

## Graphical Analysis

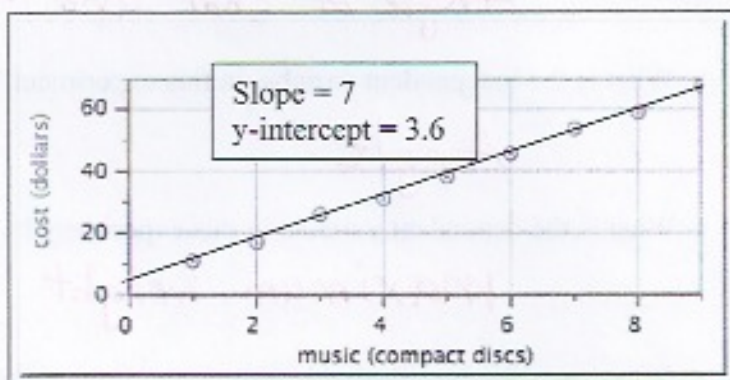
1. A friend prepares to place an online order for CD's.

a. What are the units for the slope of this graph?

$\frac{\text{dollars}}{\text{compact discs}}$

b. What does the slope of the graph tell you in this situation?

It costs \$7 for each compact disc



c. Write an equation that describes the graph.

$$y = 7x + 3.6$$

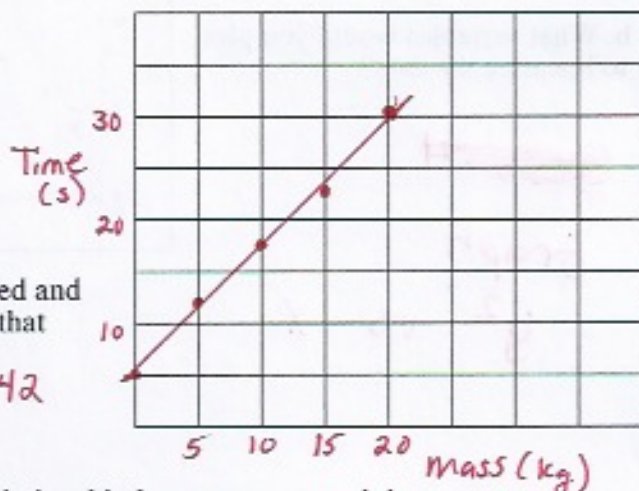
Cost =  $\left(\frac{7 \text{ dollars}}{\text{compact discs}}\right) \text{Music} + 3.6 \text{ dollars}$

d. Provide an interpretation for what the y-intercept could mean in this situation.

3.6 dollars is shipping & handling. It costs \$3.6 no matter how many CDs.

2. The following times were measured for spheres of different masses to be pushed a distance of 1.5 meters by a stream:

Mass (kg)	Time (s)
5	10.2
10	17.3
15	23.8
20	31.0



a. Graph the data by hand on the grid provided and write a mathematical model for the graph that describes the data.

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{17.3 - 10.2}{10 - 5} = \frac{7.1}{5} = 1.42$$

$$y = 1.42x + 5$$

b. Write a clear sentence that describes the relationship between mass and time.

$$\text{time} = \left(1.42 \frac{\text{s}}{\text{kg}}\right) \text{Mass} + 5 \text{ s}$$

As mass increases time also increases

3. A student performed an experiment with a metal sphere. The student shot the sphere from a slingshot and measured its maximum height. The sphere was shot six times at six different angles above the horizon.

a. What is the relationship being studied?

Angle of shot and maximum height

b. What is the independent variable in this experiment?

Angle

c. What is the dependent variable in this experiment?

Maximum height

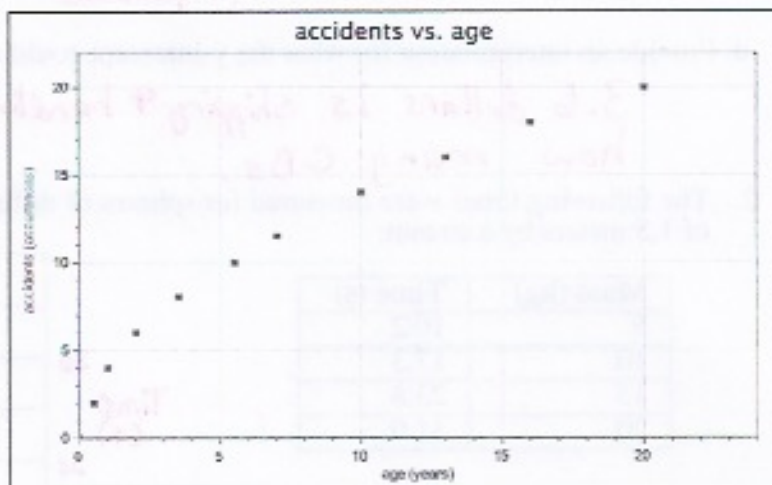
d. What variables must be held constant throughout this experiment?

Size of sphere  
mass of sphere  
slingshot  
force of pull on slingshot

Anything else?

4. a. What type of relationship does this graph suggest?

Case 4 - the square of  $y$  is proportional to  $x$



b. What variables would you plot to linearize the data?

~~Graph~~

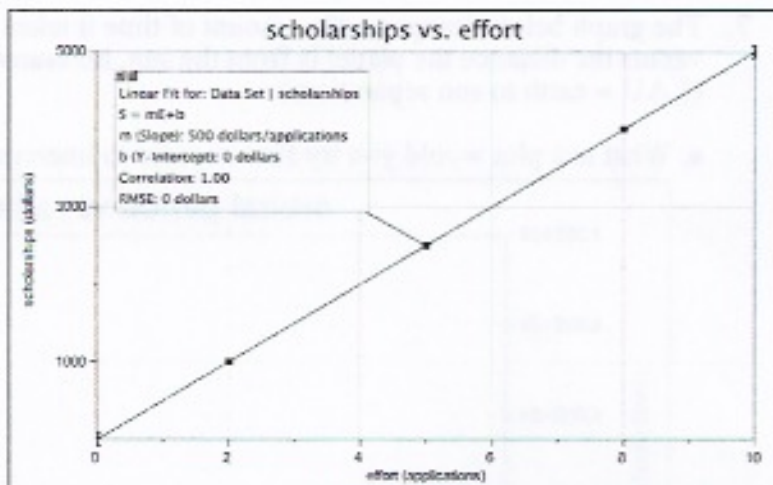
Graph

$y^2$  vs  $x$

5. Consider the graph at right.

a. Write a mathematical expression that describes the relationship.

$$y = 500x + 0$$



b. Provide an interpretation for the y-intercept.

No effort (or applications for scholarships) means no scholarship dollars

c. Using the equation, predict how many applications would be needed to earn \$8000.

$$\text{Scholarships} = \left( \frac{500 \text{ dollars}}{\text{applications}} \right) \text{effort} + 0 \text{ dollars}$$

6. For each of the following graphs:

$$8000 = \left( \frac{500 \text{ dollars}}{\text{app}} \right) \text{effort}$$

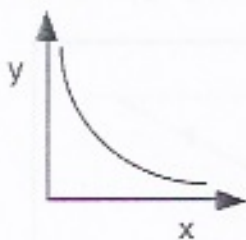
$$\frac{8000 \text{ app}}{500 \text{ dollars}} = \text{effort}$$

$$\boxed{16 = \text{effort}}$$

16 applications

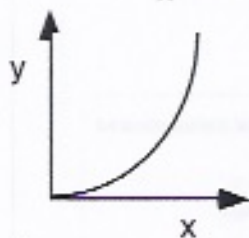
- Describe how you would linearize the graph.
- Assuming a linear test plot results, write the equation that would describe the straight line produced.

a.



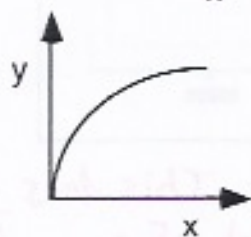
Case 2  $y \text{ vs } \frac{1}{x}$

b.



Case 3  $y \text{ vs } x^2$

c.

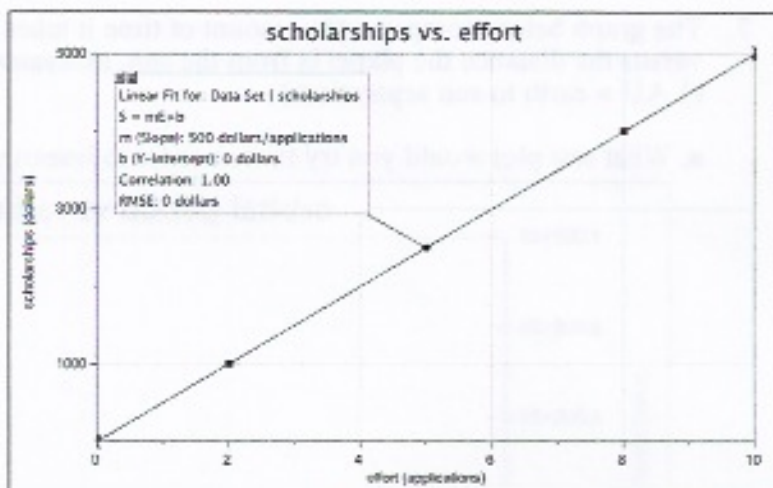


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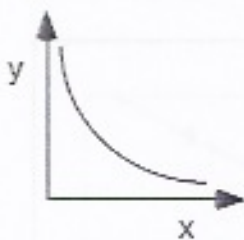
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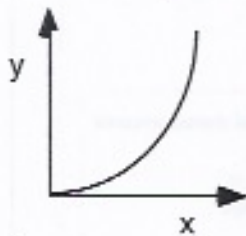
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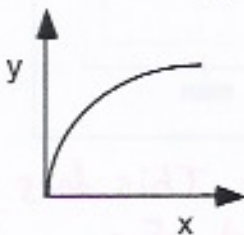
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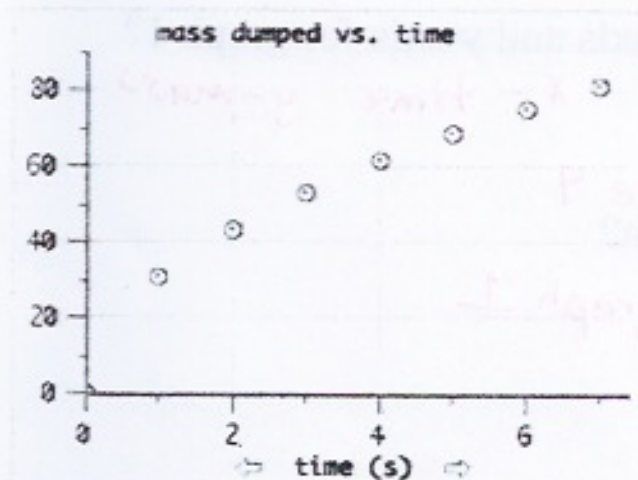


Case 4  $y^2 \text{ vs } x$

8. Look at the data below from a small truck as it dumps grain onto a scale.

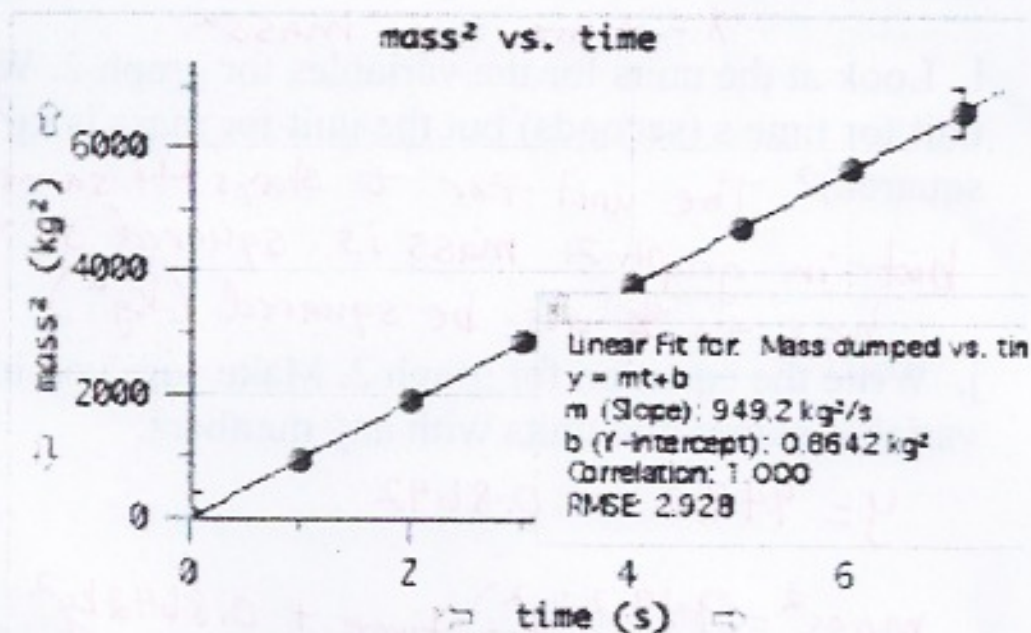
Use the chart and graphs to answer the questions below.

Mass dumped vs. time			
time	mass	mass <sup>2</sup>	
(s)	(kg)	(kg <sup>2</sup> )	
1	0	0.0	0.000
2	1	30.3	948.640
3	2	43.6	1900.960
4	3	53.4	2851.560
5	4	61.6	3794.560
6	5	68.9	4747.210
7	6	75.5	5700.250
8	7	81.5	6642.250



Graph 1

Graph 2



- a. What is the name of the independent variable? *time*
- b. What is the unit of the independent variable? ~~seconds~~ *seconds*
- c. What is the dependent variable's name? *mass*
- d. What is the unit the dependent is measured in? *kg*
- e. Which variable is on the x axis and y axis for graph 1?
- f. Which Case is this graph? *x - time y - mass*
- g. Why is there a second graph? *Case 4*  
*To linearize graph 1*

h. What is the variable on the x axis and y axis for graph 2?

- i. Look at the units for the variables for graph 2. Why is the unit for time s (seconds) but the unit for mass is  $\text{kg}^2$  (kilograms squared)? *x - time y - mass<sup>2</sup>*  
*The unit for t stays the same as graph 1 but in graph 2 mass is squared so the units (kg) has to also be squared ( $\text{kg}^2$ )*
- j. Write the equation for graph 2. Make sure you include variable names and units with any numbers.

$$y = 949.2x + 0.8642$$

$$\text{mass}^2 = \left( \frac{949.2 \text{ kg}^2}{\text{sec}} \right) \text{time} + 0.8642 \text{ kg}^2$$