

Determining Exponential Functions when given a starting value and one data point.

Example 1

Given $(0, 5)$ and $(7, 48)$ find the expo function to fit the data.

$$a = 5$$

$$x = 7$$

$$f(x) = 48$$

* The output of 2nd ordered pair becomes your $f(x)$

* The output (y-value) of the ordered pair with input 0 (x-value) becomes your a

* The input of your 2nd ordered pair is your x-value (time) your exponent!

$$f(x) = a b^x \quad \text{we are missing } \underline{\underline{b}}!$$

$$1) f(x) = a b^x$$

$$48 = 5 b^7$$

1) Plug in values you've determined from ordered pairs

$$2) \frac{48}{5} = \frac{5 b^7}{5}$$

2) Divide both sides by "a" to isolate variable

$$3) 9.6 = b^7$$

$$9.6^{(1/7)} = b^{7(1/7)}$$

$$9.6^{(1/7)} = b$$

3) Take the n^{th} (x) root of both sides, you can easily do this by raising both sides to $(1/n)$ where n is your exponent

$$1.381 = b$$

4) minus one if you want to find rate otherwise set up equation

$$4) f(x) = 5(1.381)^x$$

rate is .381 or 38.1%

* make sure to include at least 3 significant digits when solving for b.

Example 2

$(0, 15)$ and $(7, 220)$

$$\begin{aligned} a &= 15 \\ x &= 7 \\ f(x) &= 220 \end{aligned}$$

$$\frac{220}{15} = \frac{15}{15} b^7$$

$$14.667^{(1/7)} = b$$

$$14.667 = b^7$$

$$b = 1.468$$

$$f(x) = 15(1.468)^x$$

Example 3

$(0, 420)$ and $(12, 30)$

$$30 = 420(b)^{12}$$

$$0.0714^{(1/12)}$$

$$f(x) = 420(.803)^x$$

$$0.0714 = b^{12}$$

$$.803 = b$$

Homework

1) $(0, 16)$ and $(3, 222)$

2) $(0, 19)$ and $(12, 5)$