Directions: Read all questions and answer carefully. Show all work!

1. What must your average speed be (in meters/second) in order to travel 220 miles in 2.0 hours?

2. A runner makes two laps around a 200 m track in a time of 55 seconds. What were the runner's (a) average speed and (b) average velocity?

3. A space shuttle takes off from Florida and circles the globe several times, finally landing in California. While the shuttle is in flight, the husband of an astronaut on the shuttle flies from Florida to California so that he can greet his wife when she steps off the shuttle. Who undergoes the greater displacement? Explain.

4. An elevator rises 13 floors in 0.75 minutes and then descends 5 floors in 0.35 minutes. A) What is the velocity in m / s of the elevator on the trip up? B) The trip down? C) The whole trip? (one floor = 4 meters)

5. A police car leaves in pursuit of a holdup car 0.5 hours after the latter has left the scene of the crime at 86 mi/hr. How fast in mi/hr must the police car go if it is to catch up with the holdup car in one hour?

6. The black mamba is one of the world's most poisonous snakes, and with a maximum speed of 18.0 km/hr, it is also the fastest. Suppose a mamba waiting in a hide-out sees prey and slithers toward it with a velocity of **+**18.0 km/hr for a total of 2.5 seconds. The mamba realizes that its prey can move faster than it can. The snake realizes that the prey is out of reach and turns around, slowly returning to its hide-out in 12 seconds.

    (A) How far did the mamba travel from his hide-out?
    (B) Calculate the mamba's velocity during its **return** trip to the hideout.
    (C) Calculate the mamba's average **velocity** for the complete trip.
    (D) Calculate the mamba's average **speed** for the complete trip.

7. An ostrich can run at speeds of up to 72 km/hr. How long will it take an ostrich to run 1.5 km at this top speed?

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8. A cheetah is known to be the fastest mammal on Earth, at least for short runs. Cheetahs have been observed running a distance of 5.50 E 2 m with an average speed of 1.00 E 2 km/hr. How long would it take a cheetah to cover this distance at this speed?

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9. A gazelle travels 1.7 km south, only to encounter a passing pride of lions. Instead of trying to travel around the lions, the gazelle turns around and travels 0.60 km north to wait out the lions. It then turns around again immediately and travels 1.44 km south to the watering hole. What is the total displacement (in meters) of the gazelle? What is the average velocity (in m/s) of the gazelle if it makes this trip in 4 hours?

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10. Eustace drives 20.0 km to the east when he realizes he left his wallet at home. He drives 20.0 km west to his house, takes 5.0 min to find his wallet, then leaves again. Eustace is 40.0 km east of his house exactly 60.0 min after he left the first time. What is his average velocity (m/s) ?

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11. Emily takes a trip, driving with a constant velocity of 89.5 km/hr to the north for 20 km. She takes a 22.0 min rest stop and then drives at 77.8 km/hr to the north for an additional 65 km. What is Emily's average velocity (km/hr) for the entire trip?

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12. Laura is skydiving when at a certain altitude she opens her parachute and drifts toward the ground with a constant velocity of 6.50 m/s, straight down. What is Laura's displacement if it takes her 34.0 s to reach the ground?

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