GRADE 12 APPLIED
UNIT C – FUNCTIONS
LOGARITHMS

Name: _____
Date: _____

A logarithm is an *undo* of an exponent. Just like a divide by 5 undoes a multiply by 5, and just like how a square root undoes a square.

Complete the tables (*manually*?) May need to count using fingers!

x	$y = 2^x$
-1	
0	
1	
2	
	8
	16
6	
	512
$\log_2 y$	y

x	$y = 5^x$
-2	
-1	
0	
1	
	25
	125
	15625
	625
$\log_5 y$	y

You get a value by putting some exponent on a base number: value = b^x

A '**$\log_b$**' , pronounced '*log base b*' is the exponent that you put on a base number to get a certain value. $\log_b(\text{value}) = x$

So if $y = b^x$; then $x = \log_b y$ is how we say it mathematically!

If you don't like this conceptual thinking then just trust what the calculator says! The conceptual abstract thinking is usually the Pre-Calculus thinking if you want to be a nurse or scientist or engineer,etc. Or if you just want to exercise your brain.

Guess, estimate the value of $\log_5(100)$
Check it by calculating the exponent form. $5^{\text{guess}} = 100$?

Guess, estimate the value of $\log_2(17)$
Check it by calculating the exponent form. $2^{\text{guess}} = 17$?

Guess, estimate the value of $\log_{10}(50)$
Check it by calculating the exponent form

$Log_{10}x$ are easy, you have a **button** on your calculator does those! LOG

a. $\log_{10}100$ = b. $\log_{10}(1000)$ =

c. $\log_{10}$ 0.1 = d. $\log_{10}1$ =

e. log1000000 f. log50

g. log (20) h. log200

i. log2000 j. log 0.5

k. log0.05 j. log(0.005)

k. log (0) WTH? How many tens multiply or divide to make zero?

Sometimes we use brackets () in the logarithm notation sometimes we do not. If the base is not indicated then we assume it is the base 10.

What is the value of $\log_2(18)$?
No button on calculator does that! But we can calculate it by using base 10, we can change the base by using the formula:

$$log_c x = \frac{log_{10} x}{log_{10} c}$$

The Change of Base formula for logarithms!

$log_2 18 = \frac{log_{10} 18}{log_{10} 2}$= _____
Check it in the exponent form: 2^{answer} = 18?

Calculate the following using the change of base formula, and check answer using the exponential form.

a. $\log_2 32$ = b. $\log_5 25$= c. $\log_3 27$ =

d. $\log_4 30$ = d. $\log_7 48$ = e. $\log_7 50$=

f. $log_5\left(\frac{1}{5}\right)$= g. $log_2\left(\frac{1}{4}\right)$= h. $log_5(0.2)$=

i. $log_2(0.25)$ You invent a few! Play!