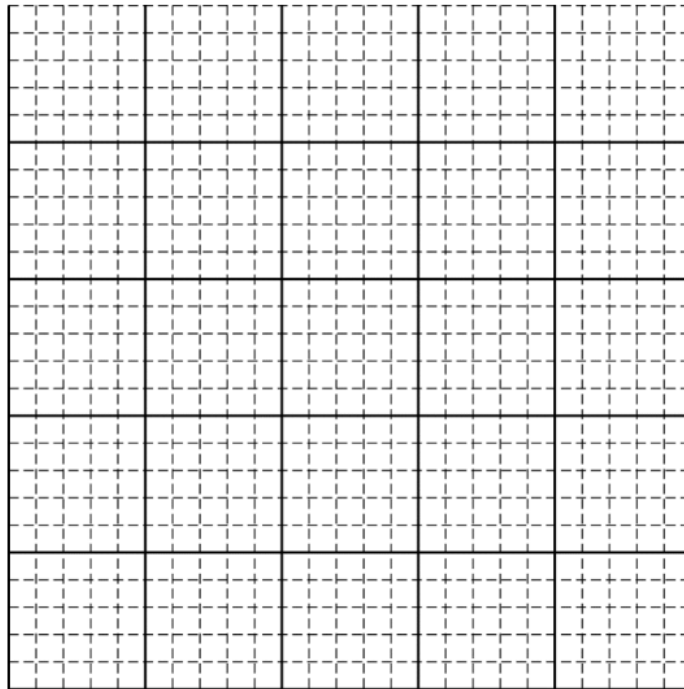


Week 0 HW - Sample Free Response

1. A physics student investigated the motion of a cart on a frictionless track. This student used a motion detector attached to a data collection device. The motion detector measured the position of the cart as a function of time. The collected data is shown in the table below.

| Time (s) | Position (m) |
|----------|--------------|
| 0.00 | 0.00 |
| 0.10 | 0.45 |
| 0.20 | 0.94 |
| 0.30 | 1.38 |
| 0.40 | 1.84 |
| 0.50 | 2.40 |

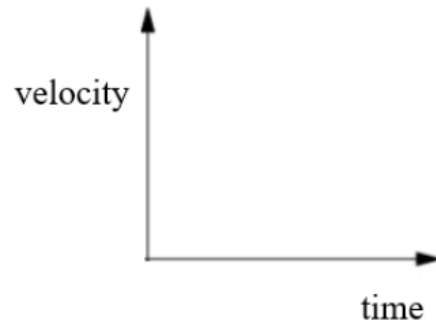
- (a) Plot the data points for the quantities indicated in the table on the graph below. Clearly scale and label all axes, including units. Draw a best-line fit of the data.



(b) Using the best-line fit from the graph, calculate the slope.

(c) Using your slope, determine the position of the cart at 0.75 sec.

(d) Sketch the velocity-time graph of the cart below.



(e) The student repeated the experiment with a second cart that covered more distance in a shorter amount of time. How would that change the graph in part (a)?

(f) The second cart has a motor that allows it to travel at a constant speed of 6.5 m/s. If this cart started at a position of 0 m at $t = 0$ sec, calculate the position of this cart at 0.32 sec. Write the equation, substitution, and solve with units.