

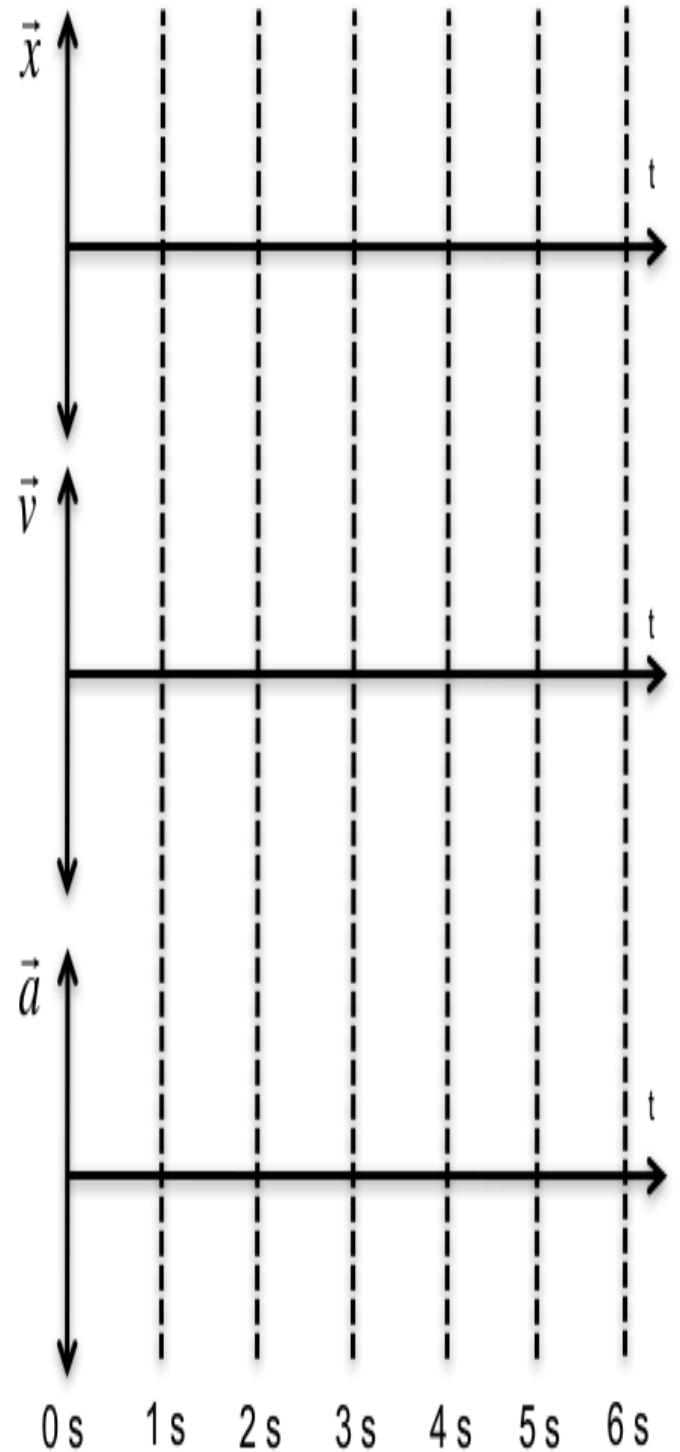
You will be graded on your COMMUNICATION of physics understanding

- #1 You and your friends are excited to be the first people to be on the new super drop ride. With you and your friends in a car, the total mass is 1000 kg. Starting at rest, you drop down a very slippery track losing 15 m of elevation, slide along 40 m on level ground and then rise up 5 m to the top of a hill on level ground, coming to a stop by compressing a spring by 2 meters.
- Without finding the answer, explain completely how you would go about finding the spring constant from the information given, right up to and including setting up the formulas.
 - Without finding the answer, explain completely how to find the maximum acceleration as we compress the spring, right up to and including setting up the formula.
 - Let's say now that there is a coefficient of friction on the level part of the track of $\mu_d = 0.2$. Please describe how this would affect the way you solved (a) above for the spring constant.
 - Save for the end only if you have extra time.* Can you tell me if the consideration of friction would have a large or small effect on your answer for (a), *supporting your answer*.

#2 The mass of your friend is 50 kg and she is in a 450 kg elevator for a total mass of 500 kg. She is moving downward and her speed is decreasing as she stops on the ground floor. The table at right indicates the speed as a function of time.

a) Please make the graphs describing her motion. Make sure they have the right shape, and if you have time, please fill in the correct numbers.

Time (s)	Speed (m/s)
0	8
1	8
2	6
3	4
4	2
5	0
6	0



#3 Imagine your friend is 50 kg and is standing on a scale in the previous page.

a) What does the scale under her read at $t = \frac{1}{2}$ s?

b) What does the scale under her read at $t = 3$ s?

#4 A 1.0 kg ball moving at 10 m/s *to the right*, has a totally *elastic* collision with *stationary* “Ball X” of unknown mass, and *turns around moving to the left* at 8 m/s. We want to find the mass of Ball X, and its final velocity.

- a. Without doing any math, can you tell me if the mass of Ball “X” is more or less than 1 kg? That is: fill in the space with $<$, $>$, or $=$: m_X ___ 1 kg
please give a reason



- b. What must be the momentum of Ball X after the collision? Explain completely
- c. What must be the kinetic energy of Ball X after the collision? Explain completely
- d. Only if you have time: Find the mass of ball X and the final velocity of ball X.

Name _____