

## **Conceptual Physics - Chapter 2**

### **Linear Motion**

#### **Rate**

#### **Speed**

**Instantaneous Speed**

**Average Speed**

#### **Discussion:**

**1. The speedometer in a car also has an odometer which records the distance traveled.**

**A. If the odometer reads 25 km at the beginning of the trip and a half hour later it reads 60 km, what is the average speed?**

**B. Would it be possible to attain this average speed and never exceed a reading of 70 km/h on the speedometer?**

**2. A cheetah can maintain a constant speed of 25 m/s. At this rate, how far will it travel in 10 seconds? In 1 minute?**

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**1. What is the average speed of a cheetah which runs 140 m in 5 seconds?**

**Concepts:**

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- 1. What do we mean when we say that motion is relative?**
  
- 2. Speed is the rate at which what happens?**
  
- 5. Does the speedometer of a car read instantaneous speed or average speed?**
  
- 7. If the speedometer of a car reads a constant 40 km/h, can you say that the car has a constant velocity? Explain.**

**Acceleration:**  
**Any change in velocity.**

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**12. What is the acceleration of a car moving along a straight-line path that increases its speed from zero to 100 km/h in 10 s?**

**15. What is the meaning of free fall?**

**16. A freely falling object is dropped from rest. What is the instantaneous speed at the end of the fifth second of fall?**

## Some more difficult problems

1. (A) Light from the Sun reaches earth in 8.3 minutes. How far is the earth from the sun? (You will need to use reference material).
2. How long will it take a radio message to travel from the earth to the moon? (Radio waves travel at the speed of light).
3. A car is moving down the street at 55 km/hr. A child suddenly runs into the street. If it takes the driver 0.75 s to react and apply the brakes, how many meters will the car have moved before it begins to slow down?
4. You and a friend each drive 50.0 km. You travel at 90.0 km/h. Your friend travels at 95.0 km/h. How long will your friend have to wait for you at the end of the trip?

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**4. You and a friend each drive 50.0 km. You travel at 90.0 km/h. Your friend travels at 95.0 km/h. How long will your friend have to wait for you at the end of the trip?**

**What is the speed of a skateboarder who accelerates from rest for 3 seconds down a ramp at  $5 \text{ m/sec}^2$**

**An object falls freely from rest for 3.2 seconds. How fast will it be going at the end of the fall?**