

Don't write anything, take a moment to look at the given list. **Silently** see if you can figure out what is going on

$$2^3 = 8 \quad \text{power}_2(8) = 3$$

$$2^5 = 32 \quad \text{power}_2(32) = 5$$

$$3^2 = 9 \quad \text{power}_3(9) = 2$$

$$3^4 = 81 \quad \text{power}_3(81) = 4$$

$$5^2 = 25 \quad \text{power}_5(25) = 2$$

$$\text{power}_2(16) = \underline{4}$$

$$2^4 = 16$$

$$\text{power}_{10}\left(\frac{1}{1000}\right) = \underline{-3}$$

$$\text{eg } 10^{-3} = 1/1000$$

$$\text{power}_6(36) = \underline{2}$$

$$6^2 = 36$$

$$\text{power}_9(81) = 2$$

$$9^2 = 81$$

$$\text{power}_5(\underline{125}) = 3$$

$$5^3 = 125$$

$$\text{power}_3(81) = 4$$

$$3^4 = 81$$

$$\text{power}_2\left(\underline{\frac{1}{2}}\right) = -1$$

$$2^{-1} = \frac{1}{2}$$

$$\text{power}_{16}(\underline{64}) = \frac{3}{2}$$

Def: A logarithm is an alternative way to write an exponent

1. $\log_2(32) = 5$

Same as $2^5 = 32$

Say: log base 2 of 32 is 5

2. $\log_3(27) = 3$

Same as $3^3 = 27$

Say: log base 3 of 27 is 3

Switching Forms:

$$\log_b N = x$$

"log form"

$$b^x = N$$

"exponential form"

$\log_{\text{base}}^{\text{answer}} = \text{exponent}$

$\text{base}^{\text{exponent}} = \text{answer}$

$$b^x = a \Leftrightarrow \log_b a = x$$

Find x:

Using logarithms to solve for an unknown exponent: $10^x = 398$

using guess and check:

$$10^1 = 10$$

$$10^2 = 100$$

$$10^3 = 1000$$

$$10^{2.5} = 316$$

$$10^{2.7} = 501$$

$$10^{2.6} = 398$$

using logs:

$10^x = 398$ means

$$\log_{10} 398 = x$$

$$2.6 = x$$

if no base is given
in a log problem, it is
10!!!

$$\log 4 = x \rightarrow 10^x = 4$$

$$\log 4 = \log_{10} 4$$

Write $2^5 = 32$ in log form

Write $8^{\frac{2}{3}} = 4$ in log form

Solve $\log_3 27$

Solve for b: $\log_b 32 = \frac{5}{2}$

e: Rewrite the following in logarithmic form:

$$2^3$$

$$= 2^{-2}$$

e: Rewrite the following in exponential form:

$$32 = 5$$

$$1/2 = -1$$

Practice:

5. Solve for x
 $\log_7 x = 2$

6. Solve for x
 $\log_{-4} x = -$

7. Solve for x
 $\log_3 x = -$

8. Solve for x
 $\log_x 9 = 2$

9. Solve for x
 $\log_x 5 = 1$

