



# Dozer Challenge

This is an activity write up. Not a formal laboratory.

7 points for write up

3 points for meeting the challenge!

Sept. 12, 2005

# Notes

## Displacement and Time Activity

### Goals

- ◆ How are displacement and time related for a moving object?
- ◆ Find your groups own mathematical model that describes the motion of the object.
- ◆ Predict the displacement of the Dozer at a time given by your instructor.

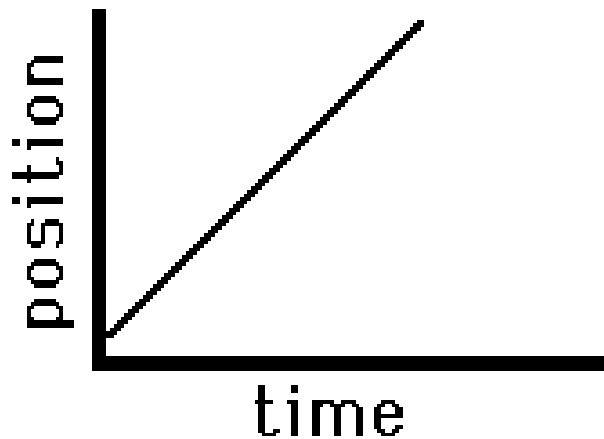
# Notes

## Process

- ◆ Goal i.e. Problem?
- ◆ Collect data
- ◆ Graph data on computer
- ◆ Calculate the equation, mathematical model, for the line. (This is the "hidden" relationship for the dozers motion.)
- ◆ What does the slope mean in the real world?
- ◆ Summarize your findings including a written interpretation of what the mathematical model means in the real world!

# Analysis

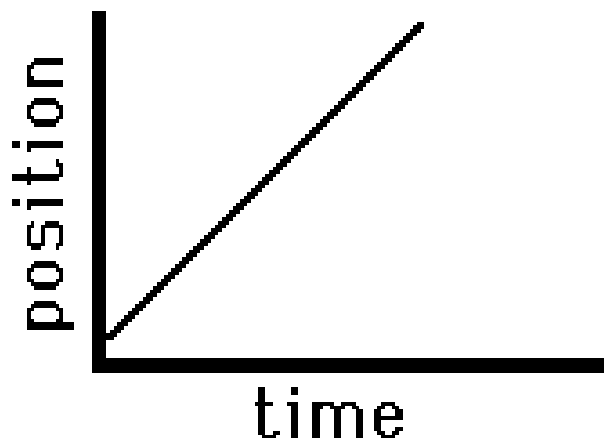
d [cm]	t [s]
$d_1$	$t_1$
$d_2$	$t_2$
.	.
.	.
$d_{10}$	$t_{10}$



- ◆ Graph the position (displacement) vs time graph.
- ◆ Run a trendline
- ◆  $Y = mX + b$
- ◆ Did you measure position 0 [cm] at 0 [s] ?
- ◆ Yes,... So it is a data point. If not it is not a data point.

# Analysis

d [cm]	t [s]
d <sub>1</sub>	t <sub>1</sub>
d <sub>2</sub>	t <sub>2</sub>
.	.
.	.
d <sub>10</sub>	t <sub>10</sub>



$$Y = mX + b$$

$$D = m t + b$$

Slope is  $\frac{\text{rise}}{\text{run}}$

$$\frac{\Delta Y}{\Delta X}$$

$$\frac{\Delta d \text{ [cm]}}{\Delta t \text{ [s]}}$$

[cm/[s] centimeters per second  
Is distance per time. Speed!

# Make a graph of velocity vs time

- ◆ Graph the velocity vs. time graph.
- ◆ Find the slope between each of the two data points, this is the velocity at  $\frac{1}{2}$  second intervals.
- ◆  $V$  is the slope and the time is 0.5 [s], 1.5 [s], etc.
- ◆ Plot the  $v$  vs.  $t$  graph
- ◆ Run a trend line
- ◆  $Y = mX + b$
- ◆ Write the real world equation for the trend line
- ◆ What does the equation mean in the real world?

# Dozer activity hand in.

- Write up summary page
  - ◆ Purpose
  - ◆ Data and notes
  - ◆ Conclusion
- Include a computer generated graph of  $d$  vs  $t$ 
  - ◆ Trend line
  - ◆ Equation for the line with the correct labels
    - Give supporting discussion.
    - What does the line mean in the real world?
- Include a computer generated graph of  $v$  vs  $t$