* Unit 4 test will be on Thurs (April 23)

Minds on: Determine the value of x that makes $2^6 = 2^{2x+4}$ true or satisfies the equation.

* Since they have common base of 2, we can say:

$6 = 2x + 4$

$6 - 4 = 2x$ → $\dfrac{2}{2} = \dfrac{2x}{2}$ → ∴ $x = 1$

$1 = x$

Example 1 Solve $2^{3x} = 2^{2x+4}$

$3x = 2x + 4$

$3x - 2x = 4$

$x = 4$

$* \ b^x$ → exponent
      ↳ base

Example 2 Solve $4^x = 2^{x+3}$ (We do not have common base number)

(Hint: think exponent rules)

$4^x = (2^2)^x = 2^{2x}$ (you must change 4^x to another number
                              which has same base number as 2^{x+3})

∴ $2^{2x} = 2^{x+3}$

∴ $2x = x + 3$ → $2x - x = 3$ → $x = 3$

Example 3 Solve $8^{x-2} = 2^{x+4}$ (Do these have same base number?)

No! So   we must change 8^{x-2} into another number with base
number of 2.   → $8 = 2^3$

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

$2^{3x-6} = 2^{x+4}$

$3x - 6 = x + 4$ $\dfrac{2x}{2} = \dfrac{10}{2}$

$3x - x = 4 + 6$ ∴ $x = 5$

$2x = 10$

Therefore,

| If the bases are the same, the exponents must be the same. $b^a = b^x$ → $a = x$ |

1. $4^{x+1} = 2^{x-1}$

$(2^2)^{x+1} = 2^{x-1}$

$2^{2x+2} = 2^{x-1}$

$2x+2 = x-1$

$2x - x = -1 - 2$

$\therefore x = -3$

2. $9^{3x+1} = 27^x$

$(3^2)^{3x+1} = (3^3)^x$

$3^{6x+2} = 3^{3x}$

$6x+2 = 3x$

$6x - 3x = -2$

$\dfrac{3x}{3} = \dfrac{-2}{3}$

$x = \dfrac{-2}{3}$

3. $5^{2n+1} = \dfrac{1}{125}$ $* \dfrac{1}{5^3} = 5^{-3}$

$* \ 125 = 5 \times 5 \times 5 = 5^3$

$5^{2n+1} = 5^{-3}$

$2n+1 = -3$

$2n = -3 - 1$

$\dfrac{2n}{2} = \dfrac{-4}{2}$

$\therefore n = -2$

4. $\left(\dfrac{3}{2}\right)^{\frac{m}{2}} = \left(\dfrac{4}{9}\right)$

$* \ \dfrac{4}{9} = \left(\dfrac{2}{3}\right)^2 = \left(\dfrac{3}{2}\right)^{-2}$ (right side

$\left(\dfrac{3}{2}\right)^{\frac{m}{2}} = \left(\dfrac{3}{2}\right)^{-2}$

$2 \times \dfrac{m}{2} = -2 \times 2$

$\therefore m = -4$

5. $\left(\dfrac{2^{2x+1}}{2^{x-3}}\right) = 4$

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

$2x+1 - (x-3) = 2$

$2x+1 - x + 3 = 2$

$x + 4 = 2$

$x = 2 - 4$

$\therefore x = -2$

* HW is worksheet

6. $3^{x+2} - 3^x = 216$

$* \ 3^{x+2} = 3^x \cdot 3^2$

$3^x(3^2) - 3^x = 216$

$9 \cdot 3^x - 3^x = 216$

$* \ 9A - A = 8A \qquad * \ 3^x = A$

$\dfrac{8 \cdot 3^x}{8} = \dfrac{216}{8}$

$3^x = 27$

$3^x = 3^3$

$\therefore x = 3$

Key Concepts: $y = ab^x$ (exponential growth)

① As x (independent variable) increase by constant amount, the y (dependent variable) increase by a common factor (b)

② The ratio of $\dfrac{\Delta y}{y}$ is constant in exponential growth.

③ The first difference is not same. (except when $y = 1^x$)

④ Sometimes it makes sense to restrict the domain of an exponential model based on the situation.

⑤ First differences change by "b".

P185 #3a) y int = -2 $\rightarrow$ $y = -2b^x$

First Day Branding Activity!

Get into groups of 3 people. In groups, you will be given a random image. This image is your logo for your group company! Your task is to assess the image and determine it's meaning and what it is supposed to best represent. From that you will create the following with your team:

1) Company Name
2) Company Description (2-3 sentences) – ie: what do you do? What do you sell?
3) Company Slogan (one short sentence) ie: I'm lovin' it!
4) The meaning of your logo (why does this logo represent your company?)
5) Company Jingle – can be a rap, song – be creative and have fun!

Yes… you will present this in your groups at the end today!