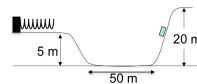


You will be graded on your COMMUNICATION of physics understanding

#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. You drop down a very slippery track as shown at right (in a drawing that is way way too small to be used as a reasonable diagram).

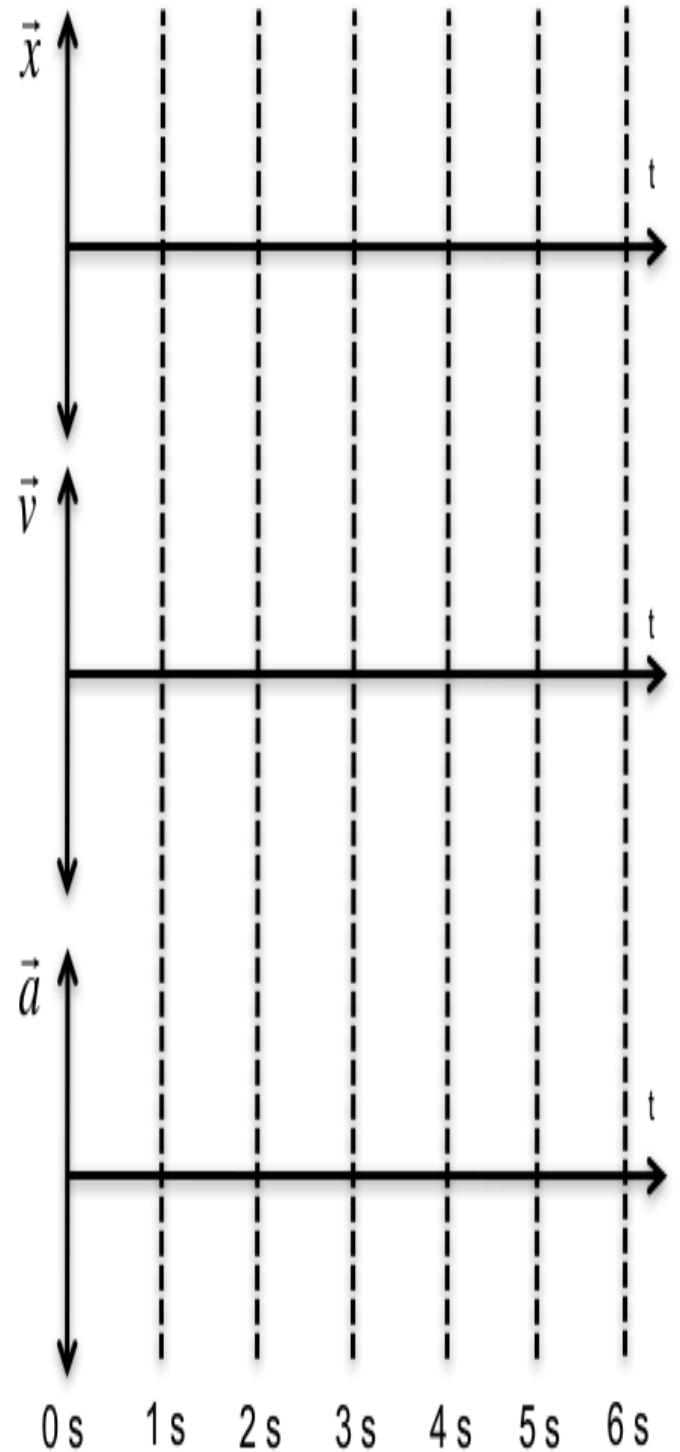


- You start at the top at rest and compress the spring at the end by 2 meters as you come to a stop.
- Without finding the answer, explain completely how you would go about finding the spring constant from the information given, right up to setting up the formulas.
  - Without finding the answer, explain completely how to find the maximum acceleration as we compress the spring, right up to 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 *continues on to the right* at 8 m/s. We want to find the mass of Ball X, and its final velocity. Is it a good idea to draw a picture?

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?

c. What must be the kinetic energy of Ball X after the collision?

d. Find the mass of ball X and the final velocity of ball X.

Name \_\_\_\_\_