PreCalculus 12

Name_____
Date_____

Logarithm Quiz#1 – No Calcs !

1. Express $8^{-2} = \frac{1}{64}$ in logarithmic form.

$\log_8\left(\frac{1}{64}\right) = -2$

2. Using the fact that $\log 3 = P$ and $\log 5 = Q$, find:

a) $\log 9 =$

$\log 3^2$

$2\log 3$

$2P$

b) $\log\left(\frac{25}{9}\right) =$

$\log 25 - \log 9$

$2\log 5 - 2\log 3$

$2Q - 2P$

c) $\log 5\sqrt{3} =$

$\log 5 + \log \sqrt{3}$

$Q + \frac{1}{2}P$

d) $\log 300 =$

$\log 10 + \log 30$

$\log 5 + \log 2 + \log 3 + \log 10$

$Q \quad\quad P \quad\quad 1$

$Q + P + 1 + \log 2$

3. If $\log_5(x) = -2$, what is the value of x?

$5^{-2} = x$ $\quad 5^{-2} = \frac{1}{25}$ $\quad x = \frac{1}{25}$

4. Give the Domain for the function $y = \log_2(x-4)+1$

$x > 4$

$2^{y-1} = x-4 \Rightarrow x = 2^{y-1} + 4$

5. Simplify completely and give restrictions on x:

$x > 4 \quad x > -2$

$\log_7(x^2-16) - \log_7(x^2-2x-8)$

$x > -4, \quad x > 4$

$\log_7 \frac{(x^2-16)}{(x^2-2x-8)}$

$\log_7 \frac{(x+4)(x-4)}{(x-4)(x+2)}$

$\log_7 \left[\frac{(x+4)}{(x+2)}\right]$

$x > 4$ or $x < -4$

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Logarithm Quiz #3

1. When Mr. Abra gets his morning coffee at exactly 8:00, he calculates its temperature by the function:

$$T = 60(0.9)^{t/5} + 20$$

where T is temperature in °C, and t is time in minutes.

a) What is the initial temperature at 8:00 AM?

$t = 0$ $\quad$ $T = 80°C$

b) If he can drink it only after it has cooled to 43°C, how long must he wait? (to the nearest minute)

$T = 43°C$ . . . . $t = 45.5$

c) Explain the meaning of the base of 0.9 in the function.

temp drops 10% every 5 min

2. Solve for x:

a) $\log_2(x-4) + \log_2(x+2) = 4$

$x > 4$ $\quad$ $x > -2$

$\log_2(x-4)(x+2) = 4$

$2^4 = (x-4)(x+2)$

$16 = x^2 - 2x - 8$

$0 = x^2 - 2x - 24$

$0 = (x-6)(x+4)$

$x = 6$ $\quad$ ~~$x = -4$~~

$x = 6$

b) $\log_x 8 = \frac{1}{2}$

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

$\sqrt{x} = 8$

$x = 64$

3. Santa brought in a motivational speaker, so the Elves have been making toys at an exponential rate. On Dec 1st, they made 1000 toys, and each day they increase their production by 50%. How long until they make 10 million toys in a day? (to the nearest day)

4. ***Bonus items I've brought to the Christmas Hamper Drive:***

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Exponents & Logarithms Quiz#3

1. When Mr. Abra gets his morning coffee at exactly 8:00, he calculates its temperature by the function:

$$T = 60(0.9)^{t/5} + 20$$

where T is temperature in °C, and t is time in minutes.

a) What is the initial temperature at 8:00 AM?

$t=0 \Rightarrow T = 60(0.9)^0 + 20 \rightarrow T = 80°C$

b) If he can drink it only after it has cooled to 43°C, how long must he wait?

$43 = 60(0.9)^{\frac{t}{5}} + 20$

$23 = 60(0.9)^{\frac{t}{5}}$

$\frac{23}{60} = 0.9^{\frac{t}{5}}$

$\log\frac{23}{60} = \log 0.9^{\frac{t}{5}}$

$\frac{\log(\frac{23}{60})}{\log 0.9} = \frac{t}{5}$

$t = \frac{5\log(\frac{23}{60})}{\log 0.9} = 45.5$ minutes

wow that's a long time...

c) Explain the meaning of the base of 0.9 in the function.

the drink cools by 10% every 5 minutes

d) Explain the meaning of the + 20 in the function.

room temp is 20°C

2. Solve for x:

a) $\log_2(x-6) + \log_2(x-8) = 3$

$x>6$ $x>8$

$\log_2(x-6)(x-8) = 3$

$2^3 = (x-6)(x-8)$

$8 = x^2 - 8x - 6x + 48$

$0 = x^2 - 14x + 40$

$0 = (x-10)(x-4)$

$x = 10$ or ~~$x = 4$~~

b) $\log_x 9 = \frac{1}{2}$

$x^{\frac{1}{2}} = 9$

$\sqrt{x} = 9$

$x = 81$

3. Using the facts that $\log_2 3 = x$ and $\log_2 5 = y$, express the following as functions of x and/or y:

a) $\log_2 45 =$

$\log_2 5 + \log_2 9$

y

$y = \log_2 3^2$

$y = 2\log_2 3$

$y = 2x$

b) $\log_2 50 =$

$\log_2 2 + \log_2 25$

$1 + \log_2 5^2$

$1 + 2\log_2 5$

$1 + 2y$

c) $\log_2(0.8) =$

$2^x = 0.8$

$\log_2\left(\frac{8}{10}\right)$

$\log_2 8 - \log_2 10$

$3 - \log_2 5 + \log_2 2$

1

$4 - y$

d) $\log_2\left(2\sqrt{15}\right) =$

$\log_2 2 + \log_2 \sqrt{15}$

$1 + \frac{1}{2}\log_2 15$

$1 + \frac{1}{2}((\log 5) + (\log 3))$

$+ \quad +$

$1 + \frac{1}{2}(y + x)$

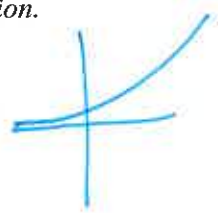
$1 + \frac{1}{2}y + \frac{1}{2}x$

log(-(x-p)

Name: _____ Class: _____ Date: _____ ID: A

Exponents & Logs Quiz#1

Multiple Choice
Identify the choice that best completes the statement or answers the question.



C 1. Which set of properties does the function $y = 2^x$ have?
- **A** no x-intercept, no y-intercept
- **B** x-intercept is 1, no y-intercept
- **C** no x-intercept, y-intercept is 1
- **D** x-intercept is 0, y-intercept is 0

D 2. A colony of ants has an initial population of 750 and triples every day. Which function can be used to model the ant population, p, after t days?
- **A** $p(t) = 3(750)^t$
- **B** $p(t) = \frac{1}{3}(750)^t$
- **C** $p(t) = 750\left(\frac{1}{3}\right)^t$
- **D** $p(t) = 750(3)^t$

D 3. To the nearest year, how long would an investment need to be left in the bank at 5%, compounded annually, for the investment to triple?
- **A** 15 years
- **B** 26 years
- **C** 28 years
- **D** 23 years

D 4. The equation $A = 90\left(\frac{1}{5}\right)^n$ can also be written as
- **A** $A = 90(5)^n$
- **B** $A = 45(5)^{-n}$
- **C** $A = 45(5)^n$
- **D** $A = 90(5)^{-n}$

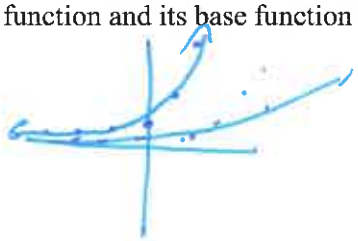
A 5. Which of the following transformations maps the function $y = 8^x$ onto the function $y = 8^{x+5} + 7$?
- **A** a horizontal shift of 5 units to the left and a vertical shift of 7 units up
- **B** a horizontal shift of 5 units to the right and a vertical shift of 7 units down
- **C** a horizontal shift of 5 units to the right and a vertical shift of 7 units up
- **D** a horizontal shift of 5 units to the left and a vertical shift of 7 units down

Name: _____ **ID: A**

Short Answer

1. For the function $y = \frac{1}{2}(3)^{x-2}$,

   a) sketch and label the function and its base function $y = 3^x$ on the same set of axes



x	y
-2	$\frac{1}{9}$
-1	$\frac{1}{3}$
0	1
1	3
2	9

x+2	0.5y
0	$\frac{1}{18}$
1	$\frac{1}{6}$
2	0.5
3	1.5
4	4.5

   b) state the domain, the range, and the equation of the asymptote for $y = \frac{1}{2}(3)^{x-2}$

Domain: $x \in \mathbb{R}$

Range: $y > 0$

~~Asymptote~~

$y = 0$