

1. A car is traveling on a street, zigzagging through traffic. The car maintains an average speed of 20 mi/hr. Can you determine the distance the car will travel in 15 minutes? If so, do the calculation; if not, explain why not.

2. A car is traveling on a street, zigzagging through traffic. The car maintains an average speed of 20 mi/hr. Can you determine what the car's displacement will be after 15 minutes? If so, do the calculation; if not, explain why not.

3. A car drives 55 mi/hr to the east. A second car travels 55 mi/hr to the west.
- Are their speeds the same? Explain.

 - Are their velocities the same? Explain.
4. A small paddle boat can travel with a speed 5 knots in the still water of a lake.
- The same paddle boat traveling along a river that has a current whose speed is 5 knots toward the west will be able to acquire what maximum speed?

Going what direction? Explain.

- What minimum speed?

Going what direction? Explain.

5. You travel in an airplane in a straight line. However, during your trip, the pilot changes his speed. Soon after take-off, the plane settles into a nice 500 mi/hr for 10 minutes. Then, it has a speed of 600 mi/hr for 20 minutes, and finally it has a speed of 675 mi/hr for 30 minutes.
- a. Explain why the average speed is not simply the average of the speeds, i.e., it is not $(500 + 600 + 675)/3$.
- b. Calculate the average speed (in mi/hr) of the plane during the 60 minutes described above.

6. Anne, while riding her bicycle to school, comes to a stop at the school's entrance. Anne describes this motion as she comes to a stop as having a velocity towards the school, but an acceleration away from the school. Is Anne correct? Explain.

7. Is it possible for an object in motion to reverse its direction of travel while the object maintains a constant acceleration? **YES** **NO**

Explain and illustrate your answer with an example.

8. While driving to a rock concert your two friends Susan and Sally get into an argument about physics. Sally maintains that acceleration is how fast the car is moving, while Susan says that acceleration is how quickly you get fast.

Who do you agree with? **SUSAN** **SALLY**

Defend your friend.

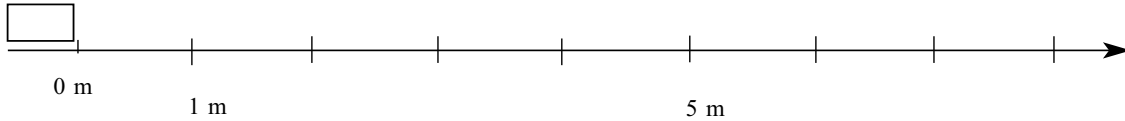
9. While at a race you watch two funny cars. The "Einstein Flash" starts from rest and accelerates to a speed of 240 mi/hr, and the other car "Newton's Revenge" starts from rest and accelerates to a speed of 275 mi/hr.

Can you say which funny car underwent the greater acceleration?

YES **NO**

Defend your answer carefully.

10. A cart travels at a constant speed of 2 m/s along a marked path. Sketch the location of the cart at 1 second, 2 seconds, 3 seconds, and 4 seconds after the initial point shown. Justify your sketch.



Justification: