CHAPTER 7: EXPONENTS AND EXPONENTIAL FUNCTIONS

7.1

APPLY EXPONENT PROPERTIES INVOLVING PRODUCTS

Exponents

- Exponent – the _____ the _____ is _____

- EX:

1) Product of Powers Property

- When you _____, _____
  the _____.
- EX:

EX:

- Simplify the expression. Write your answer using exponents.
- $(-7)^2(-7)^8$

- $x^2 \cdot x^6 \cdot x$

2) Power of a Power Property

- When you _____,
  _____ the _____.
- EX:

EX:

- Simplify the expression. Write your answer using exponents.

- $(4^2)^7$

- $[(-2)^4]^5$

- $[(m + 1)^6]^3$

3) Power of a Product Property

- When a _____ is _____ _____, raise _____ to the _____.

- EX:

EX:

- Simplify each expression. Write your answer using exponents.
- $(20 \cdot 17)^3$

EX: Simplify each expression.

- $(-4x)^2$ $(2x^3)^2 \cdot x^4$

- $-(4x)^2$

□ $(-10x^6)^2 \cdot x^2$

□ $(3x^5)^3(2x^7)^2$

Order of Magnitude

- The **order of magnitude** of a quantity is the _____ that is _____ to the _____of the quantity.
    - An _____
- EX:

EX:

- A box of staples contains 10^4 stables. How many stables do 10^2 boxes contain?

EX:

- There are about 1 billion grains of sand in 1 cubic foot of sand. Use order of magnitude to find about how many grains of sand are in 25 million cubic feet of sand.

7.2
APPLY EXPONENT PROPERTIES INVOLVING QUOTIENTS

1) Quotient of Powers Property

- When _____ with _____, _____ the _____.

- EX:

EX:

- Simplify the expression. Write your answer using exponents.

- $$\frac{(-4)^9}{(-4)^2}$$

- $$\frac{9^4 \cdot 9^3}{9^2}$$

2) Power of a Quotient Property

- When a _____ is _____ _____, raise _____ the _____ and the _____ to the power and _____ if possible.
- EX:

EX: Simplify the Expression.

- $(-7/x)^2$

- $(x^2/4y)^2$

- $(-5/y)^3$

☐ $(2s/3t)^3 \cdot (t^5/16)$ ☐ $(3x^2/3y^3)^2$

EX:

- The order of magnitude of the brightness of the Milky Way is 10^{36} watts. The order of magnitude of the brightness of a gamma ray burster is 10^{45} watts. How many times brighter is the gamma ray burster than the Milky Way?

- http://www.youtube.com/watch?v=P2ESs1rPO_A

7.3

DEFINE AND USE ZERO AND NEGATIVE EXPONENTS

Zero Power

- Anything raised to the _____ is _____.
- EX:

- WHY:

Negative Exponents

- When you have a _____ in the _____:
    - Put it in the _____ and make it _____.
    - EX:

- When you have a _____ in the _____:
    - Put it in the _____ and make it _____.
    - EX:
- NOTE: Negative exponents represent _____ numbers.

EX:
Evaluate the expression.

□ Write your answer using only positive exponents.

EX:
Simplify the expression.

- Write your answer using only positive exponents.

EX:

- The mass of one peppercorn is about 10^{-2} gram. About how many peppercorns are in a box containing 1kilogram of peppercorns?
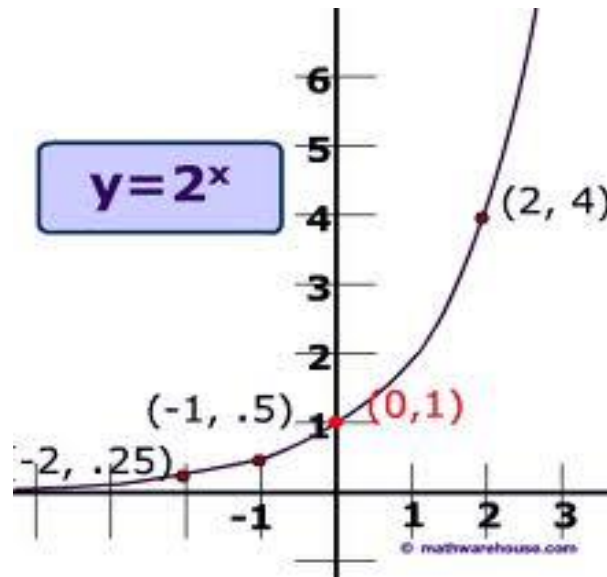
7.4
WRITE AND GRAPH EXPONENTIAL GROWTH FUNCTIONS

Exponential Functions

- An **exponential function** is a function in the form of:

  - EX:

- They are _____ functions.

  - They have graphs that are _____.

y=2ˣ

(2, 4)

(-1, .5) (0,1)

(-2, .25)

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Exponential Function Table

x	-2	-1	0	1	2
y	2	4	8	16	32

To write a rule for a function table:

- 1) Decide what _____ each _____ is being _____.
  - _____.
- 2) Find the _____ when _____.
  - _____.
- 3) Fill in _____ into _____.

EX: Write a rule for the function.

x	-2	-1	0	1	2
y	3	9	27	81	243

EX: Write a rule for the function.

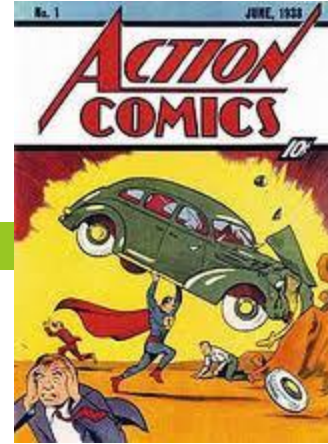| x	-2	-1	0	1	2
y	2/9	2/3	2	6	18

Exponential Growth

- When a quantity _____ by the _____ over _____.
  - EX: Each year the value of an antique car increases by 50%.

- Exponential growth is different from linear growth because _____ increases by the _____ each time interval, _____.

Exponential Growth Model

-

- a is the _____

- (1 + r) is the _____

- r is the _____

- t is the _____

EX:

□ The owner of an original copy of a 1938 comic book sold it at an auction in 2005. The owner bought the comic book for $55 in 1980. The value of the comic book increased at a rate of 2.8% per year.

- ◘ A) Write a function that models the value of the comic book over time.

- ◘ B) What was the approximate value of the comic book at the time of the auction in 2005? Round your answer to the nearest dollar.

Compound Interest

- Interest earned on both an _____ and on _____.

- EX: You put $125 in a savings account that earns 2% interest compounded yearly. What will the balance in your account be after 5 years?

7.5
WRITE AND GRAPH EXPONENTIAL DECAY FUNCTIONS

EX: Write a rule for the function.

x	-1	0	1	2
y	5	1	1/5	1/25

Exponential Decay

- When a quantity _____ by the _____ over _____.
  - EX: The number of acres of forests in the U.S. decreases by 0.5% each year.

Exponential Decay Model

-

- a is the _____
- (1-r) is the _____
- r is the _____
- t is the _____

EX:

- A farmer bought a tractor in 1999 for $30,000. The value of the tractor has been decreasing at a rate of 18% per year.
  - Write a function that models the value of the tractor over time.
  - What was the approximate value of the tractor in 2005?

Exponential Decay vs. Exponential Growth

Graph Examples: