Physics 200 **Name_____**

1-D Kinematics Test (2019-2020, Stapleton)

** For all problems, assume g=9.8m/s^2

Part I (Conceptual and Multiple Choice):

1. Describe an example of motion that has negative acceleration and negative velocity.

2. Describe an example of motion that has positive velocity and negative acceleration.

3. Which one of the following situations is impossible?
   A) A body having a positive velocity and a negative acceleration
   B) A body having a negative velocity and a negative acceleration
   C) A body having zero velocity and negative acceleration
   D) A body having constant velocity and positive acceleration

4. In which of the following situations is it possible for an object to be accelerating?
   a. Velocity is positive and constant
   b. Velocity is negative and constant
   c. Speed is positive and constant
   d. Speed is negative and constant

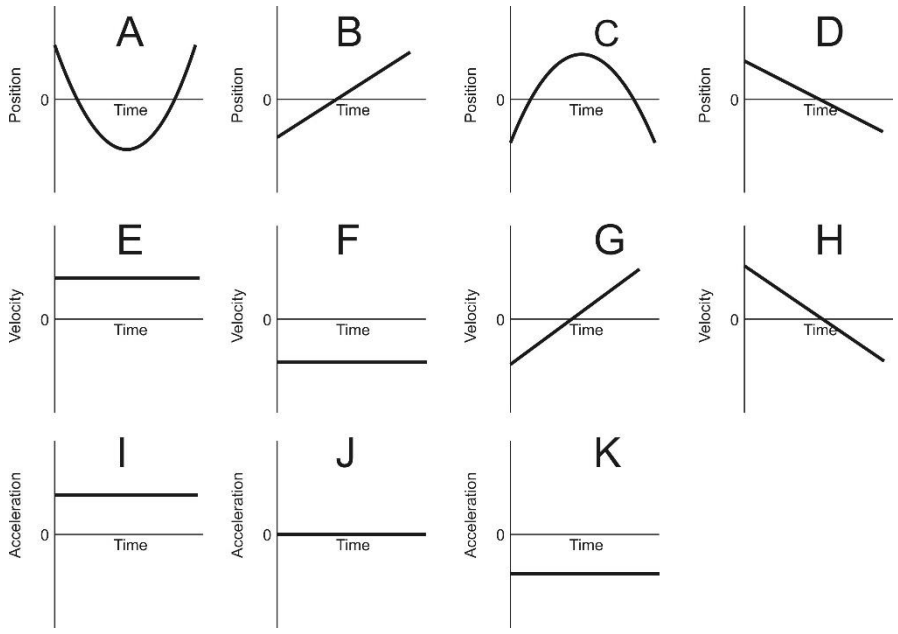
5. If speed is increasing, which of the following must <u>always</u> be true?
   A) Acceleration is zero B) Velocity is increasing
   C) Acceleration is positive D) both A and B
   E) A, B, and C F) none of these

6. Which **<u>velocity</u>** graph represents the same motion as position graph **C**?
   E F G H

7. Which **<u>acceleration</u>** graph represents the same motion as position graph **D**?
   I J K

8. Which **<u>velocity</u>** graph represents the same motion as acceleration graph **K**?
   E F G H

9. Which **<u>position</u>** graph represents the same motion as acceleration graph **I**?
   A B C D



10-13. A car travels forward 8m to the right (positive direction). Then it drives in reverse, traveling leftward for 16m. Assuming that the entire round trip takes 8 seconds…

10. What is the average speed for this round trip?
    a. 1m/s b. 2m/s c. 3m/s d. -1m/s e. -2m/s f. -3m/s

11. What is the average velocity for this round trip?
    a. 1m/s b. 2m/s c. 3m/s d. -1m/s e. -2m/s f. -3m/s

12. What is the total distance traveled by the car on its round trip?
    a. 8m b. 16m c. 24m d. -8m e. -16m f. -24m

13. What is the displacement for this round trip?
    a. 8m b. 16m c. 24m d. -8m e. -16m f. -24m

14. Which letter choice correctly describes the speed, acceleration, and velocity of an object that is falling in the absence of air resistance? +,-, and = mean "increase, decrease, and no change," respectively.

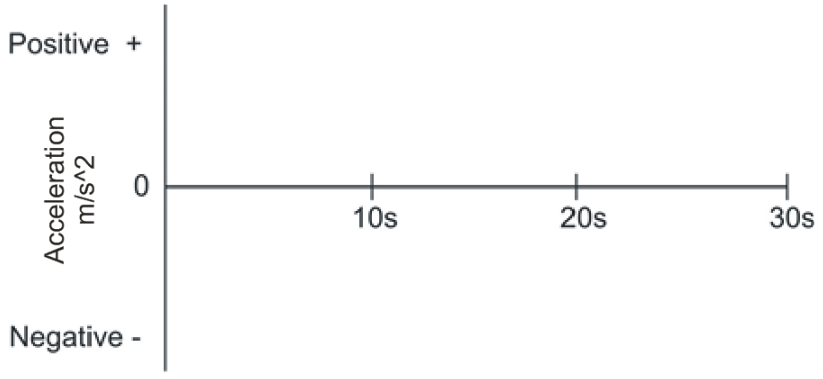
Choices	Speed	Velocity	acceleration
A	+	-	+
B	+	+	-
C	-	-	=
D	-	+	=
E	+	-	=

15. Suppose a ball is thrown straight upward. What are the values of the ball's velocity and the acceleration when it reaches its highest point?

Velocity = _____ Acceleration = _____

16. A typical elevator waits for a passenger on the 2nd floor of a hotel. The elevator then travels from the second floor to the 1st floor. Then the elevator remains on the first floor. On the graph below, sketch the changes in the elevator's **acceleration** over this 30 second period. Correct answers may vary somewhat, depending on your assumptions.

Time	Event
0s	Elevator is waiting motionless on 2nd Floor.
10s	Elevator begins traveling to 1st floor.
20s	Elevator comes to rest (stops) at the 1st floor.
30s	Elevator is still waiting on 1st floor.



Physics Problems [4 points per problem – including correct units] *In the case of wrong answers, partial credit may be given for correct formulas* ***– in their original form*** *-- and correct units.* **Enclose your answers and your starting formulas in boxes.**

2. How long does it take a racehorse to travel a distance of 300m if it is running at a constant speed of 19m/s?

3. A car traveling at a rate of 25m/s decelerates at a rate of -2m/s^2 in order to avoid hitting another car. If this deceleration lasts for 3 seconds, what is the velocity of the decelerating car at the end of those 3 seconds?

4. A grape is shot directly upward in the absence of air resistance. After 12 seconds of flight, the grape returns to the same elevation from which it was launched. How high above the launch point did the grape travel?

5. A circus performer plans to jump from a high platform into shallow pool of water, entering the water with a velocity of -15m/s. If the diver is willing to risk a maximum acceleration no greater than 120m/s^2, what is the minimum distance (water depth) over which the performer must slow down and stop?