

Problems	1	2	3	4	5	Total		Grade
Points							%	
Out of	14	26	24	16	20	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. Do well. And remember, ask me if you're not sure about something. **Be sure to report the correct units on each answer.***

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1. I purchased a last-minute vacation package to Las Vegas with a flight and four nights hotel for \$582. The cost per each night at the hotel is \$70.

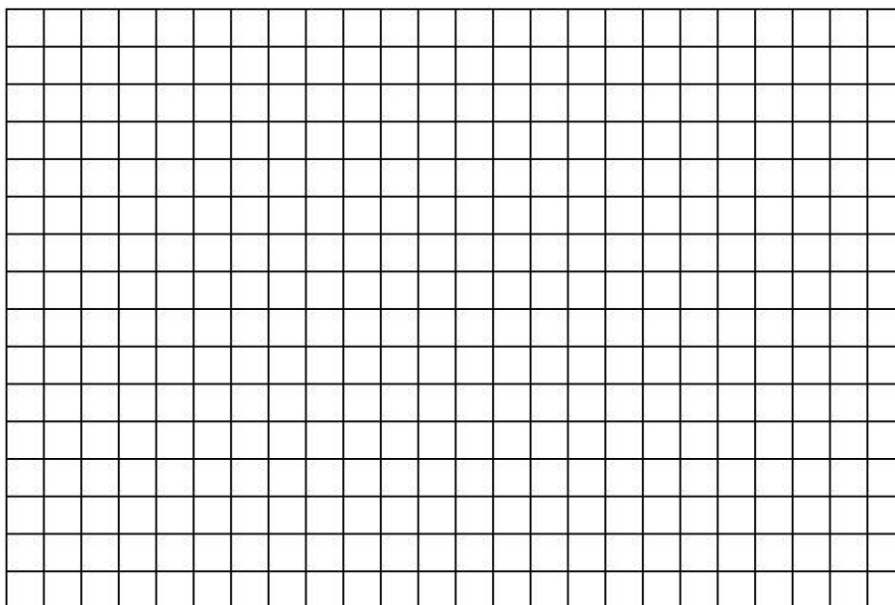
(a) Assuming each night at the hotel is \$70, what is the base price of the flight alone?

(b) This situation relates the cost of the trip to the nights I stay in the hotel. Name the variables and their dependency, including units, and write an equation relating them.

2. Since the Amazon Kindle was released in February 2009, the price has been decreasing at a constant rate. In fact, in February 2011, a blogger developed the following equation representing the price  $P$  of the Kindle in the months  $M$  since it was released in February 2009:

$$P = 359 - 12 * M$$

- (a) Make a table of values for the Kindle price 0 ( $M = 0$ ), 10 ( $M = 10$ ), and 25 ( $M = 25$ ) months since February 2009.
- (b) Draw a graph illustrating the dependence. Be sure to (a) label your axes, (b) scale your axes appropriately to fill the entire graph paper, and (c) include all of the data in your table.



- (c) I will purchase a Kindle if the price falls below \$100. When will the price fall below that level? In other words, solve the inequality  $359 - 12 * M \leq 100$ .
- (d) **Extra Credit:** Can you tell me the month and year when the Kindle is expected to be free? (This would mean that  $P = 0$ .) *Feel free to solve this extra credit on the back of the last page **after** you have finished the other problems.*

3. We are looking into purchasing a new car. We have narrowed it down between two models: the Toyota Prius, priced at \$26,100, and the Volkswagen Jetta, priced at \$23,700. Annual fuel costs (at current gas prices) for the Toyota Prius are \$1100. For the Jetta, annual fuel costs are \$1800. If we let  $Y$  represent the number of years we own the car and  $C$  the total cost of the car (in thousands of dollars \$), then the equations are:

$$\text{Toyota Prius: } C = 26.1 + 1.1 * Y$$

$$\text{Volkswagen Jetta: } C = 23.7 + 1.8 * Y$$

- (a) Complete the table comparing the total cost (purchase price and fuel costs) for each car for 1, 3, 5, and 10 years after purchasing it.

Years	1	3	5	10
Prius				
Jetta				

- (b) Set up and solve a system of linear equations to determine the **payoff time**, or the number of years for which the total costs of each car are equal.

*If you cannot solve the system symbolically, you may find the answer another way for a little partial credit.*

- (c) Based on what you've learned, **fill in the blank**.

The more expensive Toyota Prius pays off in we're going to use it for \_\_\_\_\_ years more than the Volkswagen Jetta.

4. The solid waste generated each year in US cities is increasing. The solid waste generated in 1960 was 88 million tons. In 1990, the solid waste generated was 208 million tons.

(a) By how much has the solid waste increased each year, on average? *Note: in this context the phrase “on average” means that you should assume the increase is **linear**.*

(b) Name the variables, including units, and write a linear equation relating them.

*Hint: measure the years since 1960.*

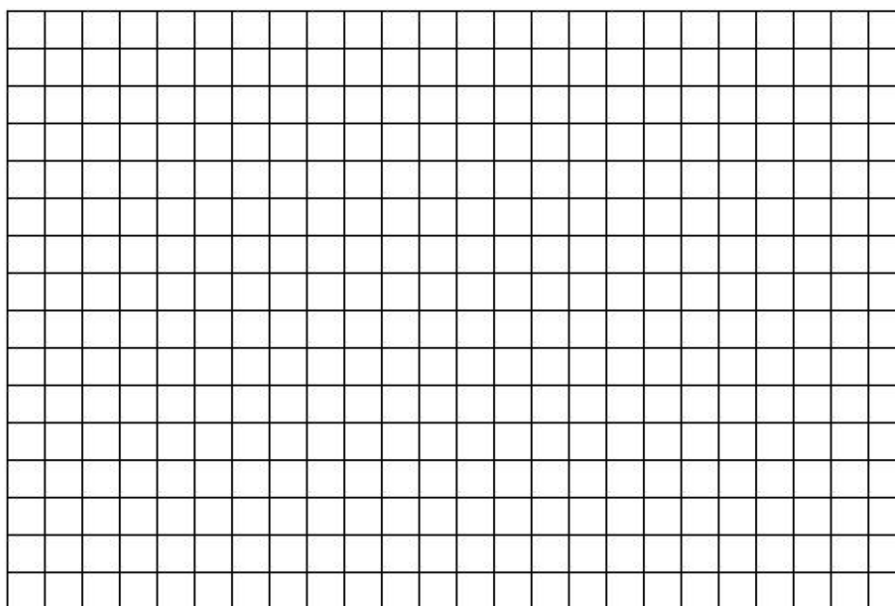
(c) According to your equation, at this rate when will the solid waste in US cities be over 250 million tons?

(d) The Environmental Protection Agency reported that in 2010 the amount of solid waste was 249 million tons. Compare this information to your previous answer. Why do you think the amount of solid waste decreased in cities?

5. The world record time in the men's 500 meter speed skating race has been improving each year, as shown in the following table.

Year	1963	1968	1970	1975	1988	1999	2007
Year since 1960	3	8	10	15	28	39	47
Time (seconds)	39.6	39.2	39.1	38.0	36.5	34.8	34.0
Time from 30 seconds	9.6	9.2	9.1	8.0	6.5	4.8	4.0

- (a) Make a large scatter plot of the points. *Note: To fit all of the data, scale the axes so that you plot years since 1960 and time from 30 seconds as your variables).*



- (b) Draw in a line that fits the data reasonably well.
- (c) According to your line, in what year do you expect the world record time to be 33 seconds?