HW Questions →

Warm Up - solve

A. $7 = \log_{1.3}(x)$

$1.3^7 = x$

$x \approx 6.27$

B. $2\log(x) - \log(3x) = 4$

$\log(x^2) - \log(3x) = 4$

$\log\left(\frac{x^2}{3x}\right) = 4$

$\log\left(\frac{x}{3}\right) = 4$

$10^4 = \frac{x}{3}$

$3(10^4) = x$

$3(10,000) = x$

Reminder:

Test Monday April 29

$3 = \log_{2.5}(x)$

base

$2.5^3 = x$

So . . . .

$x = 15.625$

$2\log(x) + \log(4x) = 4$

$\log(x^2) + \log(4x) = 4$

$\log(x^2 \cdot 4x) = 4$

$\log(4x^3) = 4$

Write in exponential form

$10^4 = 4x^3$

$\frac{10^4}{4} = x^3$

$x = \sqrt[3]{\frac{10^4}{4}}$

$x^3 = 2500$

$x \approx 13.57$

Questions
on
HW

$133/$

a) $\sqrt[3]{x^3} = \sqrt[3]{243}$

$x =$

b) $\log 3^{x} = \log 243$

$$\frac{x \cdot \cancel{\log 3}}{\cancel{\log 3}} = \frac{\log 243}{\log 3}$$

$\boxed{121}$

$$\frac{x+2}{x^2-9} - \frac{1}{x+3} \rightarrow \frac{x+2}{(x+3)(x-3)} - \frac{1}{(x+3)}\frac{(x-3)}{(x-3)}$$

$$\frac{x+2-(x-3)}{(x+3)(x-3)} \rightarrow \frac{x+2-x+3}{(x+3)(x-3)}$$

$$\rightarrow \frac{5}{(x+3)(x-3)}$$

6-127. Ryan has the chickenpox! He was told that the number of pockmarks on his body would grow exponentially until his body overcomes the illness. He found that he had 60 pockmarks on November 1, and by November 3 the number had grown to 135. To find out when the first pockmark appeared, he will need to find the exponential function that will model the number of pockmarks based on the day. Homework Help ✎

a. Ryan decides to find the exponential function that passes through the points (3, 135) and (1, 60). Use these points to write the equation of his function of the form $f(x) = ab^x$.

b. According to your model, what day did Ryan get his first chickenpox pockmark?

$(3, 135)$ $(1, 60)$

$y = ab^x$ $y = ab^x$

$135 = ab^3$ $60 = ab^1$

$$\frac{135}{60} = \frac{\cancel{a}b^3}{\cancel{a}b^1}$$

$$\frac{135}{60} = b^2$$

$$b^2 = \frac{135}{60}$$

$$b = \pm\sqrt{\frac{135}{60}}$$

131

$y = ax^2 + bx + c$

Find the equation of the parabola that passes through the points
(–2, 24), (3, –1), and (–1, 15).

$(-2, 24) \quad 24 = a(-2)^2 + b(-2) + c$

6-133. Solve each of the following equations for x.

a. $x^3 = 243$

b. $3^x = 243$

Today:

Solve a variety of both exponentianal and log equations.

Solve Log Equations

a) $\boxed{\log}(3n-5) = \boxed{\log}(n+1)$

$y = \log_b x$

$(0,1)$

$2^0 = 1$

$3n - 5 = n + 1$

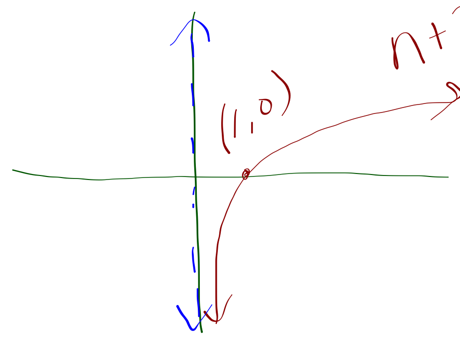
$2n - 5 = 1$

$2n = 6$

$\boxed{n = 3}$

$2^{n+3} = 2^{7n}$

$n + 3 = 7n$



b) $\frac{16}{2} = \frac{2\log_2\left(\frac{3}{x}\right)}{2}$

$8 = \log_2\left(\frac{3}{x}\right)$

$\frac{2^8}{1} = \frac{3}{x}$

$x = \frac{3}{2^8}$

$x \approx .0117$

c) $3 = \log_2(x) + \log_2\left(\frac{x}{3}\right)$

$3 = \log_2\left(\frac{x}{1} \cdot \frac{x}{3}\right)$

$3 = \log_2\left(\frac{x^2}{3}\right)$

$2^3 = \frac{x^2}{3}$

$3 \cdot 8 = x^2$

$\sqrt{24} = \sqrt{x^2}$

$x = \pm 2\sqrt{6}$

$\sqrt{24} = \sqrt{4}\sqrt{6}$
$= 2\sqrt{6}$

$x = \pm 2\sqrt{6}$

extraneous

(d) $\log_4(2x) - \log_4(x) = 4$

$\log_4\left(\frac{2x}{x}\right) = 4$

$4^4 = \frac{2\cancel{x}}{\cancel{x}}$

$4^4 \neq 2$

NO sol.

(e) $\frac{3(4)^{n-1}}{3} = \frac{999}{3}$

$4^{n-1} = 333$

log form

log both sides

$\log_4 333 = n-1$

$\log 4^{(n-1)} = \log 333$

Change of base

$\frac{\log 333}{\log 4} = n-1$

$\frac{(n-1)\cancel{\log 4}}{\cancel{\log 4}} = \frac{\log 333}{\log 4}$

$n = \frac{\log 333}{\log 4} + 1$

(d) $\log_4(2x) - \log_4(x) = 4$

condense

$\log_4(2x^2) = 4$

convert to equiv. form

$4^4 = 2x^2$

divide

$128 = x^2$

$x = \pm\sqrt{128}$

$\approx \pm 11.314$

(e) $3(4)^{n-1} = 999$

divide

$4^{n-1} = 333$

Take log of both sides

Convert to log form

(e) $3(4)^{n-1} = 999$

divide

$4^{n-1} = 333$

Convert to log form

Take log of both sides

$\log\left(4^{n-1}\right) = \log(333)$

$(n-1)\log(4) = \log(333)$

$n-1 = \dfrac{\log(333)}{\log(4)}$

$$\boxed{n = \frac{\log(333)}{\log(4)} + 1}$$

(e) $3(4)^{n-1} = 999$

divide

$4^{n-1} = 333$

Convert to log form

$n-1 = \log_4(333)$

$n = \log_4(333) + 1$

$$n = \frac{\log(333)}{\log(4)} + 1$$

Take log of both sides

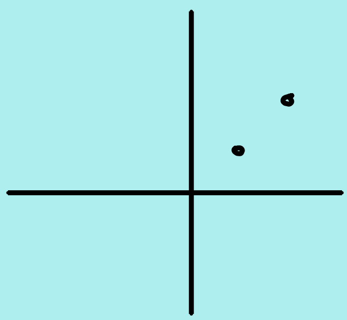
$\log(4^{n-1}) = \log(333)$

$(n-1)\log(4) = \log(333)$

$n-1 = \frac{\log(333)}{\log(4)}$

$$\boxed{n = \frac{\log(333)}{\log(4)} + 1}$$

Exponential Functions

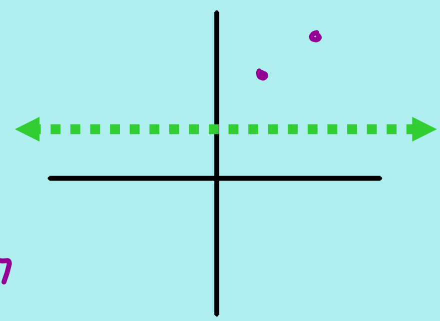


$y = a \cdot b^{x}$

Aim

#2 today

Exponential Functions

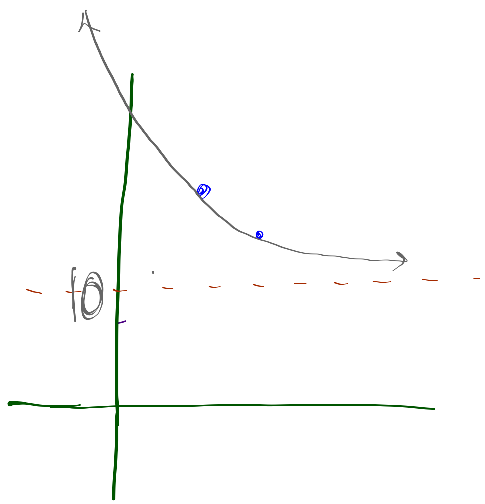


$y = a \cdot b^{(x-h)} + k$

6-125

growth or decay?

(3, 12.5) (4, 11.25)



$y = ab^x + c$

$(3, 12.5)$ $\quad 12.5 - 10 = a \cdot b^3 + 10 - 10 \Rightarrow 2.5 = a \cdot b^3$

$(4, 11.25)$ $\quad 11.25 - 10 = a \cdot b^4 + 10 - 10 \Rightarrow 1.25 = a \cdot b^4$

Substitution

$\frac{2.5}{b^3} = \frac{a \cdot b^3}{b^3}$

$a = \left(\frac{2.5}{b^3}\right)$

$1.25 = \left(\frac{2.5}{b^3}\right)\frac{b^4}{1}$

$1.25 = 2.5b$

$\frac{1.25}{2.5} = b$

$b = .5$

same either method

Elimination

$\frac{1.25 = \cancel{a} \cdot b^4}{2.5 = \cancel{a} \cdot b^3}$

$.5 = b$

$2.5 = a(.5)^3$

$2.5 = a(.125)$

$a = 4$

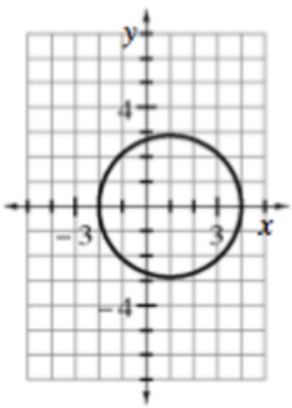
$y = 4(.5)^x + 10$

Assignment

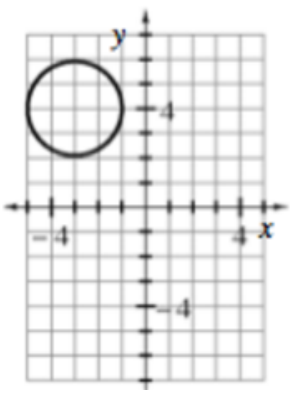
Worksheet 6.2.3

April 19, 2019

134 a.



b.



6-135. Add or subtr

a. $\frac{x^2}{x-5}-\frac{25}{x-5}$

c. $\frac{x^2}{x-y} - \frac{2xy-y^2}{x-y}$

6-136. Find the inverse of each of the functions below. V

a. $p(x) = 3(x^3 + 6)$

April 19, 2019