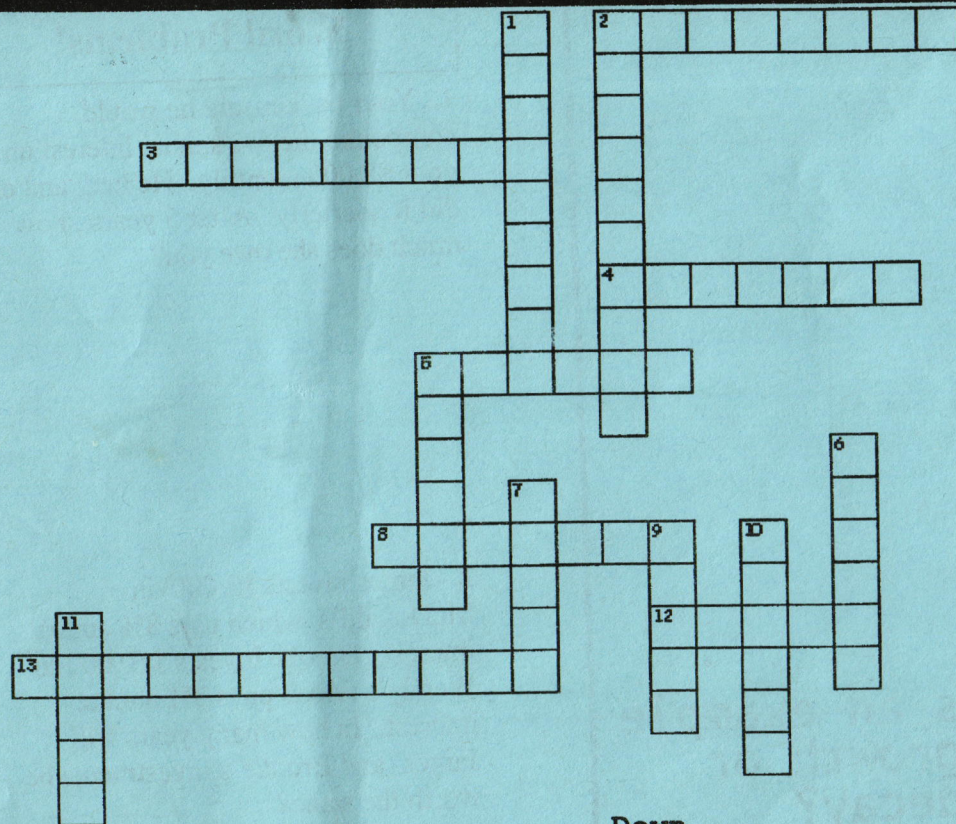


# VOCABULARY!!



## Across

2. When you take a bunch of logs with the same base being added and subtracted and write them as a single log.
3. "Log" is short for this word.
4. "LN" is an abbreviation for this type of log.
5. What you get when you take the log base 5 of 5 to the eleventh power.
8. What you get when you switch  $x$  &  $y$ , then resolve for  $y$ .
12. To get closer and closer to a number (algebraically) but never reach it.
13. Use the "shampoo" formula whenever you see this word.

## Down

1. To get closer and closer to a line (in a graph) but never reach it.
2. if you get interest yearly, but it is re-figured every month, we say that it is \_\_\_\_\_ monthly.
5. The opposite of "condense".
6. The amount of something is increasing at an exponential rate.
7. The amount of something is decreasing at an exponential rate.
9. The number "e" is named for this guy.
10. Log base ten is called this type of logarithm.
11. bald guy in the front of room, usually babbling on about math.

NAME:

# Logarithms and "e"

Simply:

1.  $\log_5 5$       2.  $\log_5 25^x$

3.  $\log_2 8$       4.  $\text{LN } e$

5.  $\log_\pi 1$       6.  $\log_5 \frac{1}{25}$

7.  $e^{\text{LN } 72}$       8.  $e^{\text{LN } e^x}$

9.  $e^{12}e^{-5}$       10.  $\frac{36e^{4y}}{24e^{6y}}$



## Expand or Condense

### Condense:

- $7\log_x 2 - 3\log_x 5$
- $y\log_e 3 + x\log_e 7$
- $A\log_x 3 - (2\log_x 4 + 5\log_x y)$
- $4\log x + 6(\log x - \log z)$

### Expand:

- $\log_4 \frac{x^{12}y^2}{A^B}$
- $\ln \frac{e^2}{7}$
- $\log_2 \frac{2^x}{\sqrt{4}}$

## FIND THE INVERSE

- $y = \log_3 x$
- $y = \ln 18x$
- $y = \ln(x+4)$
- $y = \log_6(x-5)$

Is this an example of growth or decay?

- $y = 15e^{4x}$
- $y = 7(0.38)^{5x}$
- $y = \frac{1}{2}4^{-6x}$
- $y = 2\left(\frac{1}{2}\right)^{-x}$

## Everyone's favorite... Word Problems!

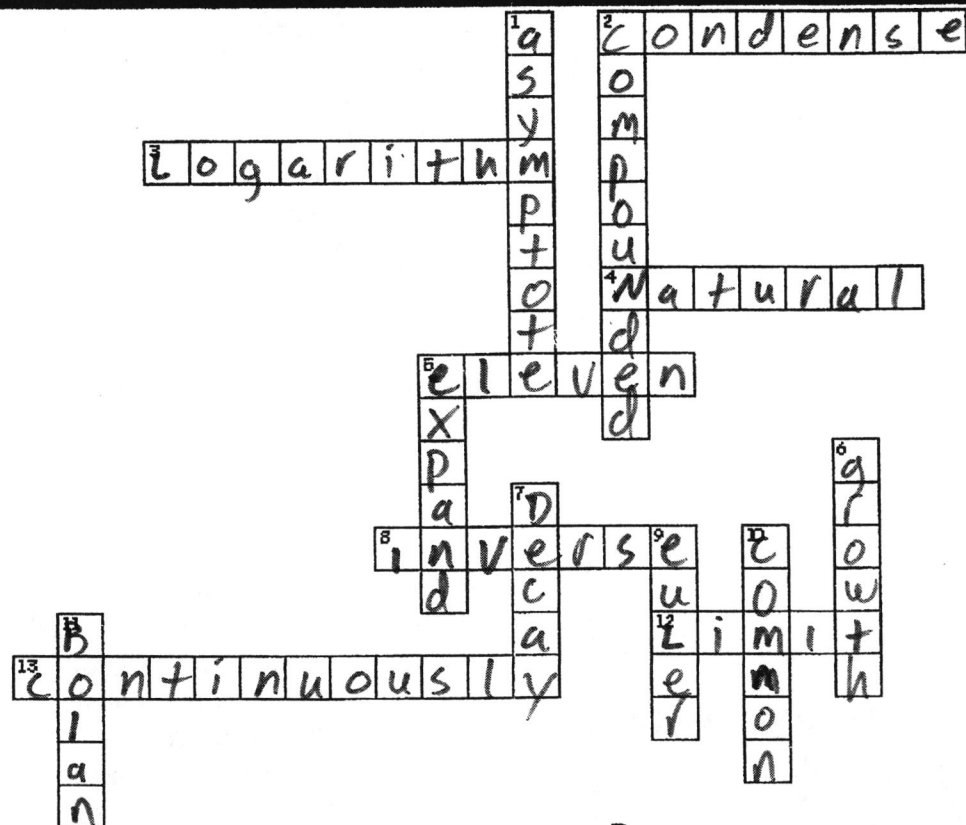
1. Your banker said he would compound the 6% annual interest on your \$8,000 monthly. He lied, and only did it quarterly. After 5 years, how much does she owe you?

2. James invests \$2,000 in McDonald's which pays 8% annual interest. Brooke invests \$10,000 in Wendy's which pays 3% annual interest. In how many years will James' and Brooke's investments be worth the same?

3. The fungi population of Jack's locker grows continuously at a daily rate of 7%. If there are 2 spores in there now, how many will there be in 10 days?



# VOCABULARY!!



## Across

- When you take a bunch of logs with the same base being added and subtracted and write them as a single log.
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NAME:

# Logarithms and "e"

Simply:

1.  $\log_5 5$

1

2.  $\log_5 25^x$

$2x$

3.  $\log_2 8$

3

4.  $\text{LN } e$

1

5.  $\log_\pi 1$

0

6.  $\log_5 \frac{1}{25}$

-2

7.  $e^{\text{LN } 72}$

72

8.  $e^{\text{LN } e^x}$

$e^x$

9.  $e^{12} e^{-5}$

$e^7$

10.  $\frac{36e^{4y}}{24e^{6y}}$

$\frac{3}{2e^{2y}}$

# Expand or Condense

## Condense:

1.  $7\log_x 2 - 3\log_x 5$

$$\log_x \frac{2^7}{5^3} \text{ or } \log_x \frac{128}{125}$$

2.  $y\log_e 3 + x\log_e 7$

$$\ln \frac{3^y}{7^x}$$

3.  $4\log_x 3 - (2\log_x 4 + 5\log_x y)$

$$\log_x \frac{3^4}{16y^5}$$

4.  $4\log x + 6(\log x - \log z)$

$$\log \frac{x^{10}}{z^6}$$

## Expand:

5.  $\log_4 \frac{x^{12}y^2}{A^B}$

$$12\log_4 x + 2\log_4 y - 8\log_4 A$$

6.  $\ln \frac{e^2}{7}$

$$2\ln e - \ln 7 \text{ or } 2 - \ln 7$$

7.  $\log_2 \frac{2^x}{\sqrt{4}}$

$$x\log_2 2 - \frac{1}{2}\log_2 4 = x - 1$$

# FIND THE INVERSE

1.  $y = \log_3 x \quad x = \log_3 y$

$$3^x = y$$

2.  $y = \ln 18x \quad x = \ln 18y$

$$e^x = 18y \rightarrow y = \frac{e^x}{18}$$

3.  $y = \ln(x+4)$

$$x = \ln(y+4)$$

$$e^x = y+4 \rightarrow y = e^x - 4$$

4.  $y = \log_6(x-5)$

$$x = \log_6(y-5)$$

$$6^x = y-5 \rightarrow y = 6^x + 5$$

Is this an example of growth or decay?

5.  $y = 15e^{4x}$

growth

6.  $y = 7(0.38)^{5x}$

Decay

7.  $y = \frac{1}{2}4^{-6x}$

Decay

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

Growth

# Everyone's favorite... Word Problems!

1. Your banker said he would compound the 6% annual interest on your \$8,000 monthly. He lied, and only did it quarterly. After 5 years, how much does she owe you?

$$8000(1 + \frac{.06}{12})^{5 \cdot 12} \text{ vs. } 8000(1 + \frac{.06}{4})^{5 \cdot 4}$$

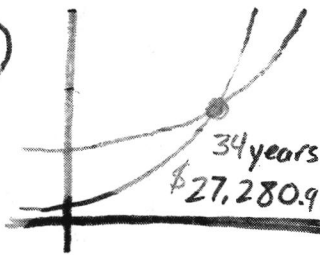
$$\$10,790.80 - \$10,774.84$$

$$\$15.96$$

2. James invests \$2,000 in McDonald's which pays 8% annual interest. Brooke invests \$10,000 in Wendy's which pays 3% annual interest. In how many years will James' and Brooke's investments be worth the same?

$$\text{James: } 2,000(1.08)^x$$

$$\text{Brooke: } 10,000(1.03)^x$$



3. The fungi population of Jack's locker grows continuously at a daily rate of 7%. If there are 2 spores in there now, how many will there be in 10 days?

$$Pe^{rt} \rightarrow 2e^{.07 \cdot 10}$$

4 spores.