Phys1010 Homework 2 SIM

1) Stopping Distance. Consider two cars, a 700kg Porsche and a 600kg Honda Civic. The Porsche is speeding along at 40 m/s (mph) and the Civic is going half the speed at 20 m/s. **If the two cars brake to a stop with the same constant acceleration**, lets look at whether the amount of time required to come to a stop or the distance traveled prior to stopping is influenced by their initial velocity.

Use Moving Man to simulate this situation. (Select the accelerate option and set the initial velocity, initial position, and an acceleration rate so that the walking man's motion will emulate that of the car stopping with constant acceleration. **Choose your acceleration, velocity, and position values wisely so that Moving Man does not run into the end of his range!** In the case of the walking man, the man will actually stop and then turn around and go in the other direction but we are interested in the motion up until the time the man stops). Observe both how much time it takes him to stop and how far he walks during this time. Double his initial walking speed and observe the difference in his stopping time and stopping distance.

If you double the initial walking speed, the amount of time it takes to stop…

- is six times longer
- is four times longer
- is two times longer
- does not change
- is half as long

If you double the initial walking speed, the man walks … before coming to a stop.

- nine times farther
- six times farther
- four times farther
- three times farther
- two times farther
- the same distance
- one-half as far
- one-third as far

If you triple the initial walking speed, the walking man goes … before stopping.

- nine times farther
- six times farther
- four times farther
- three times farther
- two times farther
- the same distance
- one-half as far
- one-third as far

2) (1 pt) The moving man simulation allows you to set him into "Accelerate" mode and control the acceleration of the walking man using the acceleration slider. Play around with this control until you gain an intuition as to how the motion of the moving man relates to this acceleration setting.

True False Not answered If the acceleration is zero, the man must be standing still.

True False Not answered Negative acceleration means the man must be slowing down.

○ True ○ False ○ Not answered Velocity and acceleration are always the same sign (both positive or both negative).

○ True ○ False ○ Not answered If the speed is increasing, the acceleration must be positive.

3) (2 pts total) The Maze Game Challenge. You may access the Maze Game Exploration on PhET's webpage. The objective of the game is to maneuver yourself from the Start to the Goal by controlling either your position, velocity, or acceleration.

a) (1 pt) Open the Maze Game and complete Level 1 using each of the 3 methods for control. You'll find that completing Level 1 under acceleration control is the most challenging, but is also a great way to gain an intuition for acceleration. The current record is 5.0 seconds! When you have successfully completed Level 1, check box below:

- [ ] Completed level 1 under position control
- [ ] Completed level 1 under velocity control
- [ ] Completed level 1 under acceleration control

b) (1 pt) Describe your strategy for minimizing your time when using the acceleration control. Be sure to back your strategy with the physics principles which explain why it would minimize your time.