L27
11.5
Change of base and Common Logs
4.5.16

Warm-up

1) Expand $\log\frac{x^4y}{3z}$

2) Condense: $(logx + logy + log3) - (logx + 2logy + logz)$

Given that log7=.8451, evaluate the logarithm.

log7,000,000

Split up the log	$log7{,}000{,}000 = log7 + log1{,}000{,}000$
Substitute with the given values.	$\log(7 \cdot 1{,}000{,}000)$ $= log7 + log1{,}000{,}000$ $= .8451 + log10^6$ $= .8451 + 6$ $= 6.8451$

We Try:

Given that log7=.8451, evaluate the logarithm.

Log.0007

Split up the log	
Substitute with the given values.	

You Try:

Given that log7=.8451, evaluate the logarithm.

Log49

Split up the log	
Substitute with the given values.	

Evaluate the expression.

$log5(2)^3$

Split up the logs	$log5 + log2^3$ $log5 + 3log2$
Use a calculator to evaluate the logs.	.6990+3(.3010)
Simplify	1.6021

We Try:

$\log\left(\frac{19^2}{6}\right)$

Split up the logs	
Use a calculator to evaluate the logs.	
Simplify	

You Try:

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

Change of Base Formula	If a, b, and n are positive numbers and neither a nor b is 1, then the following equation is true. $$\log_a n = \frac{\log_b n}{\log_b a}$$

I Try:

Find the value of $log_9 1043$ using the change of base formula.

$$log_9 1043 = \frac{log_{10} 1043}{log_{10} 9}$$

Use the change of base formula.	$log_9 1043 = \frac{log_{10} 1043}{log_{10} 9}$
Use a calculator to evaluate.	$\frac{3.0183}{.9542}$ $= 3.1632$

We Try:

Find the value of $log_8 1283$ using the change of base formula.

Use the change of base formula.	$log_8 1283 =$
Use a calculator to evaluate.	

You Try:

Find the value of $log_2 392$ using the change of base formula.

Use the change of base formula.	$log_2 392 =$
Use a calculator to evaluate.	

Use logarithms to solve exponential equations.

$Solve\ 6^{3x} = 81$

Take log to both sides	$log6^{3x} = log81$
Use the power property.	$3x\ log6 = log81$
Divide both sides by the log	$3x = \frac{log81}{log6}$
Use a calculator to evaluate the logs	$3x = 2.452$ $x = .8175$

We Try:

$Solve\ 2^{4x} = 24$

Take log to both sides	
Use the power property.	
Divide both sides by the log	
Use a calculator to evaluate the logs	

What are the restrictions to b?

$log_b x$

Solve $3log_x 6 + 1 > 4$

Isolate log	
Raise both sides by the base	
Solve for x	
Check for restrictions	

You Try:
Solve for $log_2 x < -3$

Isolate log	
Raise both sides by the base	
Solve for x	
Check for restrictions	

$2^x = 95$

Isolate log	
Raise both sides by the base	
Solve for x	

Check for restrictions	