Newton, Isaac

phys1110 **Section 14**
Due Fri, Dec 12, 2008 at 09:00 Set 4
CAPA ID 7670

1. [2pt] Which of the following statements is true? (Give all correct statements in order;i.e. AD, BCD, etc.)

A) When the acceleration of a particle is zero, its average speed is equal to the magnitude of its average velocity.

B) The speed of a particle with a positive acceleration is always increasing.

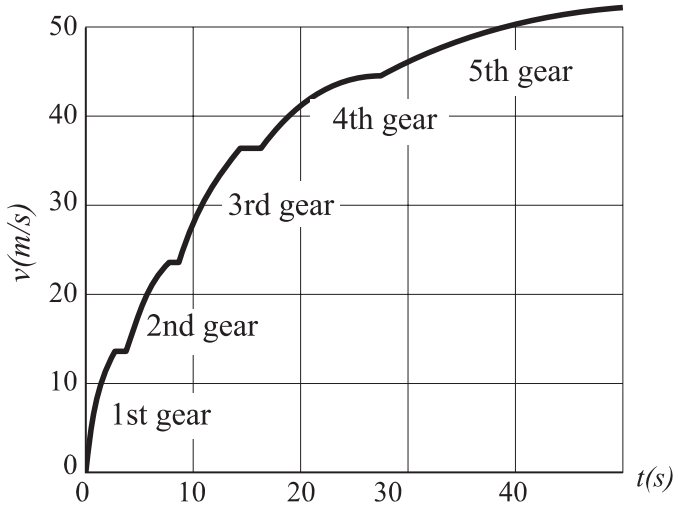
C) The velocity of an object can reverse direction when its acceleration is constant.

D) When the velocity is constant, the average velocity over any time interval does not differ from the instantaneous velocity at any instant in that time interval.

E) The magnitude of the average velocity of a particle is always equal to its average speed.

F) An object can have a zero velocity and still be accelerating.

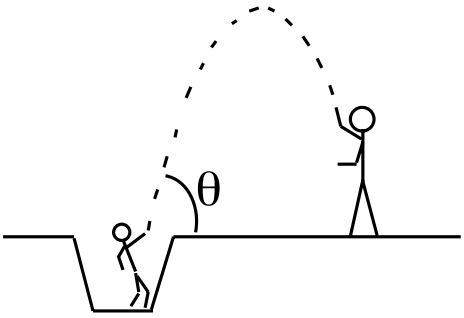
2. [2pt] A high-performance automobile can accelerate approximately as shown in the figure below in the velocity-time graph. (The short flat spots in the curve represent shifting of the gears.)



Estimate the average acceleration of the car in forth gear.

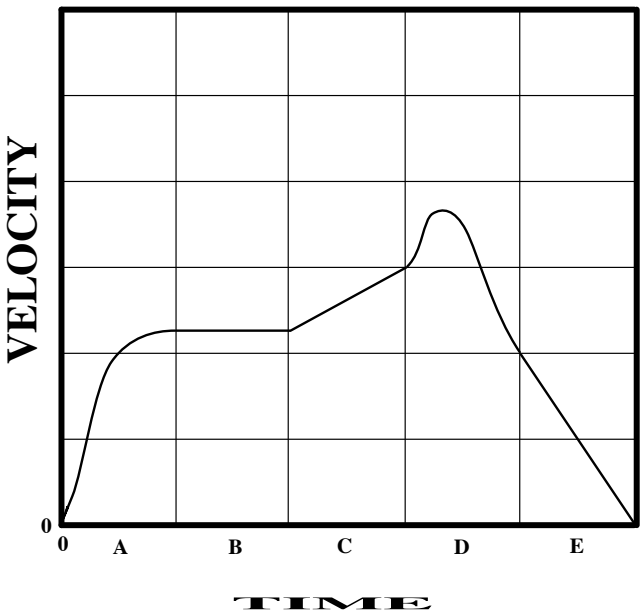
3. [2pt] The best rebounders in basketball have a vertical leap (that is, the vertical movement of a fixed point on their body) of about $124cm$. What is their initial "launch" speed off the ground?

4. [2pt] A boy standing in a ditch throws a baseball upward toward his father. The ball leaves his hand at ground level, with an initial speed of 16.0 m/s, at an angle of $\theta = 69.0°$ from the horizontal. The boy's father reaches up and catches the ball over his head, at a height of 2.0 m above the ground. The father catches the ball on its way down (as shown in the Figure). Calculate how long the ball is in the air. (g = 9.81 m/s^2)



5. [2pt] When a large star becomes a supernova, its core may be compressed so tightly that it becomes a neutron star, with a radius of about 39 km (about the size of the San Francisco area). Suppose this star has mass 2×10^{30} kg and rotates once every second. (That's realistic, but quite amazing: try to image a star rotating that fast!) Consider a small particle sitting on such a star's equator. What is the centripetal acceleration of that particle?

6. [2pt] The graph below shows the velocity of an object of mass 1 g. Each line on the time axis represents 1 s and each line on the velocity axis represents 2 m/s. Which of the following statements, describing the graph above are true? (If A and E are true, and the others are not, enter TFFFT).
In this problem, use the Force 1D Simulation to help explore forces. It's available online from the class homepage: Or go to http://phet.colorado.edu and search Force 1D



(PLEASE NOTE: The syntax on this problem is different than it has been in the past. We want a string of 5 letters, T or F. If you think A and B are true, do NOT input "AB" as you have in past weeks. Please input TTFFF)

A) In section C, the force is positive.

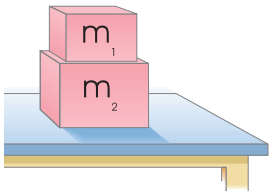
B) In section D, the force changes in magnitude, but the sign of the force remains constant.

C) In section D, the displacement is positive.

D) In section E, the force is constant and non-zero.

E) In section A, the force acts in the direction of the velocity

7. [2pt] A $m_1 = 8.00kg$ box is placed on top of the $m_2 = 19.4kg$ box, as shown in figure below.



Determine the normal force that the table exerts on the $19.4kg$ box.