Worksheet: Free Fall
C O N C E P T U A L  P H Y S I C S :  U N I T 1

Directions: Answer the following questions using the equations below. You must show your
work in order to receive credit. Each question is worth 4 points. Use g = 10 m/s²

\[ v = \frac{d}{t} \quad v = v_0 + gt \quad d = \frac{1}{2} gt^2 \quad t = \sqrt{\frac{2d}{g}} \]

Problems:
1. You drop a rock off the top of a building. It takes 6.0 s to hit the ground. How tall is the building?

2. You drop a rock off the top of a building. It takes 4.5 s to hit the ground. How tall is the building?

3. You drop a rock off the top of a 500 m tall building. Assuming there is no air resistance, how long does it
take to hit the ground?

4. You drop a rock off the top of a 750 m tall building. Assuming there is no air resistance, how long does it
take to hit the ground?
5. You drop a rock off the top of a building. It takes 3.5 s to hit the ground. What is the velocity at impact (final velocity)?

6. You drop a rock off the top of a building. It takes 1.5 s to hit the ground. What is the velocity at impact (final velocity)?

7. You throw a rock off the top of a building with an initial velocity of 8.0 m/s. It hits the ground going 28 m/s. How long did it take to impact on the ground?

8. You throw a rock off the top of a building with an initial velocity of 4.0 m/s. It hits the ground going 35 m/s. How long did it take to impact on the ground?
9. You throw a rock up into the air as hard as you can. It stays in the air a total of 8.0 s. What was the velocity of the rock when you threw it?

10. You throw a rock up into the air as hard as you can. It stays in the air a total of 6.5 s. What was the velocity of the rock when you threw it?

11. You drop a rock off the top of a tall building. How tall is the building if it hits the ground 3.5 seconds later?

12. You drop a rock off the top of a tall building. How tall is the building if it hits the ground 8.0 seconds later?
13. You toss a ball at 5 m/s straight upward. How much time will the ball take to reach the top of its path?

14. You toss a ball at 3 m/s straight upward. How much time will the ball take to reach the top of its path?

15. If a projectile fired beneath the water, straight up, breaks through the surface at a speed of 13 m/s, to what height above the water will it ascend?

16. If a projectile fired beneath the water, straight up, breaks through the surface at a speed of 30 m/s, to what height above the water will it ascend?