Math 3 Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
1-4 Solving Exponential Word Problems

RECALL:

In working with interest that is ***compounded continuously***, the same formula is always used.

http://www.algebralab.org/img/7db326fb-dd6c-4bbc-bddf-5ae27ba674c3.gif

* **A represents the amount of money after a certain amount of time**
* **P represents the principle or the amount of money you start with**
* **r represents the interest** [**rate**](javascript:def('/Glossary/glossaryterm.aspx?word=Rate',%20500,%20500);) **and is always represented as a decimal**
* **t represents the amount of time in years**

1. Growth of bacteria in food products causes a need to “time-date” some products (like milk) so that shoppers will buy the [product](javascript:def('/Glossary/glossaryterm.aspx?word=Product',%20500,%20500);) and consume it before the number of bacteria grows too large and the [product](javascript:def('/Glossary/glossaryterm.aspx?word=Product',%20500,%20500);) goes bad. Suppose that the formula http://www.algebralab.org/img/d7df1148-150c-4af3-9892-67b865fd2449.gifrepresents the growth of bacteria in a food product. The [variable](javascript:def('/Glossary/glossaryterm.aspx?word=Variable',%20500,%20500);) t represents time in days and http://www.algebralab.org/img/7bdcf139-2256-428d-95fc-289a9cd394db.gifrepresents the number of bacteria. If the [product](javascript:def('/Glossary/glossaryterm.aspx?word=Product',%20500,%20500);) cannot be eaten after the bacteria count reaches 4,000,000 how long will it take?

2. In a given year, the minimum wage was only $1.60 per hour. Use the exponential growth formula http://www.algebralab.org/img/cbba2c14-30e5-4567-9659-653deb1089ee.gifto predict when that minimum wage in the United States will reach 8.50 per hour if the [rate](javascript:def('/Glossary/glossaryterm.aspx?word=Rate',%20500,%20500);) of growth in the minimum wage is 3.9%.

3. Scientific research has shown that the risk of having a car accident increases exponentially as the [concentration](javascript:def('/Glossary/glossaryterm.aspx?word=Concentration',%20500,%20500);) of alcohol in the blood increases. A formula that models the risk of an accident is the following: http://www.algebralab.org/img/0f1870c2-8fc6-41ff-8ed0-7bbeb3bca8d6.gif. In the formula, R represents the % of risk. [R will be given as a [percent](javascript:def('/Glossary/glossaryterm.aspx?word=Percent',%20500,%20500);) and should be used as a [percent](javascript:def('/Glossary/glossaryterm.aspx?word=Percent',%20500,%20500);) rather than a decimal in working the problem.] Find the blood alcohol [concentration](javascript:def('/Glossary/glossaryterm.aspx?word=Concentration',%20500,%20500);) ( http://www.algebralab.org/img/163a3937-5449-4a79-8bcc-67f025e475be.gif) that corresponds to a 25% risk of a car accident.

4. Victor wants to buy a new car that costs $90,000. He has saved $20,000. Determine how many years it will take his $20,000 to grow to $90,000 at 6.25% interest compounded continuously.

5. You deposit $1600 into a back account that pays 5% compounded annually. How long with it take until the deposit is worth twice as much?

6. You buy a new computer for $2100. The computer decreases by 40% annually. When will the computer have a value of $600?

7. The foundation of your house has about 1,200 termites grow at a rate of about 2.4% per day. How long until the number of termites triple?

8. You drink a beverage with 120 mg of caffeine. Each hour, the caffeine in your system decreases by about 12%. How long until you have 10 mg of caffeine left in your blood stream?