

**3.5 Equation Solving & Modeling**

Target 3B: Know and understand the inverse relationships of exponential and logarithmic equations

**SAT Connection****Problem Solving and Data Analysis**

4. Given a scatterplot, use linear, quadratic, or exponential models to describe how the variables are related.

Example: The population of mosquitoes in a swamp is estimated over the course of twenty weeks, as shown in the table.

Time (weeks)	Population
0	100
5	1,000
10	10,000
15	100,000
20	1,000,000

Which of the following best describes the relationship between time and the estimated population of mosquitoes during the twenty weeks?

- A) Increasing linear
- B) Decreasing linear
- C) Exponential growth
- D) Exponential decay

**Solution****Solving Exponential & Logarithmic Equations**

Watch a video or read a website, then solve the following problems.

<http://www.purplemath.com/modules/solvexpo.htm>

<https://www.youtube.com/watch?v=M6f6dANVyxA>

Find the solution algebraically.

1.  $32 \left(\frac{1}{4}\right)^{\frac{x}{3}} = 2$

2.  $3 \cdot 2^x = 48$

3.  $0.35^x = 8$

4.  $2 \cdot 10^{2x} = 14$

5.  $3 + 2e^{-x} = 6$



Watch a video or read a website, then solve the following problems.

[http://www.mesacc.edu/~scotz47781/mat120/notes/logarithms/solving/solving\\_log\\_eqns\\_intro.pdf](http://www.mesacc.edu/~scotz47781/mat120/notes/logarithms/solving/solving_log_eqns_intro.pdf)

<https://youtu.be/59j0ALU3N7k>

6.  $3 \ln(x - 4) - 2 = 6$

7.  $\log x - \log(x + 4) = 1$

8.  $\ln(3x - 2) + \ln(x - 1) = 2 \ln x$

9.  $\frac{2^x + 5 \cdot 2^{-x}}{2} = 3$

**More Practice****Solving Exponential Functions**

<http://www.regentsprep.org/regents/math/algtrig/ate8/exponentialEquations.htm>

<http://www.purplemath.com/modules/solvexpo2.htm>

<http://www.sosmath.com/algebra/logs/log4/log46/log46.html>

<http://www.coolmath.com/algebra/17-exponentials-logarithms/11-solving-exponential-equations-01>

<https://www.youtube.com/watch?v=M6f6dANVyxA>

<https://www.youtube.com/watch?v=5R5mKpLsfYg>

**Solving Logarithmic Functions**

<http://www.regentsprep.org/regents/math/algtrig/ate9/logseq.htm>

<http://www.coolmath.com/algebra/17-exponentials-logarithms/15-solving-logarithmic-equations-01>

[http://www.mesacc.edu/~scotz47781/mat120/notes/logarithms/solving/solving\\_log\\_eqns\\_intro.pdf](http://www.mesacc.edu/~scotz47781/mat120/notes/logarithms/solving/solving_log_eqns_intro.pdf)

<https://youtu.be/59j0ALU3N7k>

<https://www.youtube.com/watch?v=UpE9snwzp30>

**Homework Assignment**

p.301 #1,3,6,11,13,16,17,27,35

**SAT Connection****Solution**

**Choice C is correct.** The mosquito population starts at 100 in week 0 and then is multiplied by a factor of 10 every 5 weeks. Thus, if  $P(t)$  is the mosquito population after  $t$  weeks, then based on the table,  $P(t) = 100(10)^{\frac{t}{5}}$ , which indicates an exponential growth relationship.

Choices A, B, and D are incorrect and may be the result of an incorrect interpretation of the relationship or errors in modeling the relationship.