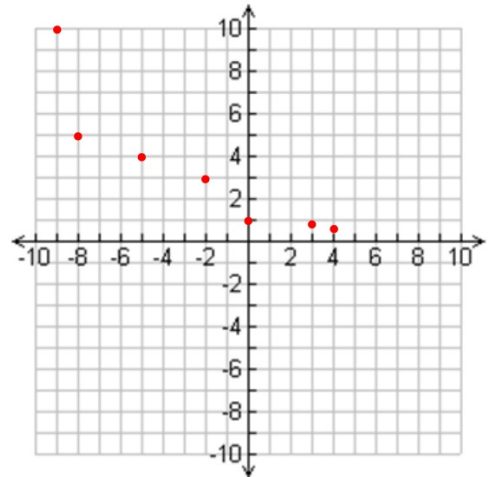


Bellwork

Graph the given points and classify the model as linear, **exponential**, or quadratic.

$(-9, 10)$, $(-8, 5)$, $(-5, 4)$
 $(-2, 3)$, $(0, 1)$, $(3, 0.75)$,
 $(4, 0.5)$



Creating Exponential Equations

Overview:

Given two points and the knowledge that something is represented by an Exponential model you will be able to find the equation that contains those given points.

Method Used:

For solving these systems we will utilize the method of elimination.

Vital Information

Be able to recall all the
Properties of Exponents:

1. Zero Exponent
- * 2. Multiplying like bases
- * 3. Dividing like bases
4. Power of a power
5. Product of a power
6. Quotient of a power
- * 7. Negative Exponents

Creating Exponential Equations

Procedure:

Step 1: Using the points, write an equation for each.

The general equation is: $y = ab^x$

Step 2: Identify the equation with the smallest exponent on the b term.

Step 3: Divide the two equations placing the one identified in step 2 in the denominator.

Step 4: Simplify and solve for b.

Step 5: Plug into one of the original equations and solve for a.

Step 6: Write the equation filling in for the a and b values.

Example

Find the EXPONENTIAL equation of the line that best describes the provided information.

1. $(4, 162)$ & $(-2, \frac{2}{9})$

Note: -2 is a smaller x value than 4 is so that equation goes to the denominator.

$$\frac{162}{\frac{2}{9}} = ab^4$$

Divide the two numbers on the left.

If you have a calculator perfect just plug it in.

If not, then remember how to divide by a fraction.

This is the approach I'm taking here.

On the right the a's will cancel and then you move the b term up, change the exponents sign and combine with the exponent that's already up there.

$$\frac{162}{1} \cdot \frac{9}{2} = b^{4+2}$$

$$729 = b^6$$

Solve for b. Take the root of both sides that is equal to the exponent on b.

$$\sqrt[6]{729} = \sqrt[6]{b^6}$$

$$3 = b$$

Now take this result and plug into one of the original equations. Typically choosing the top one, but either will work.

$$162 = ab^4$$

$$162 = a(3)^4$$

$$\frac{162}{81} = \frac{a \cdot 81}{81}$$

$$2 = a$$

Now that we have the values for both a and b we can write the equations:

$$y = 2(3)^x$$

ANSWER

Example

Find the EXPONENTIAL equation of the line that best describes the provided information.

1. $(-1, 8)$ & $(5, \frac{1}{8})$

Note: -1 is a smaller x value than 5 is so that equation goes to the denominator.

$$\frac{1}{8} = ab^5$$
$$8 = ab^{-1}$$

Divide the two numbers on the left.

If you have a calculator perfect just plug it in.

If not, then remember how to divide by a fraction.

This is the approach I'm taking here turning 8 into a fraction $8/1$.

On the right the a's will cancel and then you move the b term up, change the exponents sign and combine with the exponent that's already up there.

$$\frac{1}{8} \cdot \frac{1}{8} = b^{5+1}$$

$$\frac{1}{64} = b^6$$

ANSWER $y = 4 \left(\frac{1}{2}\right)^x$

Solve for b. Take the root of both sides that is equal to the exponent on b.

$$\sqrt[6]{\frac{1}{64}} = \sqrt[6]{b^6}$$

$$\frac{1}{2} = b$$

Now take this result and plug into one of the original equations. Typically choosing the top one, but either will work.

$$\frac{1}{8} = ab^5$$

$$\frac{1}{8} = a \left(\frac{1}{2}\right)^5$$

$$\frac{32}{1} \left[\frac{1}{8}\right] = a \cdot \left[\frac{1}{32}\right] \frac{32}{1}$$

$$\frac{32}{8} = 4 = a$$