Free Fall
Lesson Notes

What is a free-falling object?
A free-falling object is an object upon which _____.

Direction of Velocity Vector:
As the free-falling object rises, the velocity is directed _____.

As the free-falling object falls, the velocity is directed _____.

Direction of Acceleration Vector:
The direction of the acceleration for free-falling objects is **always** _____.

Acceleration Caused by Gravity:
The acceleration of a free-falling object is _____ m/s/s.
This value does **NOT** depend upon mass, speed, or direction of travel.

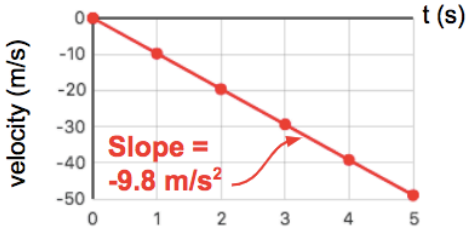
Representation of Falling Motion:

Dot Diagram

Velocity-Time Table

Time (s)	Velocity (m/s)
0.0	0
1.0	-9.8
2.0	-19.6
3.0	-29.4
4.0	-39.2
5.0	-49.0

Velocity-Time Graph

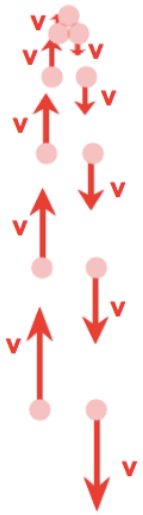


Velocity values change by -9.8 m/s every 1.0 second.

Vector Diagrams for an Up-and-Down Free-fall Motion:

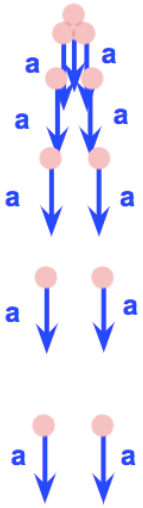
Velocity Vectors:

- Velocity is changing.
- Velocity decreases when rising, ...
- … and increases when falling.
- Velocity is directed up when rising and directed down when falling.



Acceleration Vectors:

- Acceleration NEVER changes.
- Value of acceleration is constant.
- Direction of acceleration is downward.



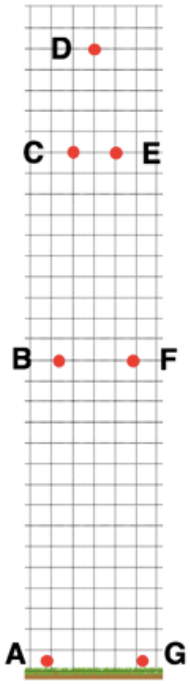
Free Fall Summary:

Free fall motion can be summarized as follows:

- The acceleration is directed downward.
- The acceleration value is 9.8 m/s/s.
- The velocity changes by -9.8 m/s each second.
- The object slows down as it rises; the object speeds up as it falls.
- The velocity is directed upward if the object is rising upward; the velocity is directed downward if the object is falling downward.

Your Turn to Practice:

Use a = ~10 m/s^2, down to analyze the up-and-down motion at the right.



1. About how much time is the object in the air?

2. What is the initial speed at point A?

3. At what points is the object moving slower than it is at point B?