

Additional 1D Motion Problems

1. A sprinter starts from rest and speeds up to 11.5 m/s over the first 1.50 seconds of the race. He then maintains that speed until 80.0 m total have passed. He then slows by 0.25 m/s/s until the end of the race at 100.0 meters from the starting line.
 - a. Sketch the motion diagram for this motion.
 - b. Sketch the motion graphs for this motion.
 - c. What is the average speed of the runner for the entire motion?

2. A car traveling 85 km/h strikes a tree. The front end of the car compresses and the driver comes to rest after traveling 0.80 m. What is the average acceleration of the car?

3. Draw the quantitative motion graphs for a ball that is thrown directly up in the air to a height of 25.0 meters.

4. A stone is thrown directly upward with a speed of 12.0 m/s from the edge of a cliff 70.0 m high.
 - a. How fast is it traveling when it hits the ground?
 - b. How long is it in the air before it hits the ground?
 - c. What is the total distance traveled?

5. A person jumps from a 4th story window onto a safety mat. The drop is 15.0 m and the person is slowed to rest over 3.0 m by the mat.
 - a. How fast was the person traveling when she hit the mat?
 - b. What was the average acceleration caused by the mat?
 - c. Draw a motion diagram.
 - d. Draw the three graphs of motion.

6. An airplane can fly the 150 km from city A to city B in 45.0 minutes on a calm day. There is a wind blowing 20 km/h.
 - a. How long would it take to make the trip if traveling against the wind?
 - b. How long would it take to make the trip if traveling with the wind?