

Name \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

## General Physics WS2

Show given information, equations, algebra, substitution, and units for full credit. Pay attention to significant figures.

$$\text{Formulas: } v = \frac{\Delta x}{\Delta t} \quad a = \frac{\Delta v}{\Delta t}$$

### Speed, Velocity, and Acceleration Problems

1. If a car moves with an average speed of 60.0 km/hr for an hour, it will travel a distance of 60.0 km. How far will it travel if it continues this average rate for 4.00 hrs? **240 km**
2. A motorist travels 406 km during a 7.00 hr period. What was the average speed in km/hr and m/s? **58.0 km/hr, 16.11 m/s**
3. A bullet is shot from a rifle with the speed of 720 m/s. What time is required for the bullet to strike a target 3240 m away? **4.75 seconds**
4. Light from the sun reaches the earth in 8.30 minutes. The speed of light is  $3.00 \times 10^8$  m/s. In **kilometers**, how far is the earth from the sun?  **$1.49 \times 10^8$  km**
5. The peregrine falcon is the world's fastest known bird and has been clocked diving downward toward its prey at a constant vertical velocity of 97.2 m/s. If the falcon dives straight down from a height of 100. m, how much time does this give a rabbit below to consider his next move as the falcon begins his descent? **1.03 seconds**
6. You decide you want to figure out how deep the Grand Canyon is, so you bring your stopwatch to a location in the Grand Canyon. When you yell into the canyon, you hear your yell echo back from the floor of the canyon 7.20 seconds later. How deep is the canyon at this location? (Assume speed of sound is 340.0 m/s) **1220 m**
7. Michael Phelps set the swimming world record for the men's 100 m butterfly in 2009, when he swam it in 49.82 seconds. (Use 100.0 m for your sig fig calculation)
  - a. What was his average speed in m/s? **2.007 m/s**
  - b. What was his average speed in mph? **4.490 mph**

8. For a long time it was the dream of many runners to break the "4-minute mile." Now quite a few runners have achieved what once seemed an impossible goal. On July 2, 1988, Steve Cram of Great Britain ran a mile in 3.81 min. During this amazing run, what was Steve Cram's average speed in: (1 miles = 1609 m)
- m/s?
  - mi/hr?
9. It is now 10:29 a.m., but when the bell rings at 10:30 a.m. Suzette will be late for French class for the third time this week. She must get from one side of the school to the other by hurrying down three different hallways. She runs down the first hallway, a distance of 35.0 m, at a speed of 3.50 m/s. The second hallway is filled with students, and she covers its 48.0 m length at an average speed of 1.20 m/s. The final hallway is empty, and Suzette sprints its 60.0 m length at a speed of 5.00 m/s. Does Suzette make it to class on time or does she get detention for being late again?
10. During an Apollo moon landing, reflecting panels were placed on the moon. This allowed earth-based astronomers to shoot laser beams at the moon's surface to determine its distance. The reflected laser beam was observed 2.52 s after the laser pulse was sent. The speed of light is  $3.0 \times 10^8$  m/s. What was the distance between the astronomers and the moon?
11. A car accelerates from 3.27 m/s to 15.55 m/s in 4.0 seconds flat. What is its acceleration?
12. Acceleration... (circle one)
- is the rate of change of velocity
  - reflects a change in speed **or** a change in direction
  - is zero when an object is at constant velocity
  - all of the above
13. When you turn a corner in your car at 20 mph.... (circle one)
- Your velocity changes
  - You accelerate
  - Your speed changes
  - a. and b.
  - a. and c.
14. Explain how velocity can be positive when acceleration is negative.