Physics Bell Work, March 2 - 5, 2015

Physics: Instantaneous Velocity, Average Velocity, Constant Acceleration, Motion Maps of Uniform Acceleration

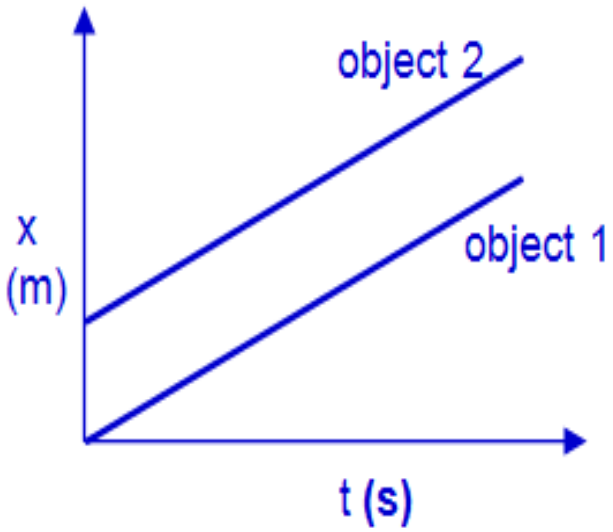
Physics Bell Work Monday , Mar 2, (2 Ques.)

1. What is instantaneous velocity?

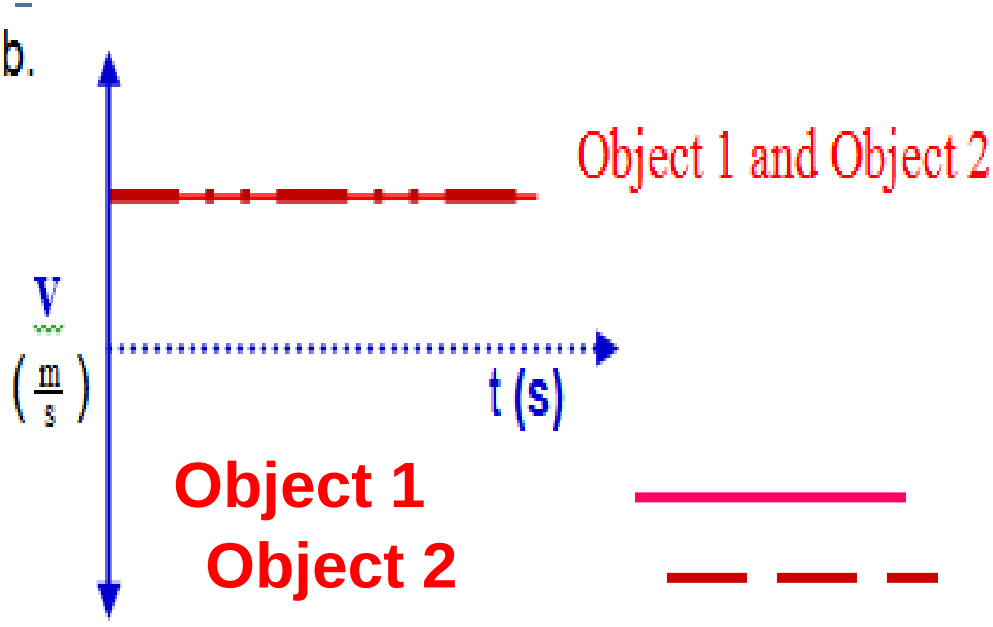
The speed and direction of an object at a particular point in time is called the instantaneous velocity

2. a. Describe, using a clear, complete sentence, **how does the motion** (not the graph shape) **of object 2 differs from the motion of object 1 on the position – time graph below.**

b. Sketch the graph of velocity vs time for object 1 and object 2. (label clearly)



a. Both objects travel in the same direction at the same speed, but object 2 has a head start.

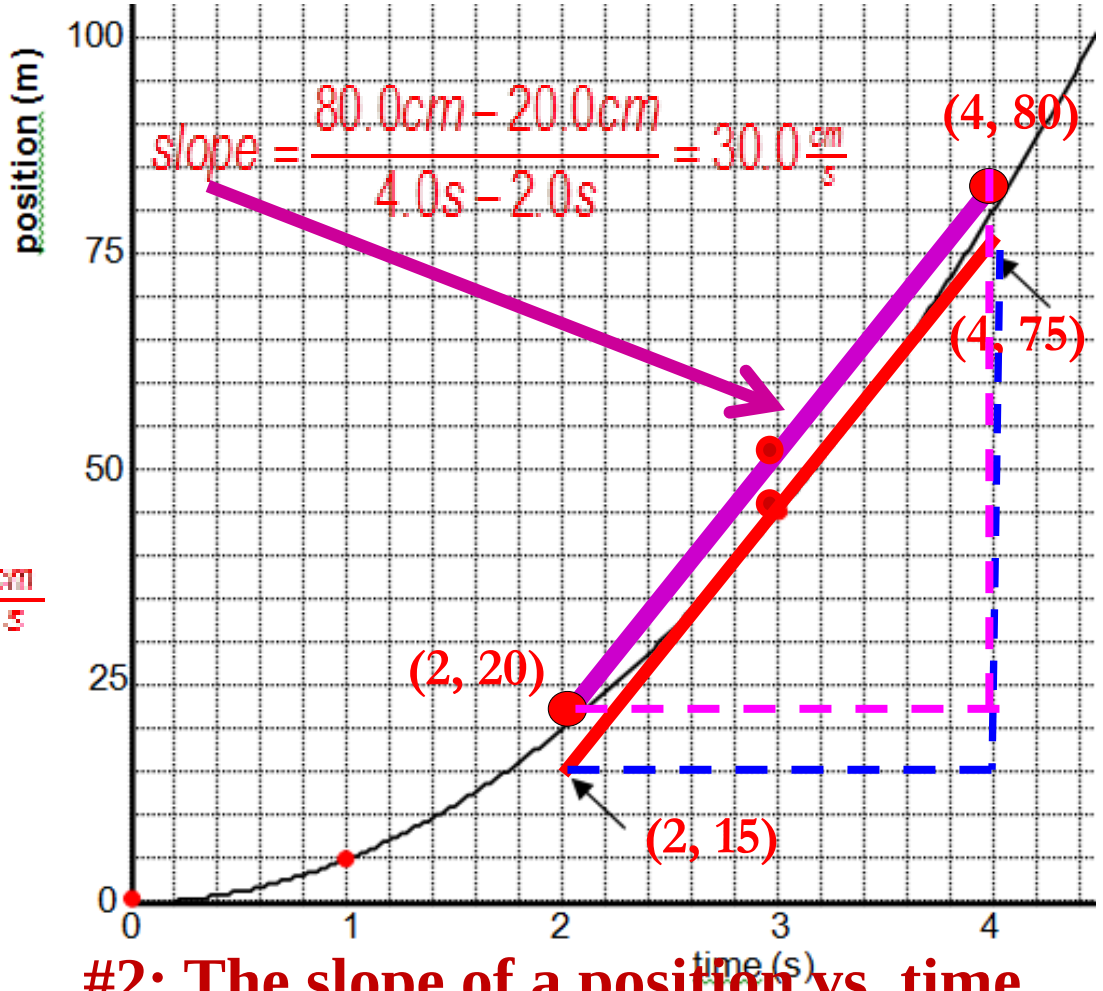


IB Physics Bell Work, Tuesday, Mar 3 (3 ques)

1. **Draw a line tangent to the graph at t = 3.0 s.**
2. **Calculate the slope of this tangent line. Compare average & instantaneous velocity.**

$$slope = \frac{75.0cm - 15.0cm}{4.0s - 2.0s} = 30.0\,\frac{cm}{s}$$

3. **Explain what the slope of tangent line tells you about the motion of the object.**

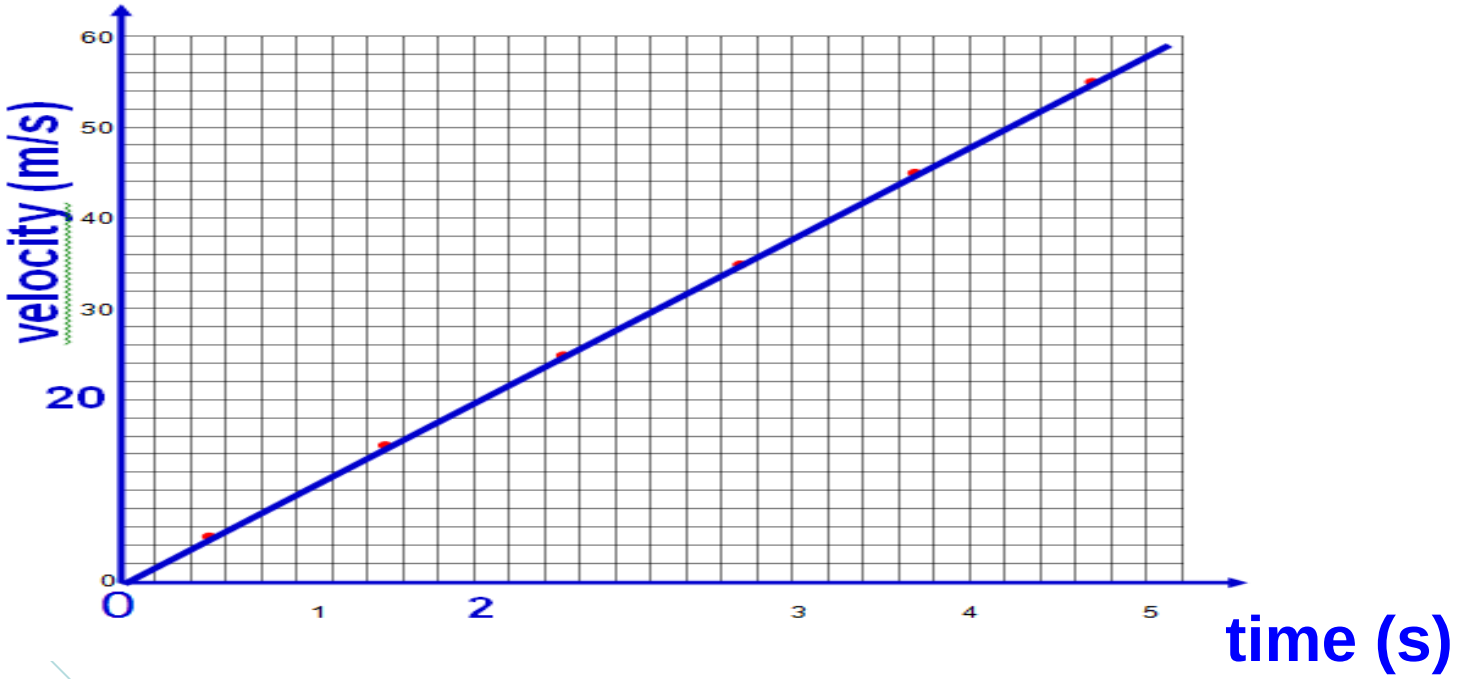


This slope of the tangent line tells us that the <u>instantaneous velocity</u> at the 3s clock reading is 30.0cm/s.

#2: The slope of a position vs. time graph is the average velocity if the slope is over a time interval. If it is the slope at a point it is the instantaneous velocity.

Physics Bell Work, Wed, Mar 4 (3 ques.)

Sketch the graph.



1. What does this graph tell you about velocity?

The velocity is increasing at a constant rate with time.

2. Calculate the slope of this v-t graph.

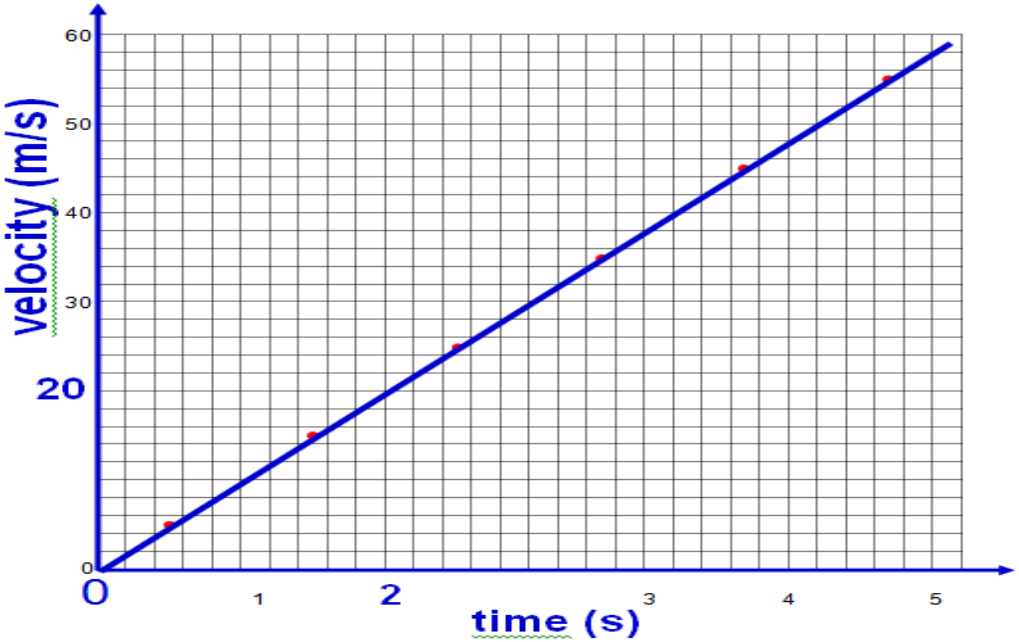
$$\frac{(20-0)\ \frac{m}{s}}{(2-0)\ s} = 10\ \frac{\frac{m}{s}}{s}$$

3. What are the units of this slope?

$$\frac{\frac{\mathrm{m}}{\mathrm{s}}}{\mathrm{s}} = \frac{\frac{m}{s}}{\frac{s}{1}} = \frac{m}{s} \bullet \frac{1}{s} = \frac{m}{s^2}$$

Meters per second per each second

Physics Bell Work, Wed , Mar 4



4. What is the significance of the slope of this v-t graph?

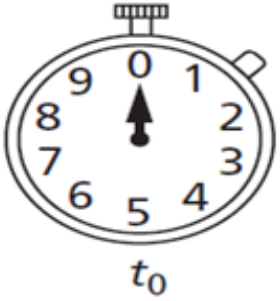
The slope, m, = $\frac{\Delta v}{\Delta t}$ = a , acceleration

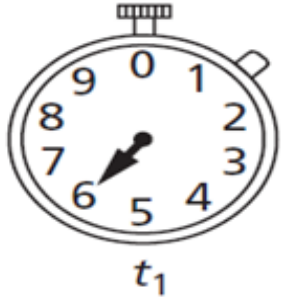
Because the slope is constant (a straight line), the acceleration is constant or uniform.

5. If the time interval is 1 s (Δt = 1 s) what does acceleration tell you?

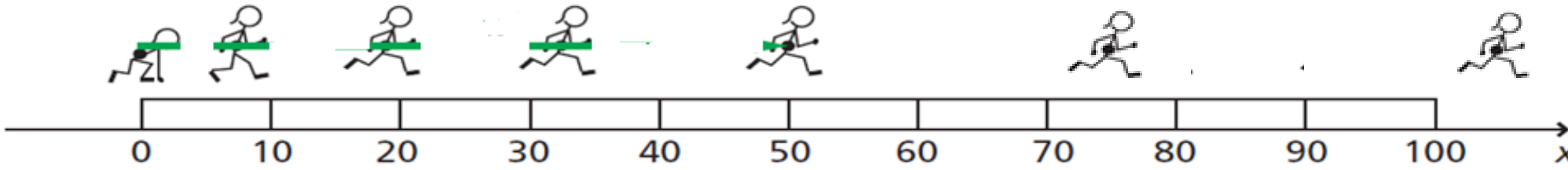
How fast the velocity is changing (increasing or decreasing) each second.

Physics Bell Work Thursday, Mar 4, 2015

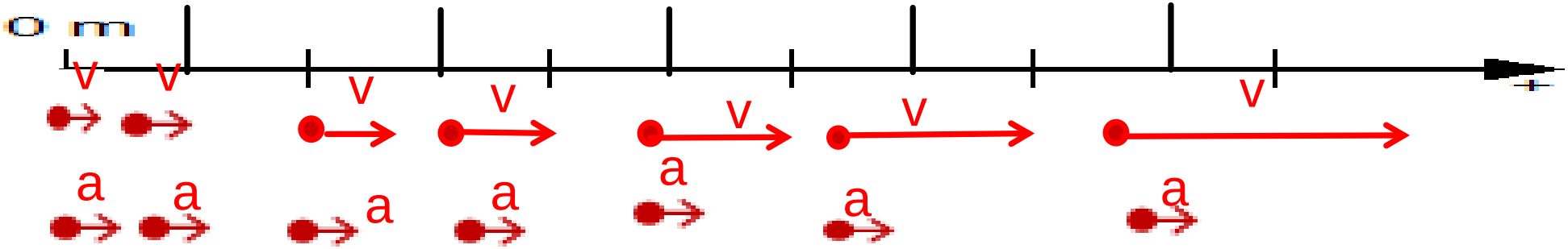




Δt = 1s

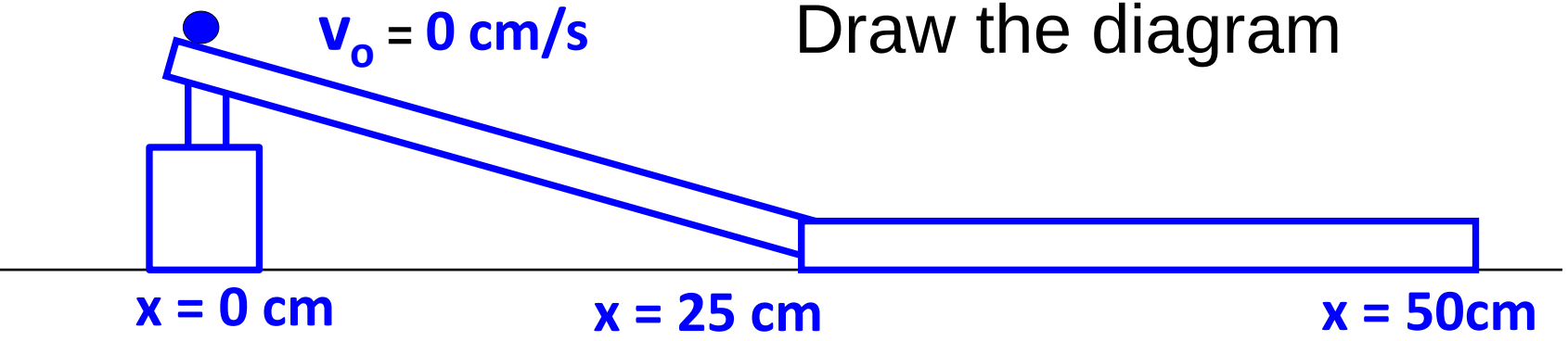


1. Draw a motion map for the runner shown above showing that velocity is not constant but acceleration is uniform .

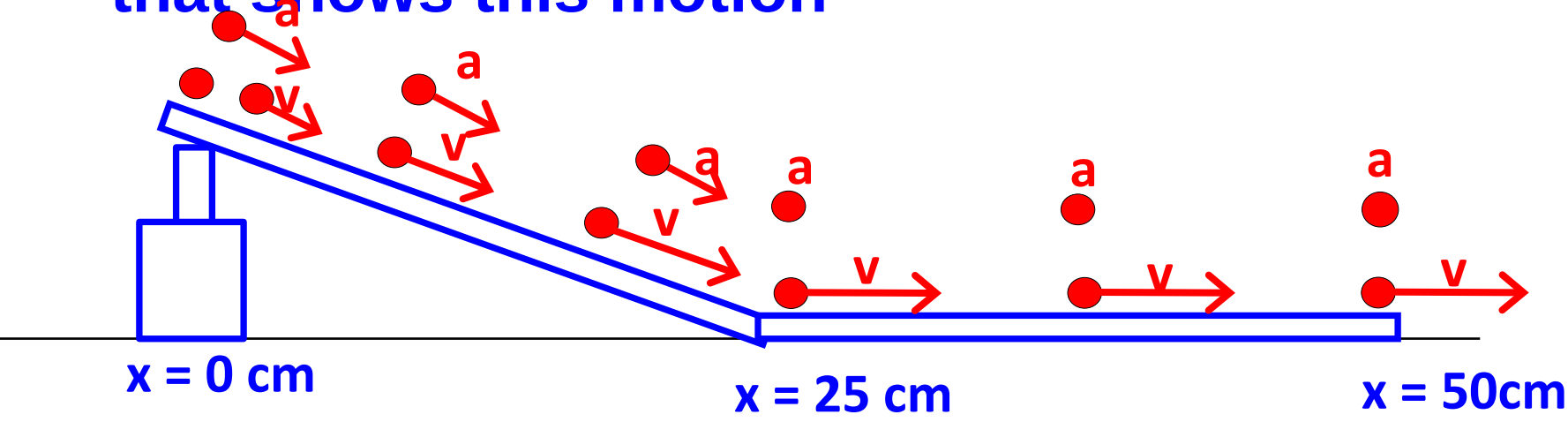


Physics Bell Work, Thursday, Mar 5, 2015

Draw the diagram

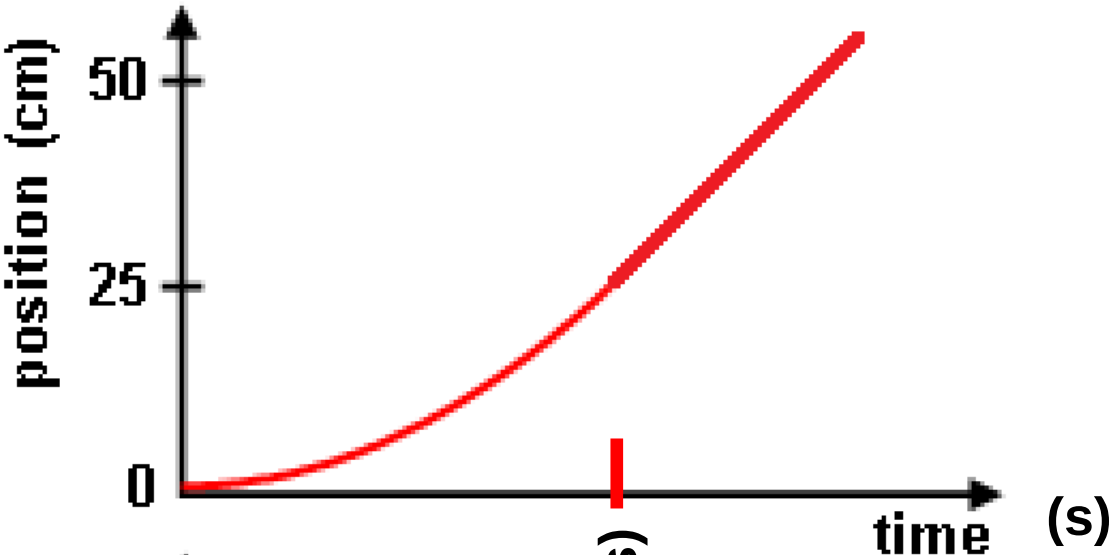


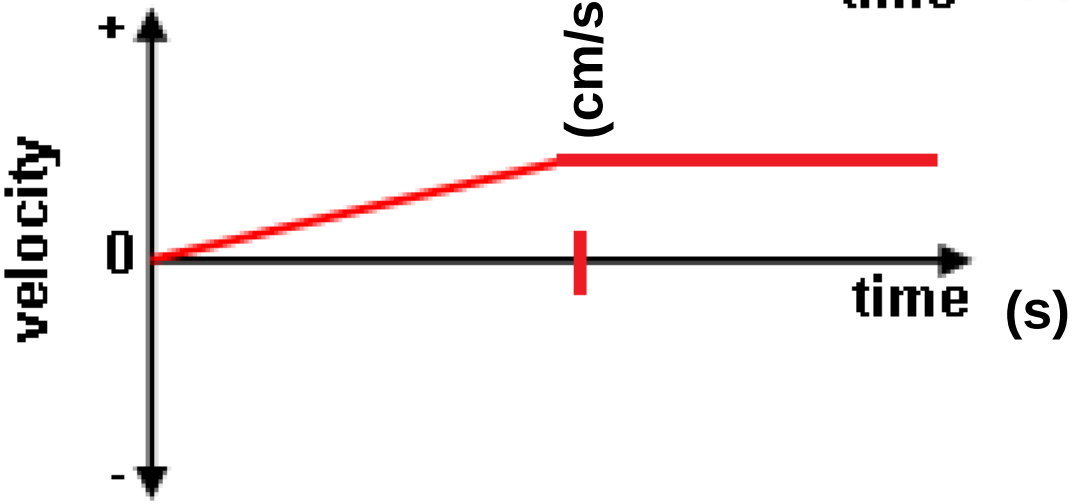
2. **Draw a motion map along the ramp for the motion of the ball when released from rest.**
3. **Draw an x-t, v-t & & a – t (acceleration – time) graphs that shows this motion**

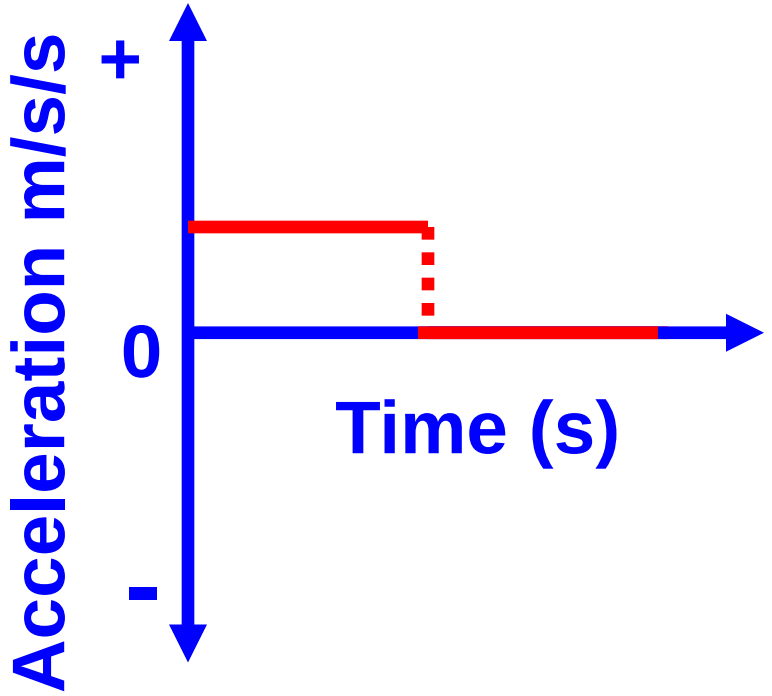


Physics Bell Work, Thursday, Mar 5, 2015

3. Draw the graphs







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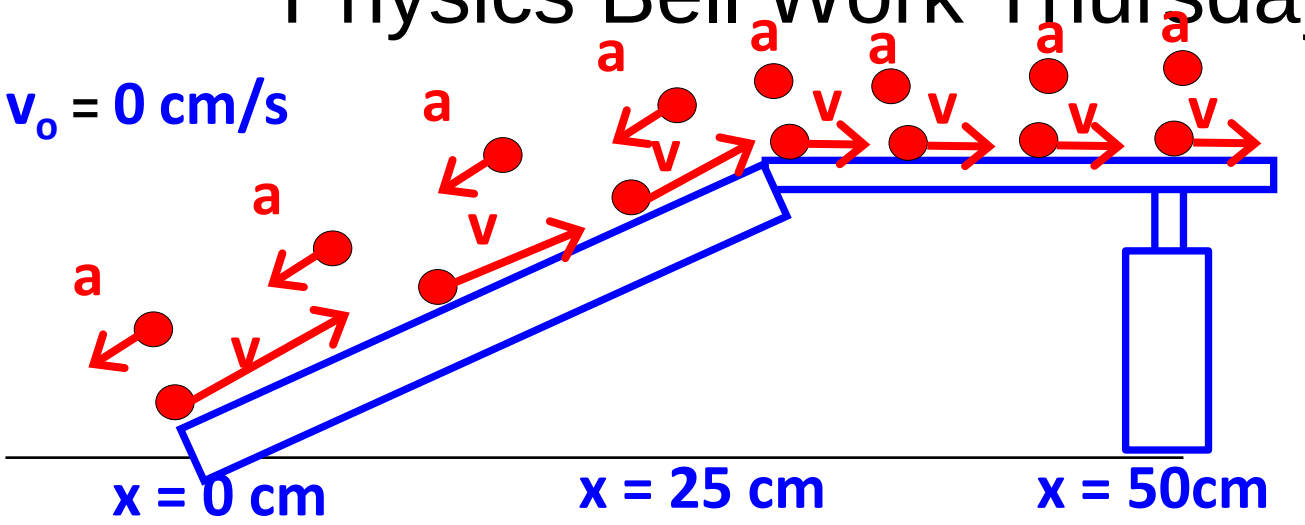

Draw the diagram

4. **Draw a motion map along the ramp for the motion of the ball when released from rest.**
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Physics Bell Work Thursday, Mar 4, 2015