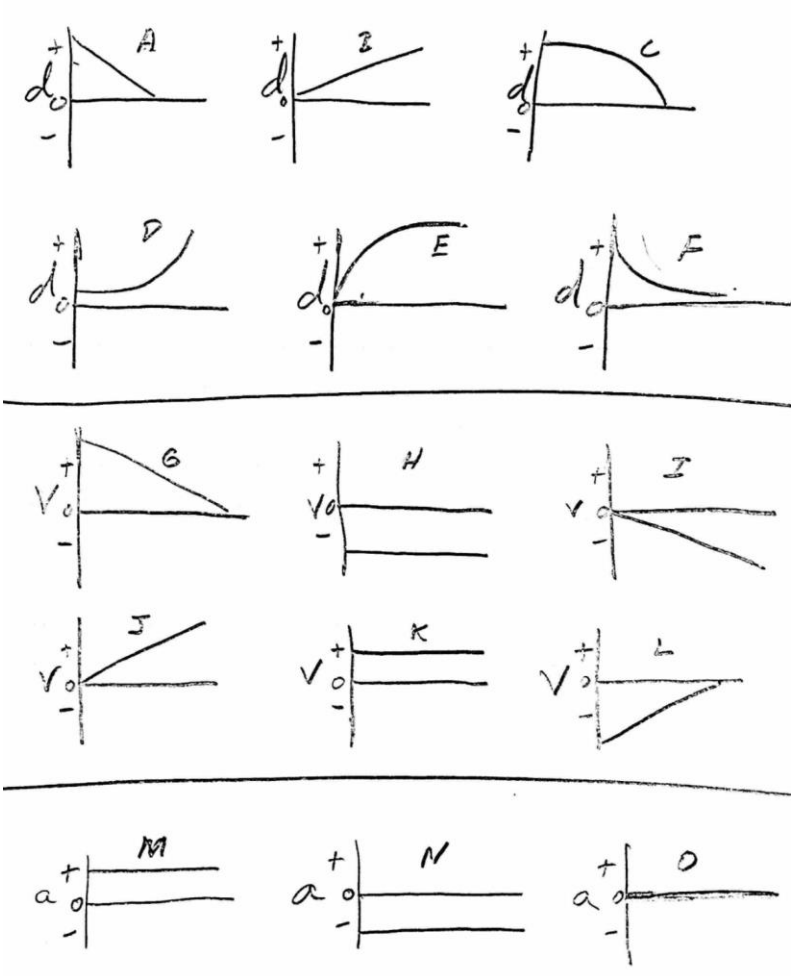
Physics 200 (Stapleton) **Name: _____**
Unit 1 Test: Extra Practice

(#3-5 MC) Relationship between speed, velocity, and acceleration: Velocity can be positive, negative, or zero. At the same time, velocity can be constant, increasing, or decreasing. Combining these two dimensions, there are 9 possible states of velocity.

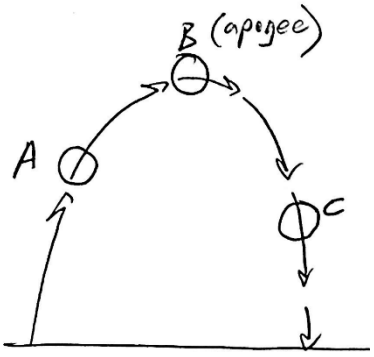
For each of the following states, decide whether or not the same must be true for speed. If it is true (e.g. if speed is also positive and constant whenever velocity is positive and constant), make a check mark next to the statement. If the statement is not true when applied to speed, write the correct statement for speed.

1. Velocity is positive and constant.
2. Velocity is negative and constant.
3. Velocity is zero and constant.
4. Velocity is positive and increasing.
5. Velocity is negative and increasing.
6. Velocity is zero and increasing.
7. Velocity is positive and decreasing.
8. Velocity is negative and decreasing.
9. Velocity is zero and decreasing.

<u>(#6-9 MC) Matching Graphs:</u> The three sets of graphs below show distance vs time, velocity vs time, and acceleration vs time.



(#10-11 MC) Phases of a Symmetric Flight In Free-Fall



At points A, B, and C in the diagram, tell what you know about the projectile's velocity, speed, and acceleration. Describe each as either positive, negative, or zero. Also identify whether each of these values is "increasing," "decreasing," "constant," or state that none of these is entirely correct. Provide actual values when they are known.

(#12 Sketchig Graphs) Sketch graphs of acceleration for these events:

1. A rocket sits at rest on the surface of a planet with no atmosphere. Suddenly the rocket launches straight upward. After a few seconds, the rocket's engine cuts off, and the rocket travels solely under the influence of gravity. After rising for several more seconds, the rocket falls, eventually crashing and coming to rest at the same spot where it launched.

2. A pitcher throws a baseball to our left. A batter hits the ball back to the pitcher, and the pitcher catches it.

Extended Problem:

A ball is carried directly upward on a conveyor belt for 25 seconds at a speed of 1.9m/s. After this ascent, the ball sits at rest for 2 seconds, until a lever throws the ball directly downward in the absence of air resistance. The lever that throws the ball causes a constant acceleration of -286m/s^2 over a vertical distance of 0.7m. Three seconds after leaving the lever, the ball makes contact with the ground, compresses downward a bit, and bounces back upward. This period of contact with the ground lasts 0.05 seconds, and during this time of contact, the ball undergoes constant acceleration. After losing contact with the ground, the ball travels upward 50m before losing all of its speed. This is the end of "the event."

1. What is the velocity of the ball just after it is accelerated by the lever?

2. What is the velocity of the ball just before it makes contact with the ground?

3. How far does the ball travel between the time it is released from the lever and the moment it contacts the ground?

4. What is the average velocity of the ball between its release from the lever and its moment of contact with the ground?

5. What is the velocity of the ball just after its bouncing contact with the ground?

6. What acceleration does the ball experience during the bounce?

7. What is the ball's overall displacement during this entire event?