IB Physics Bell Work, March 2 - 5, 2015

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

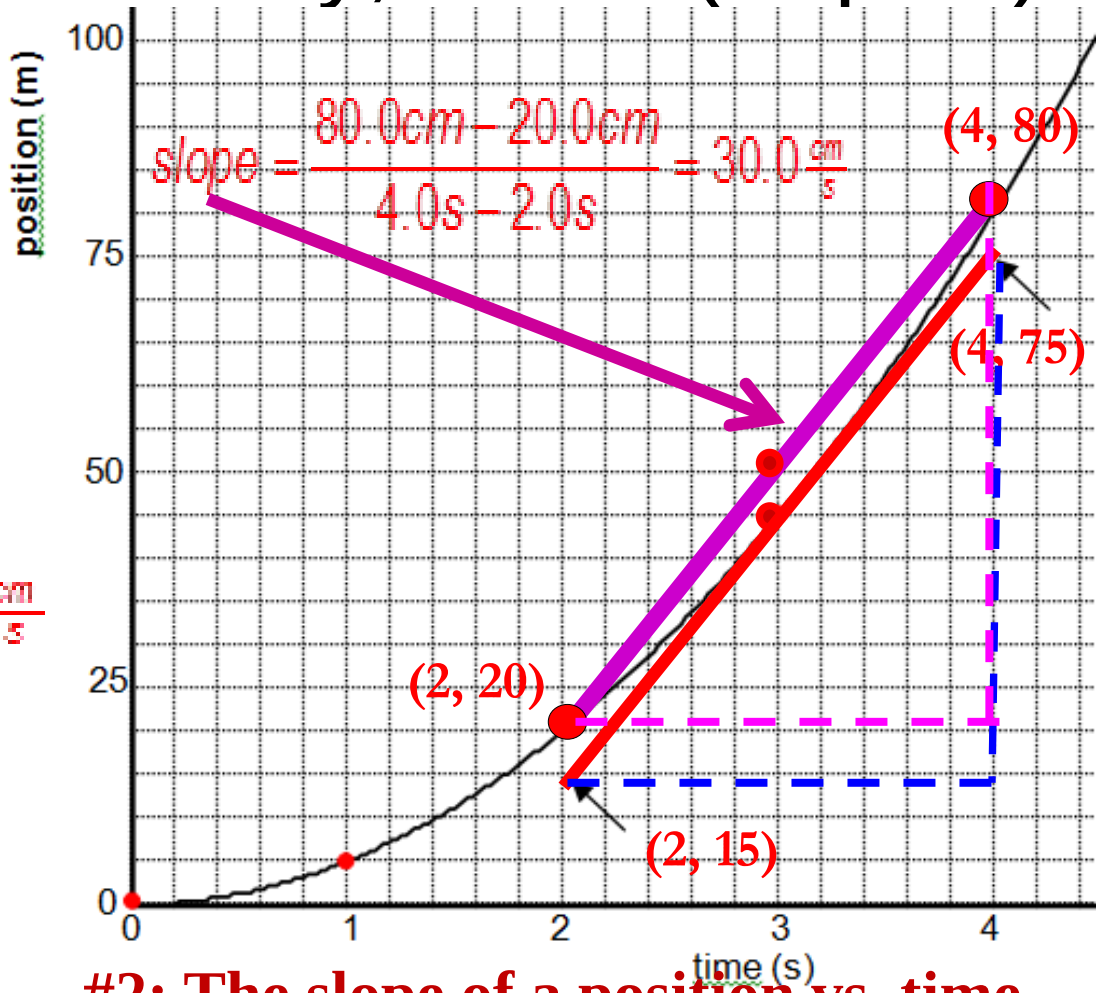
IB Physics Bell Work, Monday, Mar 2 (4 ques)

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.**

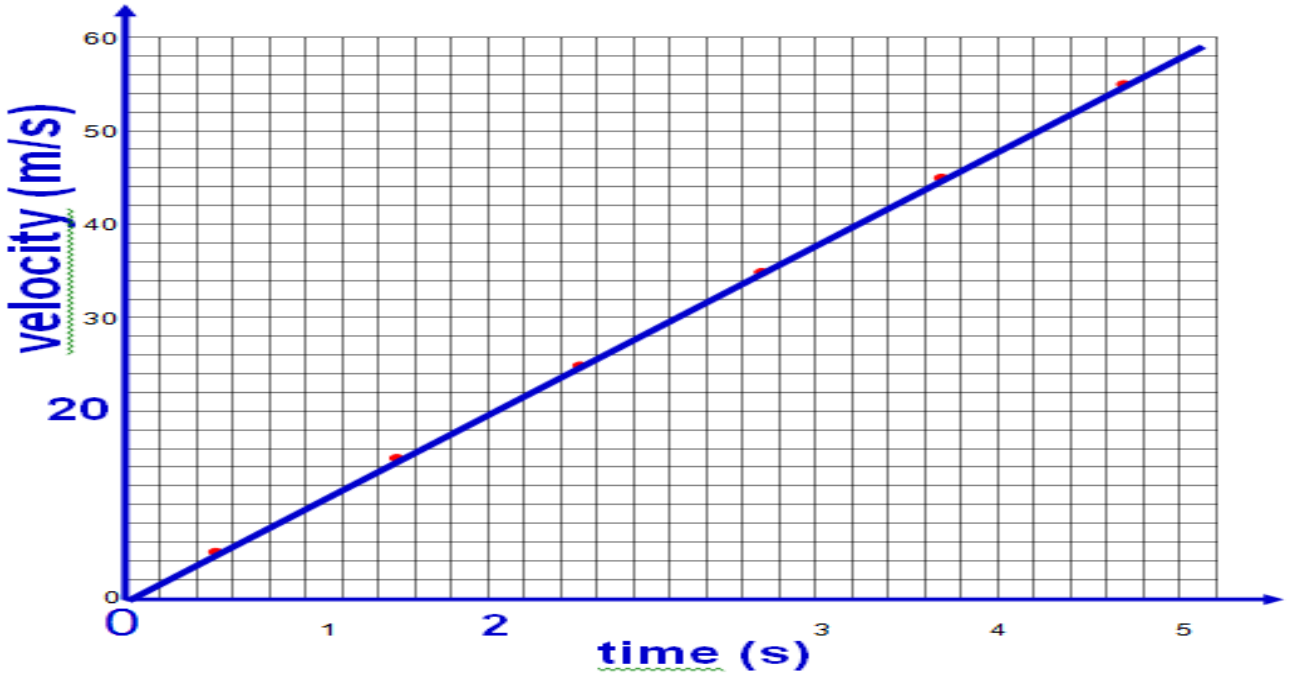
This slope of the tangent line tells us that the <u>instantaneous velocity</u> at the 3s clock reading is 30.0cm/s.



#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, Tues, Mar 3 (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.

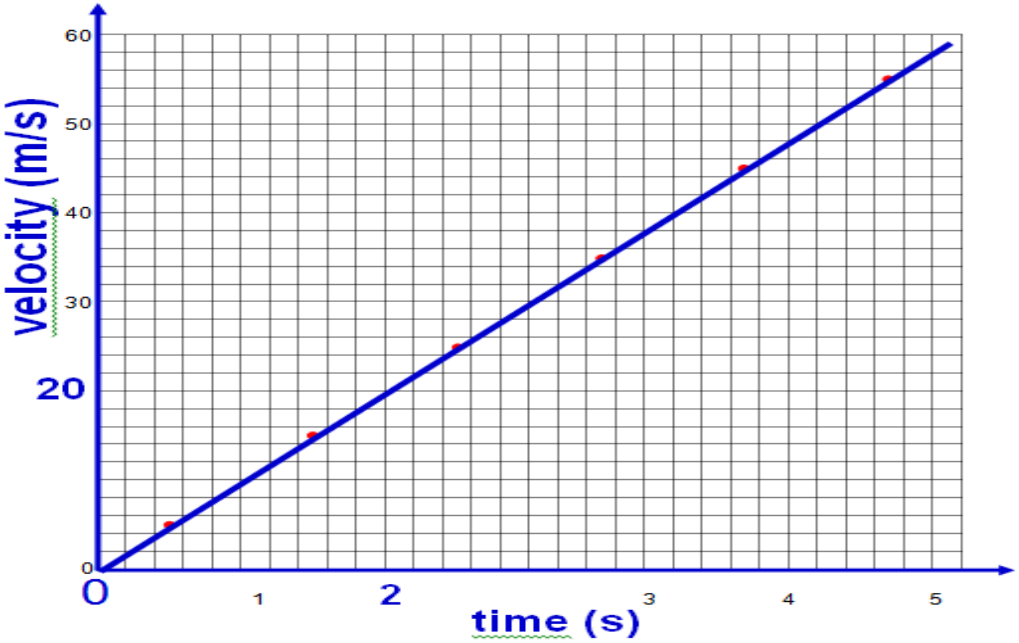
$$\frac{(20-0)\ \frac{m}{s}}{(2-0)\ s} = 10\ \frac{\frac{m}{s}}{s}$$

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

IB Physics Bell Work, Tues, Mar 3

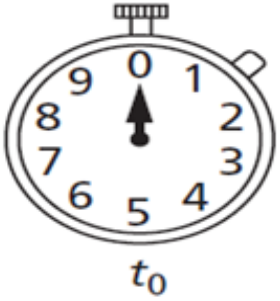


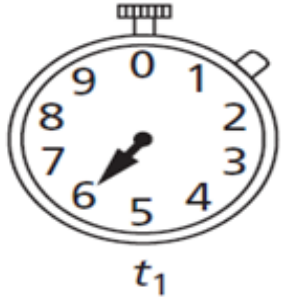
4. What is the significance of the slope of this v-t graph?

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

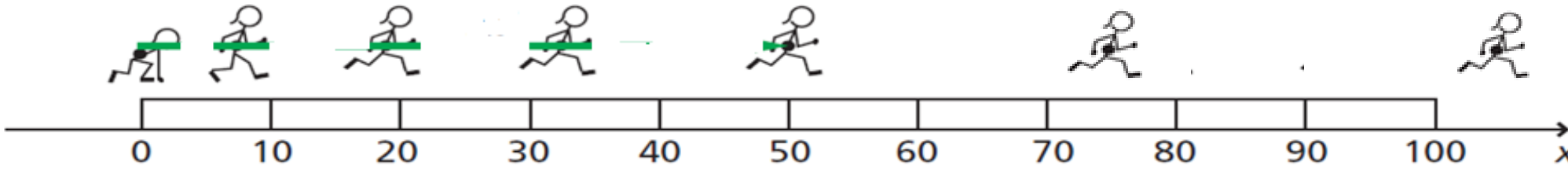
Because the slope is constant, the acceleration is constant or uniform.

IB Physics Bell Work, Wednesday, Mar 4, 2015

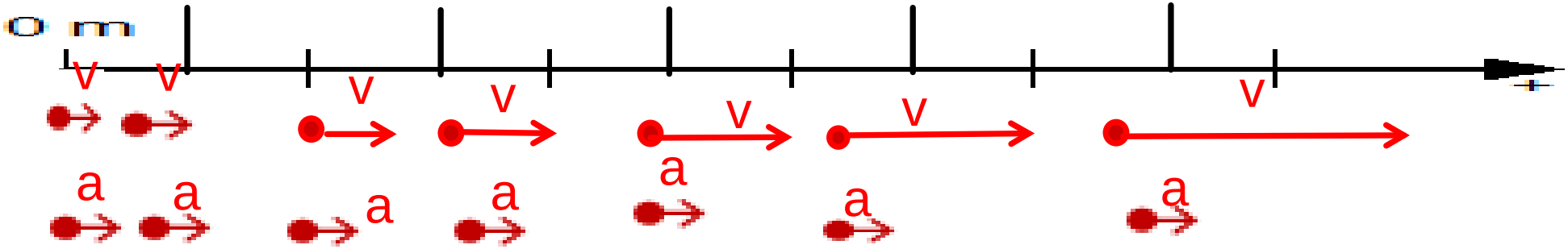




Δt = 1s

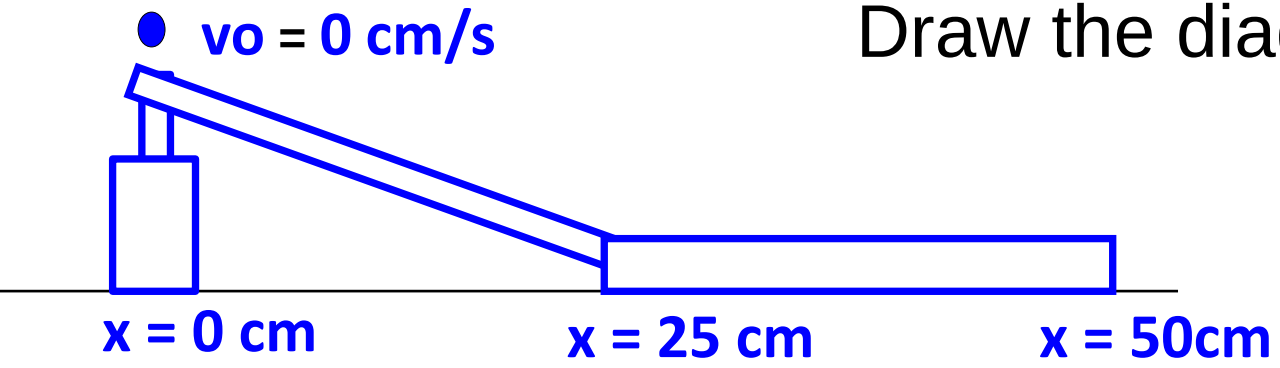


1. Draw a motion map for the runner shown above showing that velocity is not constant but acceleration is uniform .

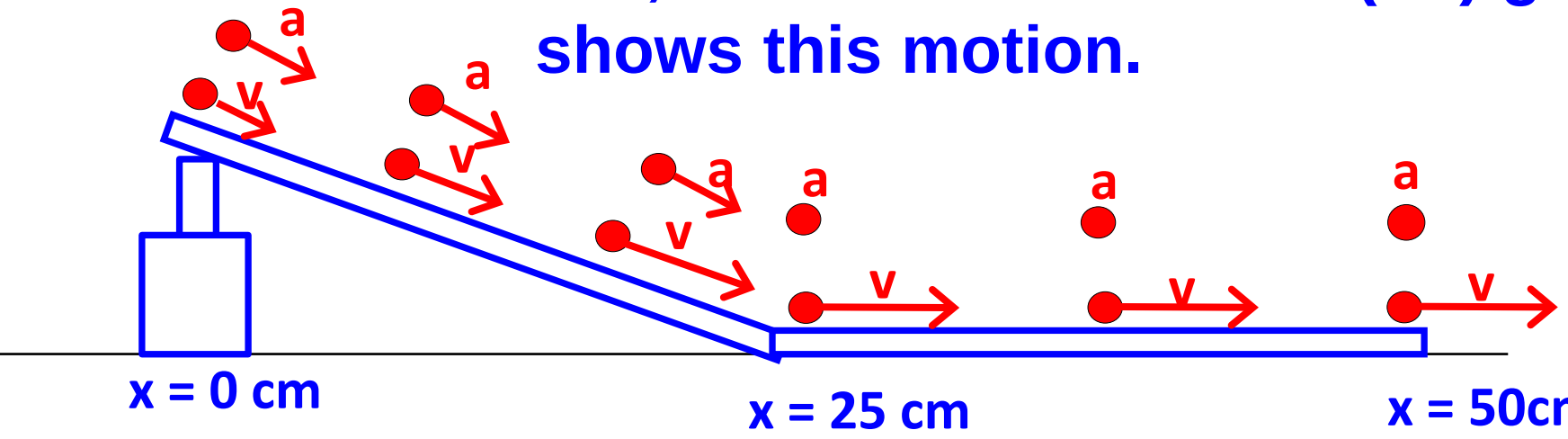


IB Physics Bell Work Wednesday, Mar 4, 2015

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, & acceleration –time (a-t) graphs that shows this motion.**



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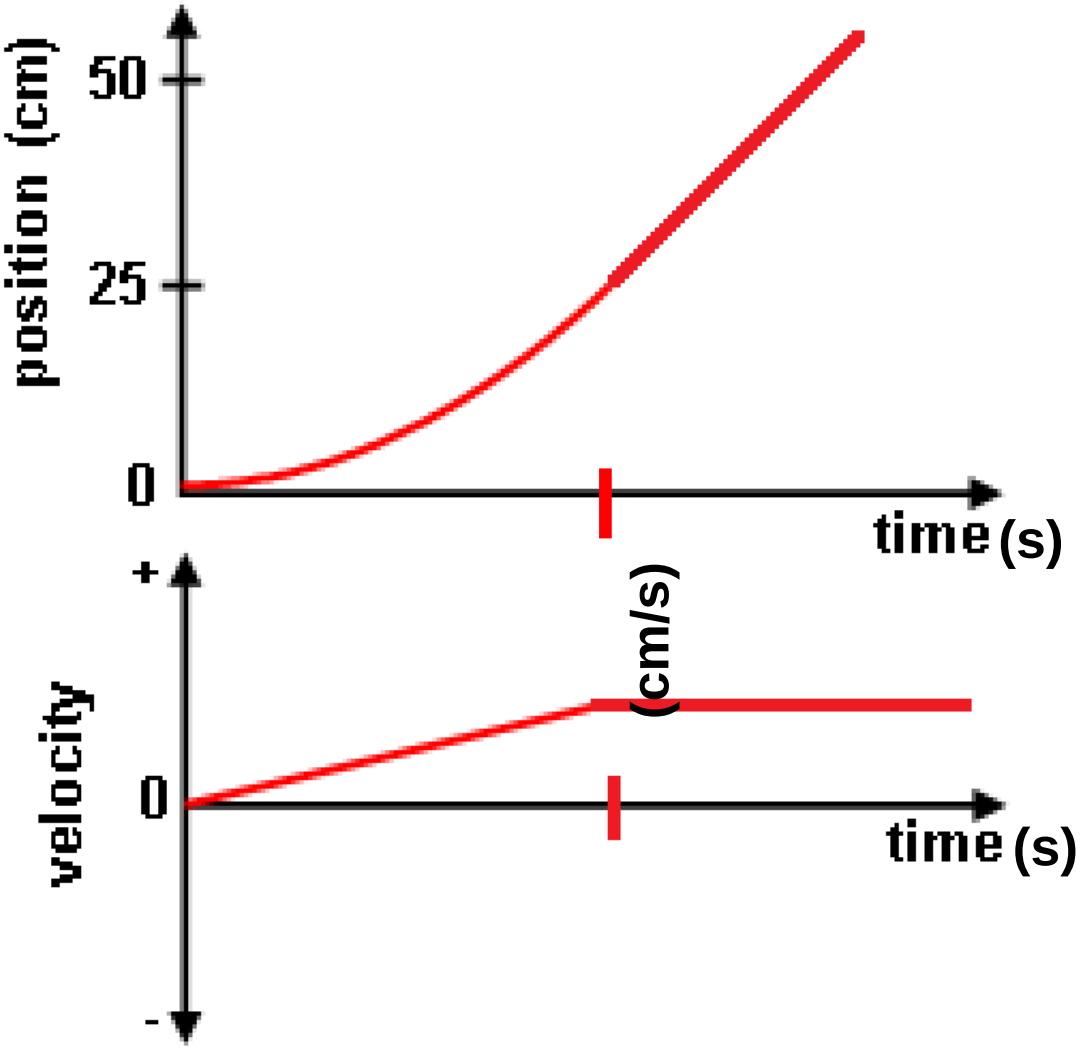
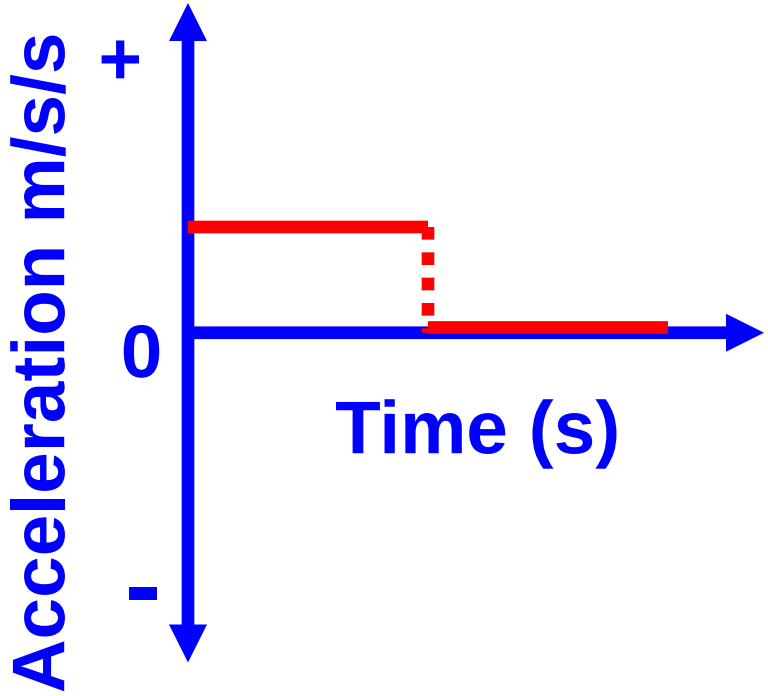
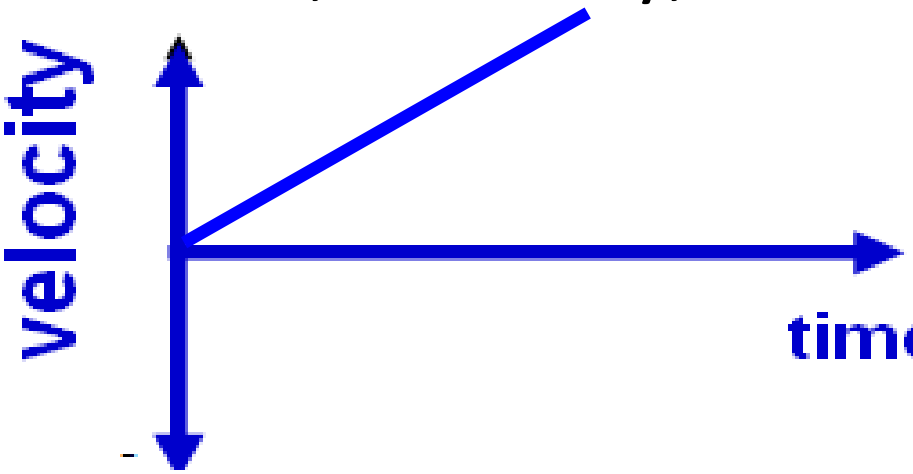
3. Draw the graphs





IB Physics Bell Work, Thursday, Mar 5 (5 ques.)

Sketch the graphs.



m = 10 m/s/s

$$a = \frac{\Delta v}{\Delta t}$$

1. Write an equation for this v-t graph in the form of y = mx + b

y = m • x + b

v_f = (10 m/s²) •time + 0

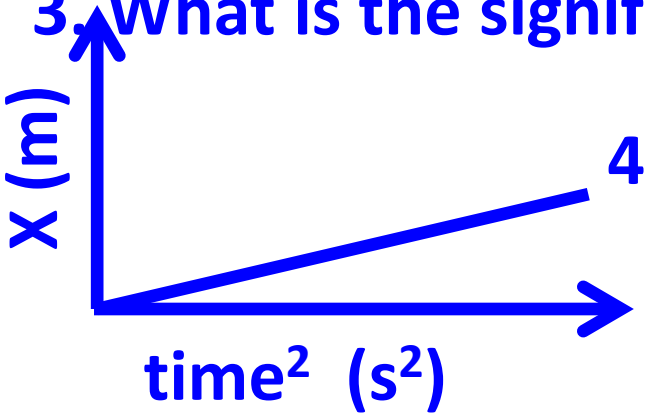
$$v_f = a \cdot t + v_0$$

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

Acceleration (how fast velocity is changing)

3. What is the significance of the slope of the x-t² graph?

½ the acceleration.

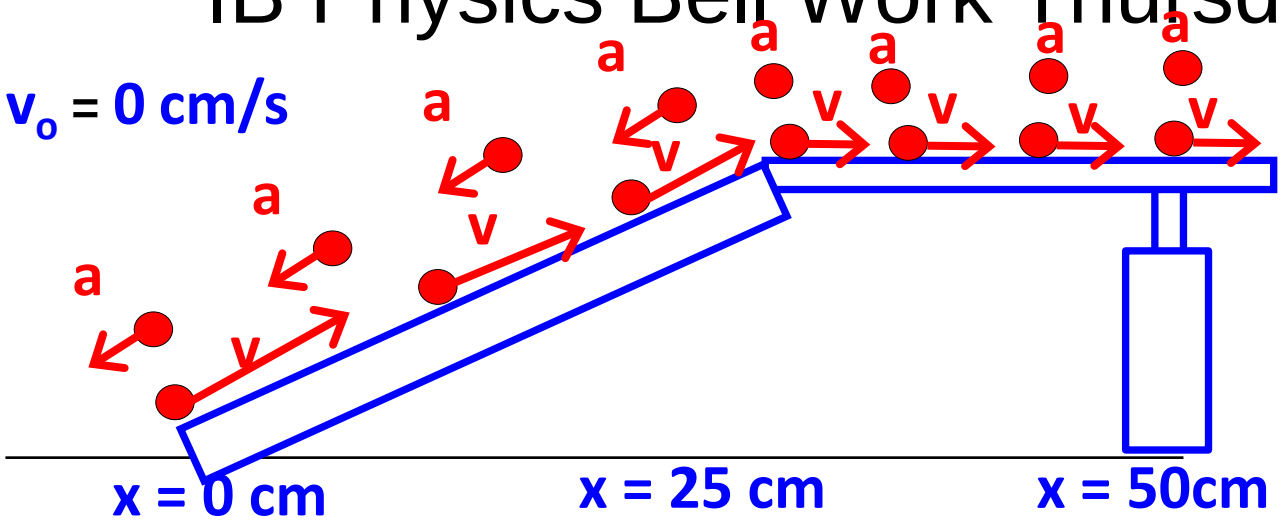


4. Write an equation for the graph.

$$\frac{\Delta x}{\Delta t^2} = \frac{\frac{\Delta x}{\Delta t}}{t} = a$$

$$x = \tfrac{1}{2}\, a \cdot t^2 + (v \cdot t)$$

IB Physics Bell Work Thursday, Mar 5, 2015



Draw the diagram

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

IB Physics Bell Work Thursday, Mar 5, 2015

6.