



## MORE Application of Exponential and Logarithmic Functions

### POPULATION GROWTH and DECAY!

- 3) A population of fruit flies is increasing according to the law of exponential growth. After 2 days, there are 100 flies, and after 4 days, there are 300 flies. How many flies will there be after 5 days?

- 4) To estimate the age of dead organic material, scientists use the following formula, which denotes the ratio of carbon 14 to carbon 12 present at any time  $t$  (in years)

$$R = \frac{1}{10^{12}} e^{-t/8223}$$

Estimate the **age** of a newly discovered fossil in which the ratio of carbon 14 to carbon 12 is

$$R = \frac{1}{10^{13}}.$$

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- 5) At Dover-Sherborn High School, with a population of 600 students, one student returned from April vacation from Mexico with a contagious and long-lasting “swine flu” virus. The spread of the virus is modeled by:

$$y = \frac{600}{1 + 599e^{-0.8t}}, t \geq 0$$

where  $y$  is the total number of students infected after  $t$  days. The high school will close when 40% or more of the students are infected.

- a) How many students are infected after 5 days?
- b) After how many days will the high school have to close?

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### EARTHQUAKES!

6) On the Richter scale, the magnitude  $R$  of an earthquake of intensity  $I$  is given by

$$R = \log \frac{I}{I_0}$$

where  $I_0 = 1$  is the minimum intensity used for comparison.

Find the intensities (measures of wave energies) per unit of area for each earthquake:

a) Northern Sumatra in 2004:  $R = 9.0$

b) Southeastern Alaska in 2004:  $R = 6.8$

**Homework:** p. 264, #7-13 odd, 37, 41, 45, 49