

Algebra 2 - Mixed Topics - Study Guide

Name Answers

Solve the exponential equation.

1)  $3^{x-4} = 81$   $x-4=4$   
 $3^{x-4} = 3^4$   $x=8$

2)  $2^{x+5} = 4^{x-2}$   $x+5=2(x-2)$   $9=x$   
 $2^{x+5} = 2^{2(x-2)}$   $2 \cdot 2^{-3x} = 2^{5(x-3)}$

$-3x+2 = 5x-15$   
 $2 = 2$   
 $-3x+15 = 5x-15$   
 $15+15 = 5x+3x$

Rewrite the logarithmic expression as an exponential. Do not solve.

4)  $\log_5 \left(\frac{1}{625}\right) = -4$   
 $5^{-4} = \frac{1}{625}$

5)  $\log_2(64) = x$   
 $2^x = 64$

6)  $\log(x) = 9.21$   
 $10^{9.21} = x$

$12 = 8x$   
 $\frac{12}{8} = x$

Rewrite the exponential equation as a logarithm. Do not solve.

7)  $6^2 = 36$

$\log_6 36 = 2$

8)  $11^{3.1} = x$

$\log_{11} x = 3.1$

9)  $e^{x-4} = 22.73$

$\ln 22.73 = x-4$

Solve the logarithmic equation by turning the log into an exponential.

10)  $\log_2(2x-1) = 4$

$2^4 = 2x-1$   $17=2x$   
 $16 = 2x-1$   $\frac{17}{2} = x$

11)  $\log_7 49 = x-3$

$7^{x-3} = 49$   $x-3=2$   $x=5$   
 $7^{x-3} = 7^2$

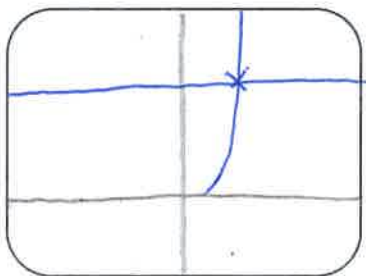
12)  $\log(.01) = x$

$10^x = .01$   
 $10^x = 10^{-2}$   $x = -2$

[NEW!] Use a graph to solve the equation. Round to the nearest tenth.

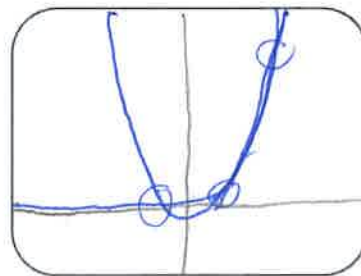
Y1 = left side; Y2 = right side; find where they cross. Sketch your screen to show work.

13)  $4^{3x-2} = 15$



$x = 1.3$

14)  $2^{x-1} = x^2 - 1$



$x = -1.1, 1.6, 6.3$

15) Consider the piecewise function  $h(x) = \begin{cases} 3x+2 & , x < -2 \\ -4 & , -2 \leq x < 3 \\ 5-x & , x \geq 3 \end{cases}$

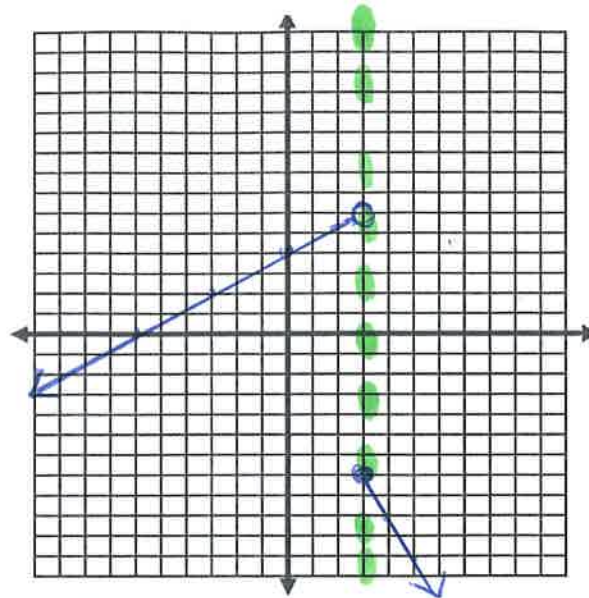
$h(2) = -4$

$h(-10) = -28$

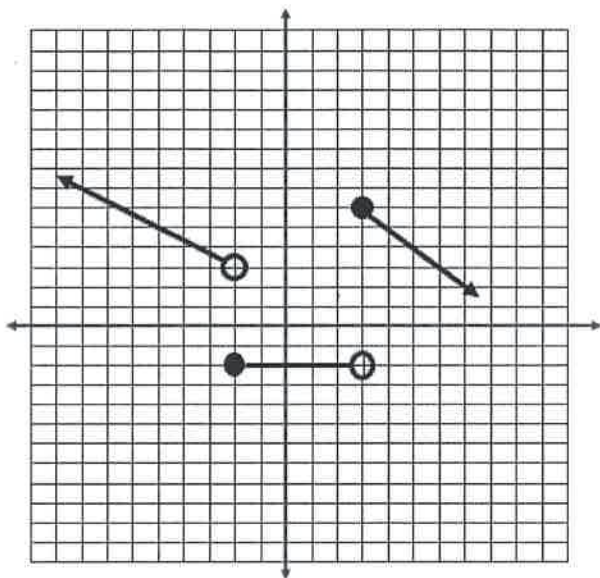
$h(3) = 2$

16) Graph the piecewise function.

$$f(x) = \begin{cases} \frac{2}{3}x + 4 & \text{if } x < 3 \\ -2x - 1 & \text{if } x \geq 3 \end{cases}$$



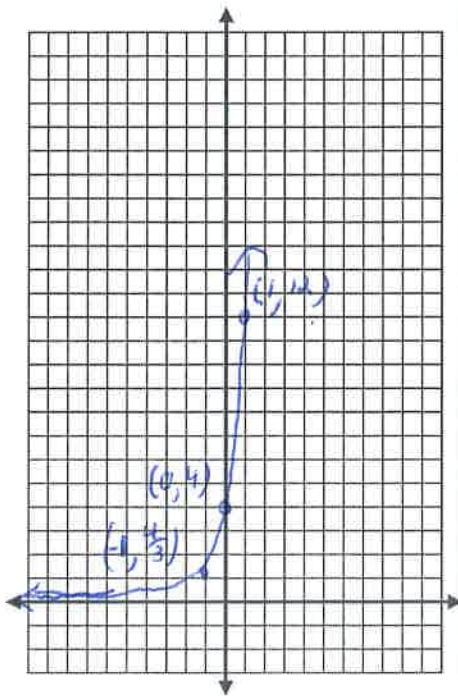
17) Write the piecewise equation for the graph below.



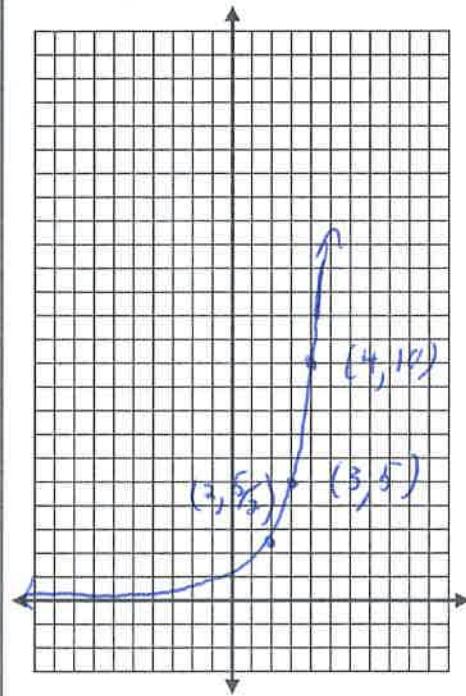
$$f(x) = \begin{cases} -\frac{1}{3}x + \frac{1}{3} & \text{if } x < -2 \\ -2 & \text{if } -2 \leq x < 3 \\ -x + 9 & \text{if } x \geq 3 \end{cases}$$

Graph the exponential functions. LABEL the three key points for each graph.

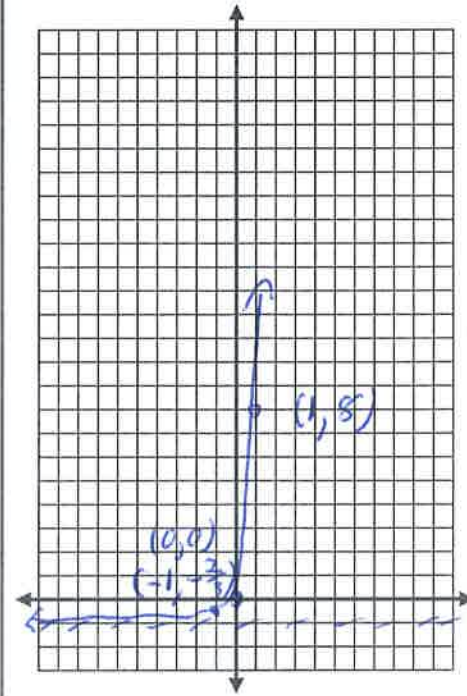
18)  $y = 4(3)^x$



19)  $y = 5(2)^{x-3}$



20)  $y = \left(\frac{1}{3}\right)^{-2x} - 1$



21) Dante buys a refrigerator for \$2000. He later learns that the value of that refrigerator depreciates at a rate of 13% per year. How much will Dante's refrigerator be worth in five years?

$$\$996.84$$

22) The half-life of Ridiculum is four days. If you start out with 13.2 kg of Ridiculum, how much will you have after sixteen days?

$$0.825 \text{ kg}$$

After 22 days?

$$0.29 \text{ kg}$$

After how many days will there be no Ridiculum (0 kg) left?

There will never be 0 kg, but it will keep getting closer to it forever.

23) Lola invests \$400 in a startup company that promises to exhibit 40% growth (interest) each year. If this is the case, how much will Lola's investment be worth in 11 years?

$$400(1.40)^{11} = 16,198.26$$

24) Consider the equation  $FV = 2100(0.79)^x$  where  $x$  is the number of years.

Is this growth or decay?

What is the rate in this equation?  $1+r = .79$

$$r = -.21$$

$$-21\%$$

25) Write an expression equal to  $x^3$  that includes... *answers are samples. Many possible.*

...a squared.	...a fraction.	...a radical.	...a negative exponent.
$x^2 \cdot x$	$\frac{x^5}{x^2}$	$\sqrt{x^6}$	$x^5 \cdot x^{-2}$

26) Simplify each expression. Answers should contain no parentheses and only positive exponents.

$x^{-4}$	$(a^4b^2)^3$	$\frac{12x^5y^{-2}}{16x^3y^2}$	$5a^{-2}b^4 \cdot 2a^3b$	$(47x)^0$
$\frac{1}{x^4}$	$a^{12}b^6$	$\frac{3x^2}{4y^4}$	$10a^1b^5$	$1$