

Solving Exponential Equations (7.3)

p364 day 4

Quiz 10

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hw: p354#3fg, 11, 12

11. A biologist places agar, a gel made from seaweed, in a Petri dish and infects it with bacteria. She uses the measurement of the growth ring to estimate the number of bacteria present. The biologist finds that the bacteria increase in population at an exponential rate of 20% every 2 days.

- a) If the culture starts with a population of 5000 bacteria, what is the transformed exponential function in the form $P = a(c)^x$ that represents the population, P , of the bacteria over time, x , in days?
- b) Describe the parameters used to create the transformed exponential function.
- c) Graph the transformed function and use it to predict the bacteria population after 9 days.

12. Living organisms contain carbon-12 (^{12}C), which does not decay, and carbon-14 (^{14}C), which does. When an organism dies, the amount of ^{14}C in its tissues decreases exponentially with a half-life of about 5730 years.

a) What is the transformed exponential function that represents the percent, P , of ^{14}C remaining after t years?

b) Graph the function and use it to determine the approximate age of a dead organism that has 20% of the original ^{14}C present in its tissues.

$$f) y = -\left(\frac{2}{3}\right)^{\frac{x-2}{5}}$$

$$g) y = 1.5(0.75)^{\frac{x-4}{2}} - \frac{2}{5}$$

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ex1: Solve

$$2^x = 8$$

$$2^x = 2^3$$

$$x = 3$$

$$3^{x-5} = 27^{x+1}$$

$$3^{x-5} = (3^3)^{x+1}$$

$$3^{x-5} = 3^{3x+3}$$

$$\therefore x-5 = 3x+3$$

$$-8 = 2x$$

$$-4 = x$$

$$4^{3x-2} = 16^{x+1}$$

$$4^{3x-2} = (4^2)^{x+1}$$

$$4^{3x-2} = 4^{2x+2}$$

$$\therefore 3x-2 = 2x+2$$

$$x = 4$$

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ex2: Solve

$$5^{2x+1} = \left(\frac{1}{25}\right)^{x-2}$$

$$5^{2x+1} = (5^{-2})^{x-2}$$

$$\therefore 2x+1 = -2x+4$$

$$4x = 3$$

$$x = \frac{3}{4}$$

4ab

5ab

$$5^{x-4} = 1$$

$$5^{x-4} = 5^0$$

$$x-4 = 0$$

$$x = 4$$

$$\sqrt[3]{(5x+1)^3} = \sqrt[3]{64}$$

$$5x+1 = 4$$

$$5x = 3$$

$$x = \frac{3}{5}$$

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ex3: After 30 h, a sample of Plutonium-243 has decayed to $\frac{1}{64}$ th of the original amount. What is the half life?

$$A(t) = A_0 \left(\frac{1}{2}\right)^{\frac{t}{h}}$$

$$\frac{1}{64} = 1 \left(\frac{1}{2}\right)^{\frac{30}{h}}$$

$$\left(\frac{1}{2}\right)^6 = \left(\frac{1}{2}\right)^{\frac{30}{h}}$$

$$6 = \frac{30}{h}$$

$$h = 5h$$

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$$\text{ex4: Solve } 3^x = 16$$

2 dec. pl.

$$x = 2.53$$

guess+check

12

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hw: p364 #4cd, 5cd, 8, 10