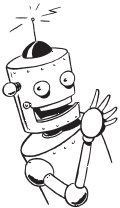


## Chapter 1 Linear Motion

**Free-Fall: How Fast, How Far****Pre-Test - Post-Test**

- As an object falls, its
  - velocity increases
  - acceleration
  - both A and B increases
  - none of these
- The gain in speed each second for a freely-falling object is about
  - 0
  - 5 m/s
  - 10 m/s
  - 20 m/s
  - depends on the initial speed
- A heavy object and a light object are dropped at the same time from rest in a vacuum. The heavier object reaches the ground
  - sooner than the light object.
  - at the same time as the lighter object.
  - after the lighter object.
- In the absence of air resistance, objects fall at a constant
  - velocity.
  - distances each successive second.
  - speed.
  - acceleration.
  - all of the above
- An object is in free fall. At one instant, it is traveling at a speed of 50 m/s. Exactly one second later, its speed is about
  - 25 m/s
  - 50 m/s
  - 55 m/s
  - 60 m/s
  - 100 m/s
  - depends on how fast it was thrown
- It takes 6 seconds for a stone to fall to the bottom of a mine shaft. How deep is the shaft?
  - about 60 m
  - about 120 m
  - about 180 m
  - more than 200 m
  - none of the above
- An object falls freely from rest on a planet where the acceleration due to gravity is 20 m/s/s. After 5 sec it falls a distance of
  - 100 m.
  - 150 m.
  - 250 m.
  - 500 m.
  - none of these.

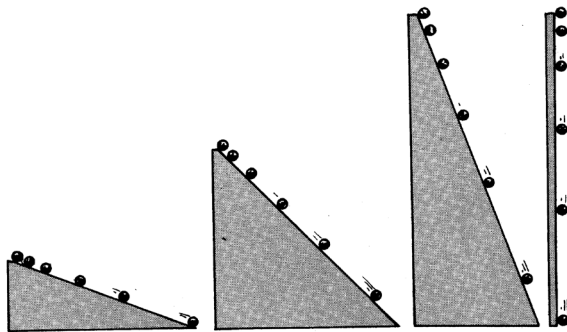


Chapter 1 Linear Motion

# Free Fall: How Far and How Fast

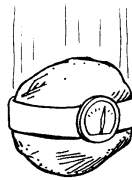
## 1.5 Gravity

1. Does a falling object gain speed?
2. Does a falling object accelerate?
3. What happens to the acceleration of a ball as the angle of a ramp increases?



## 1.6 How Fast

4. Suppose a freely falling object were equipped with a speedometer, by how much would its speed appear to increase with each second of fall?

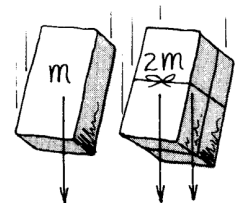


5. What value do we typically use when discussing the acceleration of gravity?
6. The acceleration of gravity is special, what variable do we typically use in formulas to represent gravity?

7. Write a **simple** equation for calculating how fast an object is falling when dropped from rest.
8. What is the velocity of an object after it has been falling for 2-seconds? 3-seconds? 5-seconds?
9. Would your answer from above be the same for ALL falling objects?

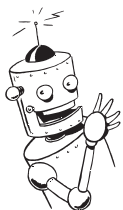
## 1.7 Air Resistance

10. When dropped from rest, do heavier objects fall faster than lighter objects?
11. How does air resistance affect a falling object?
12. If it were not for air resistance, why would it be dangerous to go outdoors on rainy days? Explain.
13. An object is dropped off the top of the UT tower; you count 4 seconds before the object hits the ground. How fast was the object moving when it hit the ground?



## 1.8 How Fast: Thrown Down

14. How would throwing an object towards the ground instead of dropping it from rest affect the acceleration of gravity?



**Chapter 1 Linear Motion**

- 15. Consider a rifle fired straight downward from a high-altitude balloon. If the muzzle velocity is 100 m/s, what is the velocity of the bullet after one second? After 6 seconds?
- 16. Write a complete formula for calculating how fast a freely falling object will be traveling after each second?

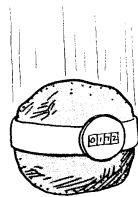
- 22. How could you find your height if you were on a hill that slopped?

**1.10 How Far: Thrown Down**

- 23. Consider a rifle fired straight downward from a high-altitude balloon. If the muzzle velocity is 100 m/s, how far has the bullet traveled after one second? After 6 seconds?
- 24. Write a complete formula that can be used to calculate the distance a freely falling object has traveled per each unit of time?
- 25. What is the acceleration of a freely falling object right as the exact moment you let go of an object?
- 26. What is the acceleration of a freely falling object when it is half way to the ground?
- 27. What is the acceleration of a freely falling object right before it hits the ground?

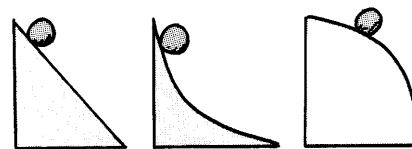
**1.9 How Far**

- 17. Suppose a freely falling object were equipped with an odometer, by how much would it's distance appear to increase with each second of fall?
- 18. As an object in free-fall gains speed, what happens to the distance the object travels per each unit of time?
- 19. Write a simple equation that can be used to calculate how far an object has fallen when dropped from rest. (This will make you popular with you friends)
- 20. How deep is a mine shaft if it takes an object dropped from rest five seconds to hit the bottom?
- 21. If you were standing on top of a tall building or at the edge of a cliff, how could you calculate your height?



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**Brain Challenge**



On which of these hills does the ball roll down with increasing speed and decreasing acceleration?

