

## Worksheet: Chapter 2 Linear Motion

--SHOW ALL WORK. Use correct unit labels, show all conversions, use dimensional analysis.

1. Explain the difference between displacement and distance. You may use a diagram, but must also have a written explanation.
2. If it takes Matthew 10 hours and 13 minutes to go 925 km from B. Hills to Sacramento, what is his average velocity? Using this example, explain what is meant by instantaneous speed and what is meant by average speed.
3. List the 5 motion equations. For each, list each variable, write what the variable means AND the typical units for that variable.
4. What is the reason for identifying all variables before beginning a problem?
5. A bus travels 280 km south with an average velocity of 88 km/h. The bus stops for 24 minutes, then travels 210 km south with an average velocity of 75 km/h.
  - a. How long does the total trip last?
  - b. What is the average velocity for the entire trip?
6. Ashley drives her car at an average velocity of 48.0 km/hr, east; how long for her to drive 144 km?
7. Suppose a treadmill has an average acceleration of  $4.7 \times 10^{-3} \text{ m/s}^2$ .
  - a. How much does its speed change after 5.0 minutes?
  - b. If the treadmill's initial speed is 1.7 m/s, what will its final speed be?
8. With an average acceleration of  $-0.50 \text{ m/s}^2$ , how long will it take for a cyclist to stop a bicycle with an initial speed of 13.5 m/s?
9. A car accelerates uniformly from rest to a speed of 23.7 km/hr in 6.5 seconds. Find the distance the car travels during that time.
10. Michael puts on the brakes of his car which slows uniformly from 15.0 m/s to 0 m/s in 2.50 seconds. How many meters prior to the stop sign must he apply his brakes to stop in time?
11. A car enters the freeway at 6.4 m/s and accelerates uniformly for 3.2 km in 3.5 minutes. How fast is the car moving after this time?
12. A car starting from rest travels for 5.0 seconds with a uniform acceleration of  $-1.5 \text{ m/s}^2$ . What is the final velocity of the car? How far does the car travel in this time interval?
13. Taylor hits a volleyball with an initial velocity of 6.0 m/s straight upward. If the volleyball starts 2.0 m above the floor, how long will it be in the air before striking the floor?
14. Jason throws an apple upward from a height of 1.3 m with an initial velocity of +2.4 m/s.
  - a. Will the apple reach Nathan in a treehouse 5.3 m above the ground?
  - b. If the apple is not caught, how long will the apple be in the air before hitting the ground?
15. A robot probe drops an object off a 239 m cliff on Mars.  $g_{\text{Mars}} = -3.7 \text{ m/s}^2$ .
  - a. Find the time required for the object to reach the ground.
  - b. What is the velocity when it hits the ground?