Good morning

-All cell phones in holder

-Quiz tomorrow!

Solving Exponential Equations

To solve an exponential equation, create common bases and set the exponents equal to each other and solve.

<u>**BASIC EXPONENTIALS:**</u> *To work the following, set the exponents equal to each other and solve.*

1) $X^{3x+8} = X^{2x-5}$

$$3x+8 = 2x-5$$
$$x+8 = -5$$
$$\boxed{x = -13}$$

2) $X^{-2x} = X^{3x-10}$

$$-2x = +3x-10$$
$$-5x = -10$$
$$\boxed{x = 2}$$

<u>**A LITTLE LESS BASIC EXPONENTIALS:**</u> *To work these, you will need to rewrite the terms using the same base, then solve.*
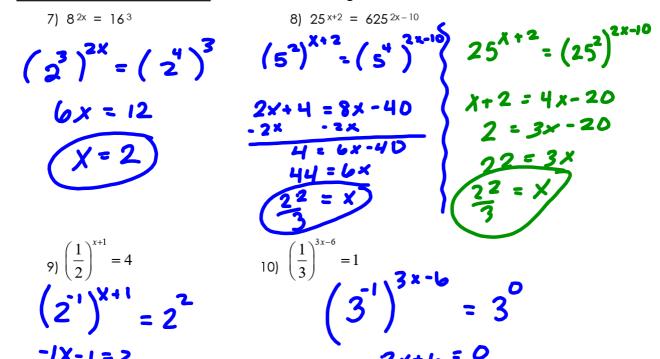
3) $2^{2x} = 8^4$

$$2^{2x} = (2^3)^4$$
$$2x = 12$$
$$\boxed{x = 6}$$

4) $3^{x+3} = 27^2$

$$3^{x+3} = (3^3)^2$$
$$x+3 = 6$$
$$\boxed{x = 3}$$

5) $125^{3x} = 5^{4x+10}$

$$(5^3)^{3x} = 5^{4x+10}$$
$$9x = 4x+10$$
$$5x = 10 \quad \boxed{x=2}$$

6) $64^{2x-3} = 4$

$$(4^3)^{2x-3} = 4^1$$
$$6x-9 = 1$$
$$6x = 10$$
$$\boxed{x = \frac{5}{3}}$$

NOT SO BASIC EXPONENTIALS: *Rewrite both sides using the same base, then solve for x.*

7) $8^{2x} = 16^3$

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

$$6x = 12$$

$$\boxed{x = 2}$$

8) $25^{x+2} = 625^{2x-10}$

$$\left(5^2\right)^{x+2} = \left(5^4\right)^{2x-10}$$

$$2x+4 = 8x-40$$
$$-2x \qquad -2x$$
$$\overline{\qquad\qquad}$$
$$4 = 6x-40$$
$$44 = 6x$$
$$\boxed{\frac{22}{3} = x}$$

$$25^{x+2} = \left(25^2\right)^{2x-10}$$

$$x+2 = 4x-20$$
$$2 = 3x-20$$
$$22 = 3x$$
$$\boxed{\frac{22}{3} = x}$$

9) $\left(\dfrac{1}{2}\right)^{x+1} = 4$

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

$$-1x-1 = 2$$
$$-1x = 3$$
$$\boxed{x = -3}$$

10) $\left(\dfrac{1}{3}\right)^{3x-6} = 1$

$$\left(3^{-1}\right)^{3x-6} = 3^0$$

$$-3x+6 = 0$$
$$-3x = -6$$
$$\boxed{x = 2}$$

3

Decay $A = P(1-r)^t$	Growth $A = P(1+r)^t$	Compounded Growth $A = P(1\pm\frac{r}{n})^{nt}$	Continuously Compounded $A = P$
A= result P= Principle (initial amount) R= rate in decimal (not %) T = time •		N = how many time it is compounded Monthly n = 12 Daily n = 365 Weekly n = 52 Quarterly n = 4	e natural occurring number approx. 2.72 (use the button o calculator) 2nd $\ln$
Coal was once a booming industry in central Pennsylvania. However, the industry has begun to decline. In the year 1950 about 600,000 were employed in the local coalmines. Since then the number of coalminers has declined by 2% every year. How many coal workers were/will be employed in the year 1962? $r = .02$ $t = 12$ $600000(1-.02)^{12}$ **470,830 Coal miner**	You have inherited land that was purchased for $30,000 in 1960. The value of the land increased by approximately 5% per year. What is the approximate value of the land in the year 2011? $r = .05$ $t = 51$ $30.000(1+.05)^{51}$ **$361,223.09**	You deposit $1600 in a bank account. Find the balance after 3 years for each of the following situations: a. The account pays 2.5% annual interest compounded monthly. (12·3) $1600(1+\frac{.025}{12})$ 1724.46 b. The account pays 1.75% annual interest compounded quarterly. $1600(1+\frac{.0175}{4})^{4·3}$ **$1686.05**	If you deposited $1000 into a savings account earning 6% annu interest and was compounded continuously. How much would you save after 5 years? $1000e^{(.06·5)}$ **$1349.86**
Extra Examples: 1. Each year the local country club sponsors a tennis tournament. Play starts with 128 participants. During each round, half of the players are eliminated. How many players remain after 5 rounds? 50% .5 $128(1-.5)^5$ **4 players**		2. Find the initial amount a bank account if the account has an annu rate of 4%, and the money left in the account for 12 years totaled $400. $\frac{400}{(1.04)^{12}} = P(1+.04)^{12}$ **$249.84**	