

**Chapter 1 Linear Motion**

**Free Fall**

**Pre-Test - Post-Test**

1. As an object falls, its \_\_\_\_\_.
 

A) velocity increases.	C) both A and B increases.
B) acceleration increases.	D) none of these.
  
2. The gain in speed each second for a freely-falling object is about \_\_\_\_\_.
 

A) 0 m/s	C) 10 m/s
B) 5 m/s.	D) depends on the initial speed.
  
3. A heavy object and a light object are dropped at the same time from rest in a vacuum. The heavier object reaches the ground \_\_\_\_\_.
 

A) sooner than the light object.
B) at the same time as the lighter object.
C) after the lighter object.
  
4. In the absence of air resistance, objects fall at constant \_\_\_\_\_.
 

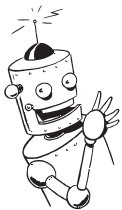
A) velocity.
B) distances each successive second.
C) speed.
D) acceleration.
E) all of the above
  
5. An object is in free fall. At one instant, it is traveling at a speed of 50 m/s. Exactly one second later, its speed is about \_\_\_\_\_.
 

A) 25 m/s.	D) 60 m/s.
B) 50 m/s.	E) 100 m/s
C) 55 m/s.	F) depends on how fast it was thrown.
  
6. It takes 6 seconds for a stone dropped from rest to fall to the bottom of a mine shaft. How deep is the shaft? \_\_\_\_\_.
 

A) about 60 m.	D) more than 200 m.
B) about 120 m.	E) none of the above.
C) about 180 m.	
  
7. 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 \_\_\_\_\_.
 

A) 100 m.	D) 500 m.
B) 150 m.	E) none of the above.
C) 250 m.	

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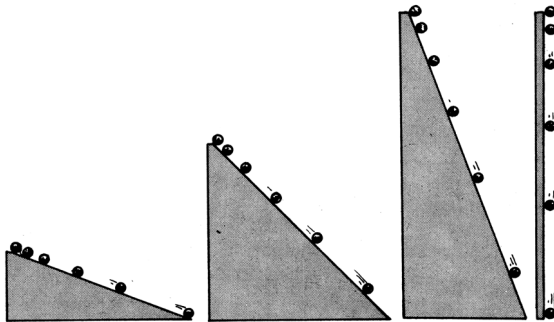


Chapter 1 Linear Motion

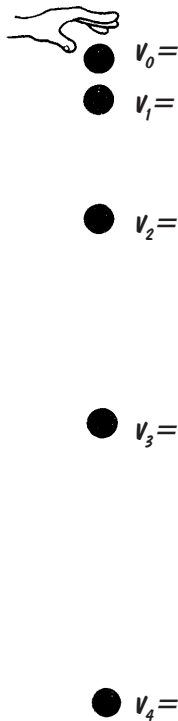
Free Fall

Falling Objects: How Fast

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



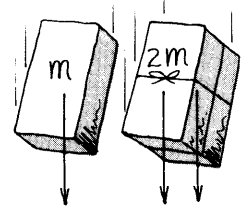
4. An object is dropped from rest. How much does its speed change each second of fall?



5. By how much does the object's speed appear to increase each second of fall?
6. If you dropped an object of a different mass, would you get the same results?

Air Resistance

7. When dropped from rest, do heavier objects fall faster than lighter objects?



8. Explain how air resistance affects the acceleration of a falling object.

9. It has been said that a penny dropped from the top of the Empire State building would kill someone below if it landed on their head, explain.

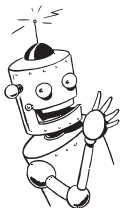


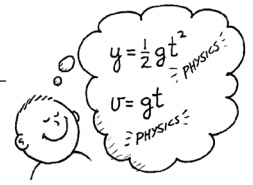
10. If it were not for air resistance, why would it be dangerous to go outdoors on rainy days? Explain.

11. In the absence of air resistance, what value do we typically use when discussing the acceleration of gravity?

12. The acceleration of gravity is special. What variable do we typically use in formulas to represent gravity?

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**Chapter 1 Linear Motion**

13. Write a **simple** equation for calculating the velocity of a falling object when the object is dropped from rest.

19. Write a **complete** equation for calculating the velocity of a falling object regardless the starting velocity.

14. Explain the importance of Galileo's famous demonstration where he dropped two rocks from the top of the Leaning Tower of Pisa.

**Falling Objects: How Far**

20. An object is dropped from rest. How far does it fall each second?



●  $d_1 =$

●  $d_2 =$

●  $d_3 =$

●  $d_4 =$

15. You drop an object from the top of the UT tower; it takes 4 seconds to hit the ground. How fast is the object moving as it hits the ground?

16. An object is thrown towards the ground at an initial velocity of 50 m/s. How fast is the object moving one second after its release?

17. How is the acceleration of an object effected when it is thrown towards the ground instead of dropped from rest.

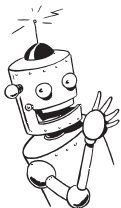
18. A bullet is fired downward from a high-altitude balloon. If the muzzle velocity is 100 m/s, complete the table.

Time of Fall	Velocity
0 sec =	100 m/s
1 sec =	m/s
2 sec =	m/s
5 sec =	m/s

21. Write a **simple** equation for calculating the distance of travel for a falling object dropped from rest.

22. Write an even simpler version of the formula above that will make you popular with your friends.

23. If you were standing on top of a tall building or cliff, how could you find the distance to the ground?



**Chapter 1 Linear Motion**

24. A bullet is fired downward from a high-altitude balloon. If the muzzle velocity is 100 m/s, complete the table.

Time of Fall	Distance
0 sec =	0 m
1 sec =	m
2 sec =	m
5 sec =	m

25. Write the complete equation to calculate the distance traveled by a freely falling object regardless of starting velocity.

26. An object is released from rest.

- What is the acceleration of the object at the moment you let go?
- What is the acceleration of the object when it has fallen half way?
- What is the acceleration of the object right before it hits the ground?

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

