



Solving Exponential Equations

(with like bases)

Exponential Property:

if $b^x = b^y$ then $x = y$

Example: if $4^x = 16$ then what must 'x' be?

if $b^x = b^y$
then $x = y$
o

Ex 1:

$$\boxed{7}^{2x} = \boxed{7}^{3x-5}$$

Check
 $7^{10} = 7^{10}$

$$2x = 3x - 5$$

$$-x = -5$$

$$\boxed{x = 5} \checkmark$$

if $b^x = b^y$
then $x = y$
o

Ex 2:

$$\underline{5}^{4m} = \underline{125}^{m+2}$$

Can I express 125 as
a power of 5? $5^3 = 125$

$$5^{4m} = (5^3)^{m+2} \quad \text{Power of a Power}$$

$$\boxed{5}^{4m} = \boxed{5}^{3m+6}$$

$$4m = 3m + 6$$

$$\boxed{m = 6}$$

if $b^x = b^y$
then $x = y$

Ex 3:

$$9^x = 27$$

what common base is there for 9 & 27? (3^2)

$$3^2 = 9 \quad \& \quad 3^3 = 27$$

$$(3^2)^x = (3^3)$$

$$\boxed{3^{2x}} = \boxed{3^3} \rightarrow \begin{matrix} 2x = 3 \\ \boxed{x = 3/2} \end{matrix}$$

Ex 4:

$$\circ \quad \left(\frac{1}{2}\right)^x = 16^{3x-1}$$

$$(2^{-1})^x = (2^4)^{3x-1}$$

$$\boxed{2^{-x}} = \boxed{2^{12x-4}}$$

$$-x = 12x - 4$$

$$-13x = -4 \quad \boxed{x = 4/13}$$