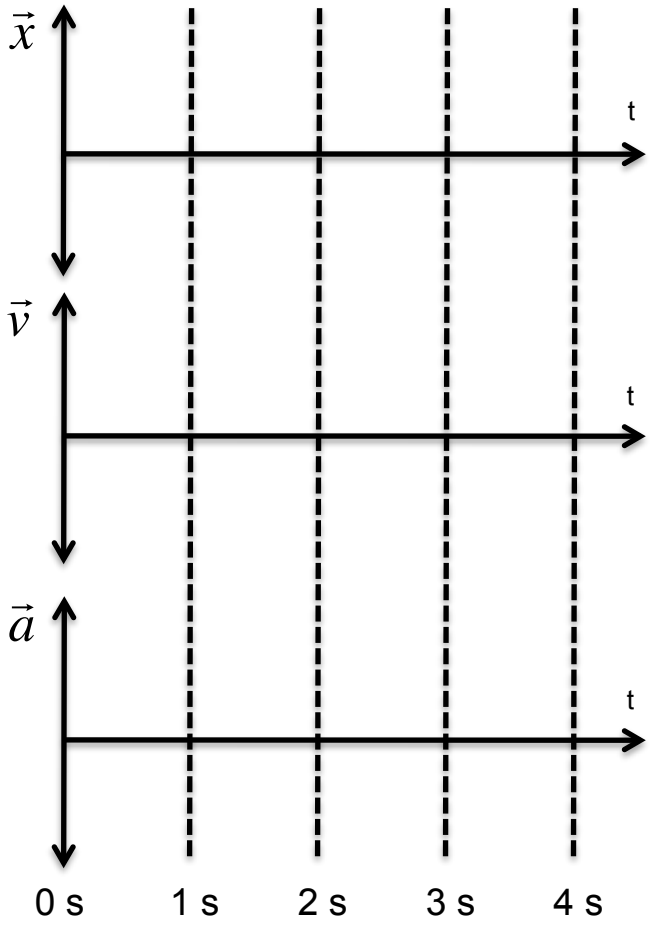
Graded on ***COMMUNICATION*** of physics

1) Two blocks: 1 kg and 4 kg, have a coefficient of friction, $\mu = 0.2$ with the floor. A spring ($K = 500$ N/m) rests on the floor with one end connected to a wall. I press the 1 kg block against the free end of the spring, compressing the spring 20 cm against the wall. Then I let it go! The 1 kg block skids 180 cm (including the 20 cm being pushed by the spring) across the floor. Then it hits and sticks to the 4 kg block. How fast are the blocks moving immediately after the collision? *You are **not** going to solve this problem* to find a numerical answer. Instead, please set up the problem and explain your strategy with complete sentences. Establish the equations and explain how you will find each term, but don't solve the equations or substitute in any numbers.

2) I run up some stairs at constant speed. My mass is 70 kg and I run a distance of 20 m, increasing my elevation only 10 m. It takes me 5 s. What is my rate of power production?
    a) I stated "constant speed". How does this change the problem from if I'd started from rest?
    b) Find my power output please! Remember to reflect on whether this makes sense.

3) Off a balcony, I throw a 2 kg rock directly upwards. At t = 0s, the rock leaves my hand at 15 m elevation, with upward velocity 10 m/s. It lands on the ground (elevation = 0), but when its velocity is 10 m/s *downward*, a parachute opens. In 0.3 s, the rock evenly slows to 4 m/s and subsequently continues downward at 4 m/s until it hits the ground. Please graph the velocity, displacement, and acceleration from when I throw the rock until 4 seconds afterwards. If possible, estimate when the rock hits the ground or its elevation at 4s.



4) In the previous question, the parachute is connected to the rock with a single string.
   a) When is the string under the greatest tension? Why do you know?
   b) Please find the maximum tension that the string must sustain clearly supporting your reasoning.