

Free Fall

Read **Sections a, b and d** from **Lesson 5** of the **1-D Kinematics** chapter at **The Physics Classroom**:

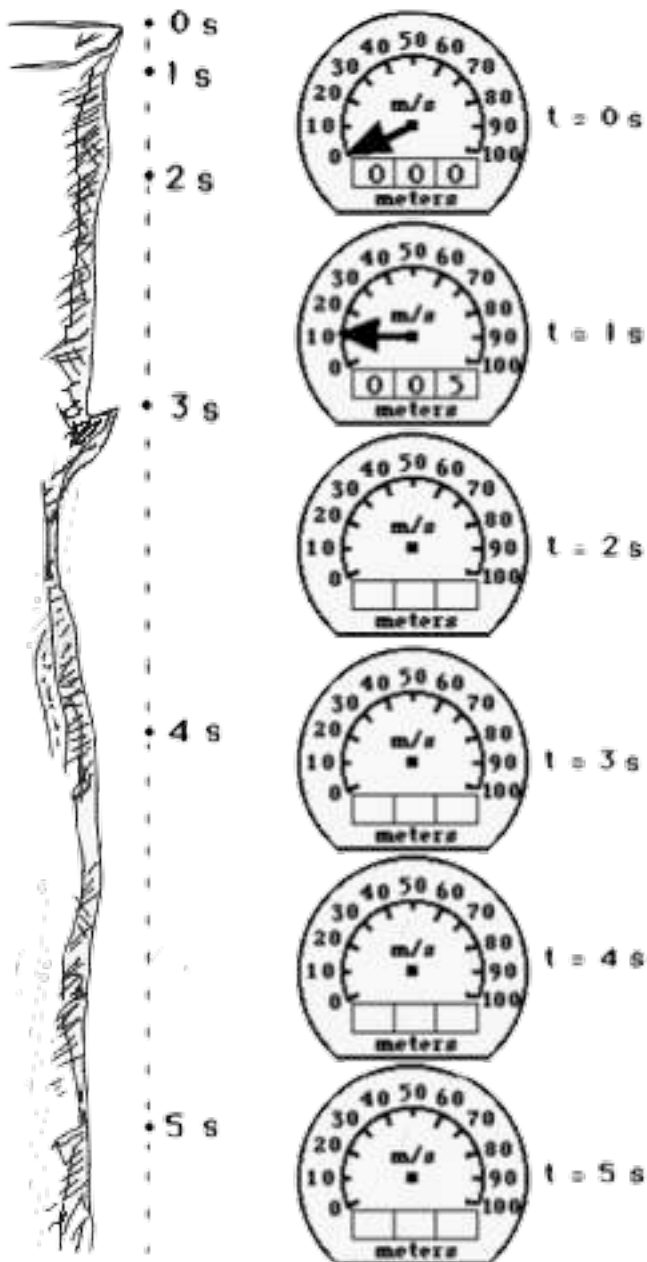
<http://www.physicsclassroom.com/Class/1DKin/U1L5a.html>

MOP Connection: None

1. A rock is dropped from a rest position at the top of a cliff and free falls to the valley below. Assuming negligible air resistance, use kinematic equations to determine the distance fallen and the instantaneous speeds after each second. Indicate these values on the odometer (distance fallen) and the speedometer views shown to the right of the cliff. Round all odometer readings to the nearest whole number.

Show a sample calculation below:

2. At which of the listed times is the acceleration the greatest? Explain your answer.
3. At which of the listed times is the speed the greatest? Explain your answer.
4. If the falling time of a free-falling object is doubled, the distance fallen increases by a factor of _____. Identify two times and use the distance fallen values to support your answer.



1-D Kinematics

5. Miss E. deWater, the former platform diver of the Ringling Brothers' Circus, dives from a 19.6-meter high platform into a shallow bucket of water (see diagram at right).

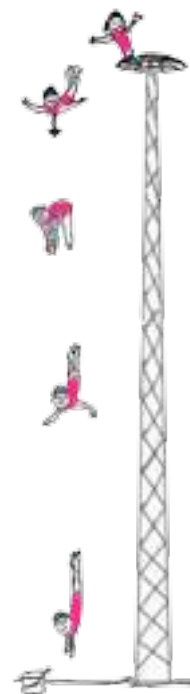
a. State Miss E. deWater's acceleration as she is falling from the platform. _____ What assumption(s) must you make in order to state this value as the acceleration? Explain.

b. The velocity of Miss E. deWater after the first half-second of fall is represented by an arrow. The size or length of the arrow is representative of the magnitude of her velocity. The direction of the arrow is representative of the direction of her velocity. For the remaining three positions shown in the diagram, construct an arrow of the approximate length to represent the velocity vector.

c. Use kinematic equations to fill in the table below.

Time (s)	Velocity (m/s)	Distance Fallen (m)	Height (m)
0.0	0.0	0.0	19.6
0.5			
1.0			
1.5			
2.0			

Show your work below for one of the rows of the table.



6. Michael Jordan was said to have a hang-time of 3.0 seconds (at least according to a popular NIKE commercial). Use kinematic equations to determine the height to which MJ could leap if he was wearing NIKE shoes and had a hang-time of 3.0 seconds.