, free fall, gravity, terminal velocity, vacuum

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. Patty climbs a tree. While sitting on a branch, she drops a leaf and an acorn at the same time. What would happen? — The two objects would hit the at around the same time air resistance would change it slightly.
2. Patty decides to try another experiment. From the same branch, she drops a large, heavy rock and a small pebble. What would happen this time? — The two stones would hit the ground at the same time.

Gizmo Warm-up

In the *Free Fall Tower* Gizmo™, drag a pair of objects (no parachutes) to the top of the tower, one to each platform. Check that **Air** is selected.

Click **Play** ( ). The objects are now in **free fall**, pulled to Earth by the force of **gravity**.

1. What did you drop? — ping pong ball and soccer ball
2. Did the objects fall at the same rate? — no
3. Which object fell faster? — Soccer ball
4. Click **Reset** ( ). Drop each possible combination of objects *without* parachutes.

A. Which object fell fastest? Watermelon Slowest? ping pong ball

B. Why do you think some objects fall faster than others?

air resistance

Free fall tower gizmo answer key is an invaluable resource for students and educators who want to understand the principles of physics related to free fall and gravitational acceleration. The Free Fall Tower Gizmo, developed by ExploreLearning, is an interactive simulation that allows users to visualize and experiment with the concepts of free fall, gravity, and motion. This article will delve into the features of the Free Fall Tower Gizmo, provide insights into the answer key, and explore the significance of this tool in educational settings.

Understanding Free Fall and Gravity

Free fall is the motion of an object falling solely under the influence of gravity. This means that no other forces, such as air resistance, are acting on the object. The acceleration due to gravity on Earth is approximately 9.81 m/s², which means that an object in free fall will increase its velocity by 9.81

meters per second every second.

Key Concepts of Free Fall

1. Acceleration: In free fall, all objects accelerate at the same rate regardless of their mass, provided that air resistance is negligible.
2. Velocity: The velocity of an object in free fall increases as it falls; this can be calculated using the equation:
- $v = g\ t$
where v is velocity, g is the acceleration due to gravity, and t is the time in seconds.
3. Distance: The distance an object falls can be calculated using the formula:
- $d = 0.5\ g\ t^2$
where d is the distance fallen.

Features of the Free Fall Tower Gizmo

The Free Fall Tower Gizmo provides a dynamic environment for exploring the laws of physics. Here are some of the notable features:

- Adjustable Parameters: Users can change the height from which an object is dropped, the mass of the object, and even the gravitational settings to see how these factors influence free fall.
- Visual Representation: The simulation provides real-time graphs that display the relationship between time, velocity, and distance, making it easier for students to visualize complex concepts.
- Interactive Experiments: Students can conduct experiments by dropping different objects, allowing them to observe outcomes and gather data.

How to Use the Free Fall Tower Gizmo

Using the Free Fall Tower Gizmo is straightforward. Here’s a step-by-step guide:

1. Access the Gizmo: Go to the ExploreLearning website and locate the Free Fall Tower Gizmo.
2. Select Parameters: Choose the height of the drop and the object you want to drop (e.g., a ball, a feather).
3. Run the Simulation: Start the simulation and watch the object fall. Observe the changes in velocity and distance.
4. Analyze the Data: Use the graphs and data provided to answer questions about the motion.

Free Fall Tower Gizmo Answer Key

The answer key for the Free Fall Tower Gizmo is typically provided to help educators and students verify their findings and understand the underlying physics principles. Here are some common questions and their corresponding answers:

Sample Questions and Answers

1. What is the acceleration of the object in free fall?
- Answer: The acceleration is approximately 9.81 m/s^2, assuming air resistance is negligible.

2. How does mass affect the fall of an object?
- Answer: In a vacuum, mass does not affect the rate of fall; all objects fall at the same rate due to gravity.

3. What happens to the velocity of an object after 3 seconds of free fall?
- Answer: The velocity can be calculated as $v = g\ t = 9.81\ m/s^2\ 3\ s = 29.43\ m/s$.

4. If an object falls for 4 seconds, what distance does it cover?
- Answer: Using the formula $d = 0.5\ g\ t^2$, we find $d = 0.5\ 9.81\ m/s^2\ (4\ s)^2 = 78.48$ meters.

5. How do you account for air resistance in free fall?
- Answer: Air resistance will slow down the object, and the simulation allows users to adjust settings to include drag forces, demonstrating the impact of air resistance.

The Importance of Simulation in Learning Physics

The Free Fall Tower Gizmo serves as an excellent educational tool for several reasons:

- Engagement: Interactive simulations increase student engagement, making learning fun and effective.
- Conceptual Understanding: Visualizing theoretical concepts helps students grasp complex ideas more easily.
- Experimentation: Students can test hypotheses in a controlled environment, encouraging scientific thinking and inquiry.

Benefits for Educators

For educators, the Free Fall Tower Gizmo offers several advantages:

- Versatile Teaching Tool: It can be integrated into various lessons, from basic physics to more advanced topics.
- Assessment Preparation: The answer key allows teachers to create assessments based on the simulation, ensuring that students are prepared for exams.
- Time Efficiency: Simulations can save time that might otherwise be spent on lengthy demonstrations or experiments.

Conclusion

In conclusion, the **free fall tower gizmo answer key** is an essential resource for both students and

teachers. It enhances learning by offering interactive simulations, allowing users to experiment with the laws of physics in real-time. As students explore concepts such as free fall, gravity, and acceleration, they develop a deeper understanding that extends beyond traditional classroom learning. The Free Fall Tower Gizmo not only makes physics accessible but also inspires curiosity and a love for science.

Frequently Asked Questions

What is the primary concept demonstrated by the free fall tower gizmo?

The primary concept demonstrated by the free fall tower gizmo is the acceleration of gravity and how objects fall at the same rate regardless of their mass.

How can students use the free fall tower gizmo to explore the effects of height on falling objects?

Students can adjust the height of the drop in the gizmo and observe how the time of fall changes, allowing them to explore the relationship between height and the speed of falling objects.

What type of data can be collected using the free fall tower gizmo?

Students can collect data on the time it takes for various objects to fall from different heights, which can then be used to calculate acceleration due to gravity.

Can the free fall tower gizmo be used to demonstrate air resistance?

Yes, students can introduce different shapes or materials to the falling objects to observe how air resistance affects their fall, comparing the results with those of free-fall conditions.

What are some educational standards that the free fall tower gizmo aligns with?

The free fall tower gizmo aligns with educational standards related to physics, specifically those focusing on forces, motion, and gravitational effects.

How does the free fall tower gizmo enhance student understanding of kinematics?

The gizmo allows students to visualize and measure the motion of falling objects, reinforcing concepts of displacement, velocity, and acceleration in a hands-on manner.

What safety considerations should be taken into account when using the free fall tower gizmo?

Safety considerations include ensuring that the area around the gizmo is clear of obstacles and that students are instructed not to stand directly below the falling objects.

Can the free fall tower gizmo simulate different gravitational conditions?

While the free fall tower gizmo primarily simulates Earth's gravity, some advanced models may allow students to adjust parameters to mimic different gravitational conditions, such as those on other planets.

What skills do students develop by using the free fall tower gizmo?

Students develop skills in scientific inquiry, data collection and analysis, critical thinking, and the application of mathematical concepts in real-world scenarios.

Free Fall Tower Gizmo Answer Key

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