# Speed & Velocity 2

Name: \_\_\_\_\_

1) Two motorcycles leave from the same spot at the same time. Bike 1 travels at +50 mi/hr for 1.5 hr, stops for 1.5 hr, then continues on at 60 mi/hr for 4 hr. Bike 2 travels at +45 mi/hr for 6 hr.

a) Draw a position-time graph for the two bikes in this information.

b) At what time(s) are the two bikes at the same position?



2) Ethan decided to race Michael Phelps in the 200 m freestyle last week. Michael swam at a blistering 1.23 m/s, while Ethan swam at 0.51 m/s. How much of a head start would Michael need to give Ethan to have tied a race? Give your answer in terms of time and distance.

3) Gene is riding his unicycle at 12.3 m/s east, while Eric is riding his horse at 16.5 m/s west. If Gene and Eric started 357 m apart, where and when would they collide?

## Chapter 2 Review

### Displacement & Velocity Concepts

1) Is displacement a vector or a scalar?

2) Is average velocity a vector or a scalar?

3) A physics book is moving across a table. Can that book

a) have a constant speed and a changing velocity?

b) have a constant velocity and a changing speed?

4) If the average velocity of a particle is zero in some time interval, give two explanations about the particle's displacement in that time period.

### **Graphing Motion**

5) For each of the following position vs. time graphs, explain how you would walk.



6) Sketch a distance vs. time graph corresponding to each of the following descriptions of motion:

a) the object moves with a constant velocity away from the origin.

b) the object moves away from the origin with a steady velocity for 5 s, and then stands still for 5 s.

c) the object moves away from the origin, starting quickly, then slowing down.

#### Distance & Speed Problems

7) While John is traveling west down I-70, he notices while in Columbus he is at mile marker 105. In Dayton, John passes mile-marker 32.

a) What is the distance between the two cities?

b) What is John's position compared to his initial position?

c) What is the displacement vector for his trip?

8) A physics textbook is moved once around the perimeter of a table that measures 3.50 m by 0.75 m.

a) If the book ends up in its initial position, what is the book's displacement?

b) What is the distance traveled?

9) Light from the Sun reaches Earth in 8.3 min. The speed of light is  $3.00 \times 10^8$  m/s. How far is the Earth from the Sun?

10) You plan a trip on which you want to average 100 km/hr. You cover the first third of the distance at an average speed of only 72 km/hr. What must your average speed for the second half of the trip be in order to meet your goal?

11) Twins Will and Tom are trying to become conjoined twins. They figure if they run at one another fast enough, this process will happen. They start 112 m apart and run toward one another, Will running at 3.4 m/s and Tom running at 2.8 m/s. If they start at the same time, where and when will they collide?