

Problems	1	2	3	4	5	Total		Grade
Points							%	
Out of	12	32	32	14	10	100		

*Relax. You have done problems like these before. Even if these problems look a bit different, just do what you can. If you're not sure of something, please ask! You may use your calculator. Please show all of your work and write down as many steps as you can. Don't spend too much time on any one problem. Always remember to report the units on an answer. Do well. And remember, ask me if you're not sure about something.*

*A few formulas from our book:*

**Root Formula:**

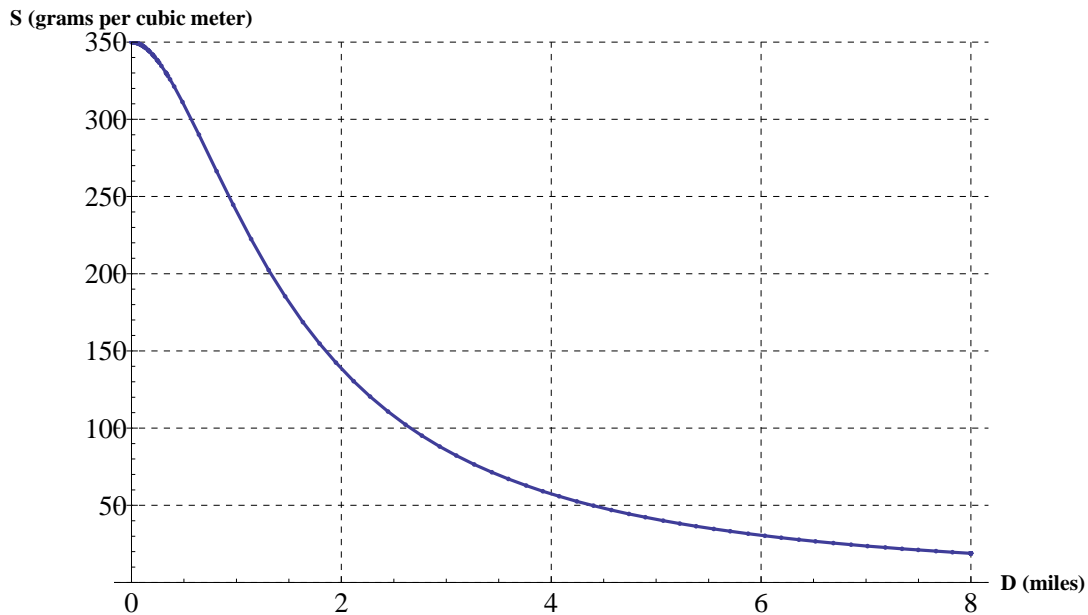
A solution of the equation  $B^n = k$  is  $B = k^{1/n}$ .

**Percent Increase Formula:**

To get the result of increasing an amount by  $r\%$ , multiply by  $1 + \frac{r}{100}$ .

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1. Khalid is concerned about the environment and hence is investigating the emissions of a local garbage incinerator. The graph below shows the amount of sulfur dioxide ( $S$ , units of grams per cubic meter) in the air a distance  $D$  (in miles) from the plant. Large amounts of sulfur dioxide in the air cause a phenomena known as acid rain. Use the graph to answer the following questions.



- (a) Does this graph show a dependency that is increasing, decreasing, or neither?
- (b) What is the sulfur dioxide concentration 3 miles from the incinerator?
- (c) How far away from the incinerator is the sulfur dioxide concentration at 150 grams per cubic meter?
- (d) This graph only shows data 8 miles from the incinerator. If Khalid moves to an apartment 10 miles from the incinerator, what do you expect the sulfur dioxide concentration to be? Please explain your answer with a sentence or two.

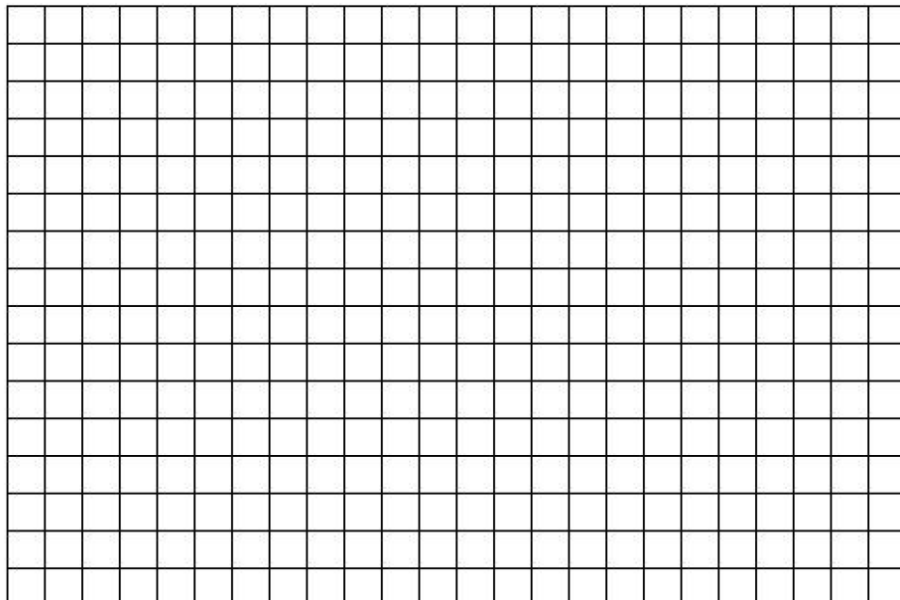
2. To hire an handyman to fix my broken garage door it costs \$95 for the service call plus a \$50 hourly rate.

(a) Make a table showing the cost of the handyman's visit if he works for 1 hour, 3 hours, and 7 hours.

(b) Name the variables, including units, and write an equation illustrating the dependence.

(c) The bill for the handyman's work was \$345. Solve your equation to determine how long he worked. *If you cannot solve the equation, you may show some other method of finding the answer for possible partial credit.*

(d) Draw a graph showing how the handyman's bill changes with his hours worked.



3. In 2005, the Worldwatch Institute estimated that world poultry production was growing at a rate of 1.6% per year. In 2005, poultry production was at 78 million tons.

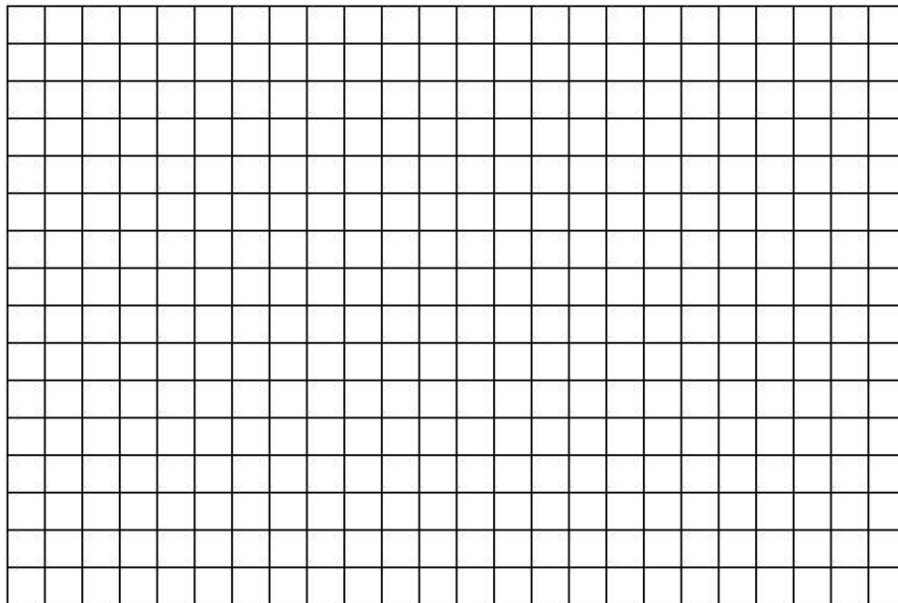
(a) Write an equation illustrating this dependence using the following variables:

$P$  = poultry production (measured in millions of tons)

$Y$  = year (measured in years since 2005)

(b) Make a table showing the production in 2005, 2010, 2015, and 2020. Please report your answer to the first decimal place.

(c) Draw a graph showing how production will change in the future.



(d) Use successive approximations to predict when the production will rise above 95 million tons. Please report your answer to the first decimal place. *Display your work in a table. Answer to the nearest year. Be sure to say the actual year.*

4. When you apply the brakes to stop a bicycle, you don't actually stop immediately. The distance it takes depends on how fast you were going. For one bike tested,  $D = 0.41S^2$ , where  $S$  is the speed of the bike (in mph) and  $D$  is the distance before stopping (in feet).

(a) Make a table showing the stopping distances for speeds of 5, 10, 15, and 20 mph. Please report your answer to the first decimal place.

(b) Approximately how fast can a bike go and still be able to stop within 30 feet? Please report your answer to the first decimal place.

*You may use whatever method you prefer to answer the question, but please give an answer accurate to one decimal place.*

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5. In South Korea, gasoline prices are recorded in won/liter. (The won is the currency of South Korea). The average price of gasoline in South Korea is 1960 won/liter. What would that price be in terms of US dollars per gallon?

*Useful facts: \$1.00  $\approx$  1,187 won and 1 gallon  $\approx$  3.8 liters*