Algebra 2   7.6
Solve exponential equations and inequalities using common logs
Evaluate logarithmic expressions by changing bases

base
exponent
logarithm
default
common log (default base)
Whiteboards

$\log_{10} 100 = 2$

$10^2 = 100$

Base 10

Use a calculator to evaluate each expression to the nearest ten-thousandth.

a. $\log_{10} 5$ 0.6990

-0.5229

b. $\log_{10} 0.3$

deferent

$\boxed{\text{Log}}$

23. $8^x = 40$

$$8^{1.7740} =$$

$$\log \cdot 8^{(x)} = \log \cdot 40$$

$$\frac{x \cdot 0.9031}{0.9031} = \frac{1.6021}{0.9031}$$

$$\boxed{x = 1.7740}$$

Can we get the bases the same?

26. $9^{b-1} = 7^b$

$$\log 9^{(b-1)} = \log 7^{(b)}$$

$$(b-1)\, 0.9542 = b\, 0.8451$$

$$0.9542\, b - 0.9542 = 0.8451\, b$$

$$-0.8451\, b$$

$$0.1091\, b = 0.9542$$

$$b = 8.7461$$

1. Write in exp form
2. log (base 10) each side to solve

Example 5 Change of Base Formula → base 10

Express $\log_3 20$ in terms of common logarithms. Then round to the nearest ten-thousandth.

$\log_3 20 = x$

$\log_3 20 = x$

$\log 3^x = \log 20$

$0.4771 x = 1.3010$

$\underline{}\ .4771 \qquad \underline{}\ .4771$

$\boxed{x = 2.7270}$

$3^{2.7270} =$

$$17^1 = 17$$
$$17^2 = 289$$
$$17^3 = 4913$$

17?=400

Guess and check...

$$\log 17^x = \log 400$$
$$x(\quad) = (\quad)$$
$$x = 2.1147$$

13?=1093

7?=40

Express each logarithm in terms of common logarithms. Then approximate its value to the nearest ten-thousandth.

33. $\log_7 18$

36. $\log_4 9$

5. Express $\log_6 8$ in terms of common logarithms. Then round to the nearest ten-thousandth.

Can we get the bases to be the same?
Always do the same thing to both sides...

Example 4 Solve Exponential Inequalities Using Logarithms

Solve $3^{5y} < 7^{y-2}$. Round to the nearest ten-thousandth.

$$5y \log 3 < (y-2) \log 7$$

17-37 org