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**PHY 140Y - FOUNDATIONS OF PHYSICS**  
**2001-2002**  
**Tutorial Questions #2**  
**September 24/25**

**Motion in a Straight Line**

1. Two cars are moving with a velocity  $v_o = 40.0$  m/s down a stretch of highway. They are displaced by a distance of 100.0 m. Both cars begin to accelerate - the lead car at a rate of  $4.0 \text{ m/s}^2$  and the trailing car at a rate of  $6.5 \text{ m/s}^2$ . How long from the onset of acceleration will it take for the trailing car to catch the other car? What are their velocities at that time?
2. A sled is sliding down a hill and is being timed at one second intervals for 10.0 seconds. In the time interval  $t = 3.0$  s to  $t = 4.0$  s, it is observed to travel 6.0 m. In the time interval from  $t = 6.0$  s to  $t = 7.0$  s, it is observed to travel 10.0 m. What is the total distance that the sled travels in the 10.0 seconds of timing?

**The Acceleration of Gravity**

3. A rock on the Moon is thrown straight up with a velocity of 5.0 m/s. After 10.0 seconds, it has a downward velocity of 11 m/s. What is the acceleration due to gravity on the Moon? How high above the starting point did the rock go before it began to fall?
4. Lisa challenges Bart to catch a five-dollar bill as follows. She holds the five-dollar bill vertically from the top, with the centre of the bill between Bart's index finger and thumb. Bart must catch the bill after Lisa releases it without moving his hand downwards. Would you bet on Lisa or Bart?