

I can write an exponential function ($y = a \cdot b^{x/c}$) from a table.

The starting y-value for the patterns below is located when $x = 0$.

I can find the MULTIPLIER by dividing 2 consecutive y-values

The pattern in the x-values in the table affect the

function's c-value.

x	0	1	2	3
y	300	225	168.75	126.5625

$$\frac{225}{300} = 0.75$$

$$y = 300 \cdot (0.75)^x$$

x	0	2	4	6
y	4	12	36	108

$$\frac{12}{4} = 3$$

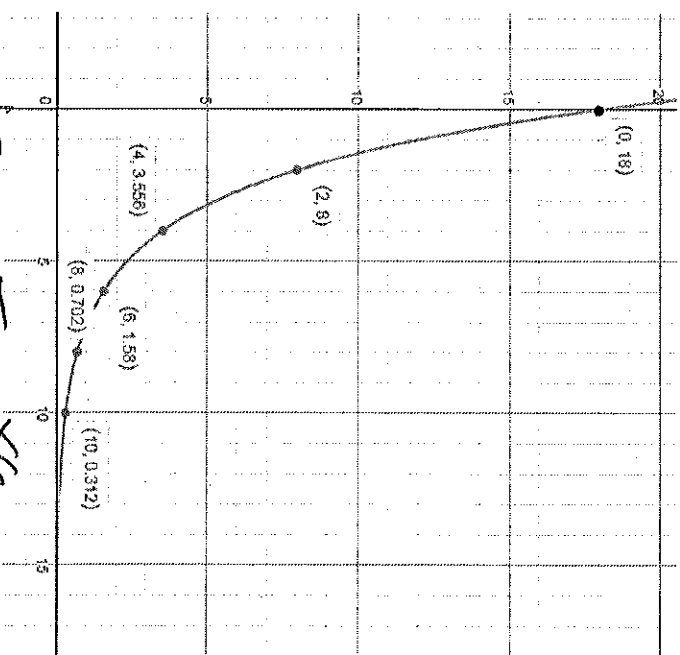
$$y = 4 \cdot (3)^{\frac{x}{2}}$$

I can write an exponential function ($y = a \cdot b^{x/c}$) from a graph.

The starting y-value for the pattern below is located on the y-axis. I can find the MULTIPLIER by dividing consecutive y-values.

The pattern in the x-values in the graph affect the function's

c-value.



$$\frac{8}{18} = 0.4$$

$$y = 18 \cdot (0.4)^{\frac{x}{2}}$$

OR $18 \left(\frac{2}{5}\right)^{\frac{x}{2}}$

<p>I can use the COMPOUND INTEREST FUNCTION</p> $F(t) = P(1 + \frac{r}{n})^t$ <p>to solve problems.</p>	<p>I can determine the PERCENT increase or decrease rate of change in an EXPONENTIAL Function.</p>
<p>In the COMPOUND INTEREST FUNCTION, the initial investment is represented by <u>\$</u>; the annual interest rate is <u>r</u>, the number of years is <u>t</u>, and <u>n</u> is the <u># of compunds per year</u></p> <p>\$10000 is invested in a fund that pays 5% interest every year. Find the amount of money in the account after 15 years.</p> $10000(1 + .05)^{15} = 20789.28$	<p>If the MULTIPLIER is <u>greater</u> than 1, the function represents a GROWING pattern.</p> <p>If the MULTIPLIER is between <u>zero</u> and <u>one</u>, the function represents a DECREASING pattern.</p> <p>The PERCENT (written as a decimal) increase is the amount the MULTIPLIER EXCEEDS <u>1</u>.</p> <p>The PERCENT (written as a decimal) decrease is the amount the MULTIPLIER IS LESS THAN.</p> <p>$f(x) = 200(1.06)^x$ represents 6% <u>increase</u></p> <p>$g(x) = 150(0.94)^x$ represents <u>6%</u> decrease.</p> <p>$h(x) = 20(1.77)^x$ represents <u>77%</u> increase</p> <p>$f(x) = 500(.88)^x$ represents 12% decrease.</p>
<p>I can explain the meaning of ZERO as an EXPONENT.</p> <p>The EXPONENTIAL expression $4 \cdot 3^0 =$ <u>4</u> because 3^0 means to multiply 4 by <u>zero</u> 3s. Which is equivalent to multiplying 4 by <u>one</u></p> <p>Multiplying by "1" has "0" impact.</p>	<p>I can explain the meaning of NEGATIVE EXPONENTS.</p> <p>The EXPONENTIAL Expression x^{-2} simplifies to either $\frac{1}{x^2}$ or $\frac{1}{x^2}$.</p> <p>A positive exponent is a shortcut repeated <u>multiplication</u>.</p> <p>A negative exponent is a shortcut for repeated <u>Division</u>.</p>
<p>I can explain the meaning of FRACTIONAL EXPONENTS.</p> <p>The EXPONENTIAL Expression $8^{\frac{1}{3}} = (2 \cdot 2 \cdot 2)^{\frac{1}{3}} =$ <u>2</u>.</p> <p>A fractional exponent is equivalent to taking a <u>root</u>. For example, $8^{\frac{1}{3}}$ is equivalent to the cube <u>root</u> of 8.</p>	

AA4 Notes: Part 2 Logarithms

I can translate between exponential and logarithmic forms.

1. Write $y = 4^x$ in logarithmic form.

$$y = \log_4 x$$

2. Write $y = \log_3 x$ in exponential form.

$$y = 3^x$$

I can find the inverses of exponential and logarithmic functions.

1. Find the inverse of $f(x) = 2(5^x) - 2$

$$\begin{aligned} \frac{y+2}{2} &= 2(5^x)^{-2} && \xrightarrow{\log_5} && \frac{y+2}{2} = 5^x && \xrightarrow{\log_5} && \log_5\left(\frac{y+2}{2}\right) = x && \rightarrow && f^{-1}(x) = \log_5\left(\frac{x+2}{2}\right) \end{aligned}$$

2. Find the inverse of $g(x) = 2\log_8(x+1)$

$$\begin{aligned} \frac{y}{2} &= \log_8(x+1) && \rightarrow && 8^{\frac{y}{2}} = x+1 && \rightarrow && 8^{\frac{y}{2}-1} = x && \rightarrow && g^{-1}(x) = 8^{\frac{x}{2}-1} \end{aligned}$$

I can solve equations using the definition of exponents and logarithms.

1. Solve for x:

a. $3^x + 4 = 31$
 $-4 -4$

$3^x = 27$
 $\log_3 3^x = \log_3 27$
 $x = \log_3 27$
 $x = 3$

b. $2(5^{4x}) - 1 = 249$
 $+1 +1$

$2(5^{4x}) = 250$
 $5^{4x} = 125$
 $4x = \log_5 125$
 $4x = 3$
 $x = \frac{3}{4}$

2. Solve for x:

a. $\log_{10}(x+2) = \frac{1}{2}$
 $10^{\log_{10}(x+2)} = 10^{\frac{1}{2}}$
 $x+2 = 10^{\frac{1}{2}}$
 $x+2 = \sqrt{10}$
 $x = \sqrt{10} - 2$

b. $0.25 \log_4(3x) - 5 = 11$
 $+5 +5$

$0.25 \log_4(3x) = 16$
 $\log_4(3x) = 64$
 $4^{\log_4(3x)} = 4^{64}$
 $3x = 4^{64}$
 $x = \frac{4^{64}}{3}$

I can graph and find characteristics (intercepts, asymptotes) of exponential and logarithmic functions.

1. Find the y-intercept and horizontal asymptote of $k(x) = 3(2^x) - 12$

$y\text{-intercept: } k(0) = 3(2^0) - 12$
 $= 3 - 12$
 $= -9$
 $H.A. y = -12$

2. Find the x-intercept(s) and vertical asymptote of $m(x) = 2 \log_4(x+2) - 6$

$V.A. x = -2$
 $x\text{-intercept: } 0 = 2 \log_4(x+2) - 6$
 $+6 +6$
 $6 = 2 \log_4(x+2)$
 $\frac{6}{2} = \frac{2 \log_4(x+2)}{2} \rightarrow 3 = \log_4(x+2)$
 $4^3 = 4^{\log_4(x+2)} \rightarrow 64 = x+2 \rightarrow 62 = x$