

# Exponential Worksheet

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Names \_\_\_\_\_

A. The percent risk,  $R$ , of an auto accident can be found by:  $R = e^{21.4 b}$  where  $b$  is the blood alcohol percent level of the driver. Note: Both variables  $b$  and  $R$  are percent numbers and should *not* be converted to a decimal. An  $R$  of 30 when  $b$  is 0.1589 means that a person would have a 30% chance of having a driving accident if their alcohol blood level was measured at 0.1589%.

- 1) What is the percent risk ( $R$ ) if the blood alcohol percent is 0.1%? 1) \_\_\_\_\_ %  
(Note: Use 0.1 not 0.001 in the calculation and round to the nearest tenth)
- 2) Double the blood alcohol percent from what it was in problem #1. 2) \_\_\_\_\_ %  
What is the percent risk now? (round to the nearest tenth)
- 3a) Did the percent risk answer to #2. above surprise you (yes or no)? 3a) \_\_\_\_\_
- b) Explain why using complete sentence(s): \_\_\_\_\_
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- 4) At what blood alcohol percent level ( $b$ ) of the driver would there be an accident for certain ( $R = 100$ ) to happen? (Go out three decimal places)  
(Note: Do not guess the answer but solve for  $b$ .) 4) \_\_\_\_\_ %

Use the graphing mode [Y=]:

- a) Press [Y=] and [CLEAR] out all equations, then make sure the cursor is after  $Y_1 =$
- b) After  $Y_1 =$  enter:  $e^{(21.4 * X)}$
- c) Press [WINDOW] on TI82's or TI83's and use the following settings:  
**TI82 or TI83:** X[0 , 0.29375] , Xscl: 0.05 , Y[ -15 , 105] , Yscl: 25
- d) Press [GRAPH]
- 5) Press [TRACE] and move the cursor using the arrows until  $X = 0.1$  5a) \_\_\_\_\_  
a) What is the  $Y$  value? (round to the nearest tenth)  
b) How does this answer in 5a) compare to #1. above? b) \_\_\_\_\_
- 6) Using the [TRACE] key answer the following: For a 0.175% blood alcohol percent level, what is the percent chance of having an accident? (round to the nearest tenth) 6) \_\_\_\_\_ %
- 7) What is the legal limit for the blood alcohol level percent in Illinois for a DUI conviction  
a) for someone 21 or older? 7a) \_\_\_\_\_  
b) for someone under 21? b) \_\_\_\_\_

Every year, drunk drivers kill 25,000 innocent people. In fact, more than half of all automobile accidents involve an intoxicated driver. But laws against drunk driving are getting tougher and tougher. Not just stiffer penalties, but more active enforcement as well. That means if you drink and drive, sooner or later you'll see those flashing lights in your rearview mirror. So do yourself, your family and your friends a favor.

Remember that:

- Alcohol impairs your ability to drive sooner than you think. Use the blood alcohol chart on the next page as a general reference.
- When you're caught, you'll either face a stiff fine, lose your license, or spend time in jail.
- You can save lives by re-thinking your drinking habits.

Sure, it's a little inconvenient to count your drinks or leave your car somewhere overnight. But compare that to the inconvenience and embarrassment of being pulled off the road by a law enforcement officer.

You have a choice about drinking and driving. You can see the light now. Or you can see the lights later.  
(Source: Office of the Illinois Secretary of State)

**Exponential Worksheet continued**

B. Given the table below of blood alcohol percents, answer the following using *your own* approximate weight.

# Drinks	Body Weight (pounds)							
	100	120	140	160	180	200	220	240
1	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02
2	0.08	0.06	0.05	0.05	0.04	0.04	0.03	0.03
3	0.11	0.09	0.08	0.07	0.06	0.06	0.05	0.05
4	0.15	0.12	0.11	0.09	0.08	0.08	0.07	0.06
5	0.19	0.16	0.13	0.12	0.11	0.09	0.09	0.08
6	0.23	0.19	0.16	0.15	0.13	0.11	0.10	0.09
7	0.26	0.22	0.19	0.16	0.15	0.13	0.12	0.11
8	0.30	0.25	0.21	0.19	0.17	0.15	0.14	0.13
9	0.34	0.28	0.24	0.21	0.19	0.17	0.15	0.14
10	0.38	0.31	0.27	0.23	0.21	0.19	0.17	0.16

0.05% - Drivers hesitant; alternate from "who cares?" to impulsive aggression.  
 0.08% - Judgment seriously affected. Coordination impaired. Legally considered "under the influence".  
 0.15% - Unmistakably drunk. All faculties seriously affected.  
 0.30% - Stuporous.  
 0.40% - Unconscious. Possibly in comma and on verge of death  
 \*between 0.40% & 0.50% - Death from blood alcohol poisoning  
 Source: Governor's Traffic Safety Coordinating Committee, Springfield Illinois

**\*\*Subtract 0.01 for each 40 minutes of drinking\*\***

(Courtesy of the Office of Alcohol and Other Drug Abuse Programming, University of Minn.)

Assume that you have been imbibing - consuming - the number of alcoholic drinks given below for 2 hours then answer the following (be sure to read the \*\* note above).

- 1) What is your *approximate* weight in the table? 1) \_\_\_\_\_
  
- 2a) For 2 drinks what will be your blood alcohol percent level? 2a) \_\_\_\_\_%
- b) Calculate your percent chance of having an accident. b) \_\_\_\_\_%
  
- 3a) For 5 drinks what will be your blood alcohol percent level? 3a) \_\_\_\_\_%
- b) Calculate your percent chance of having an accident. b) \_\_\_\_\_%
  
- 4a) For 8 drinks what will be your blood alcohol percent level? 4a) \_\_\_\_\_%  
 (Note: Death from blood alcohol poisoning occurs at 0.4% to 0.5%)
- b) Calculate your percent chance of having an accident. b) \_\_\_\_\_%
  
- 5) Compare in your group the heaviest and lightest students' answers to #4b) above by subtracting the larger % number minus the smaller % number. What is the difference? 5) \_\_\_\_\_%
  
- 6a) Did the result from #5 above surprise you (yes or no)? 6a) \_\_\_\_\_
- b) Explain why using complete sentence(s): \_\_\_\_\_  
 \_\_\_\_\_
  
- 7) Disregarding the length of time drinking, if someone weighs 160 pounds and has a 89.48% chance of having an accident then how many drinks did that person consume? 7) \_\_\_\_\_