CHAPTER 8: EXPONENTS AND FUNCTIONS

Date: Lesson:	Learning Log Title: 

Date:
Lesson:

Learning Log Title:

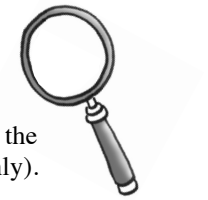
Date:
Lesson:

Learning Log Title:

Notes:

MATH NOTES

SIMPLE INTEREST



Simple interest is interest paid only on the original amount of the principal at each specified interval (such as annually, or monthly). The formula to calculate simple interest is:

$I = Prt$ where P = Principal
I = Interest
r = Rate
t = Time

Example: Theresa invested $1425.00 in a savings account at her local bank. The bank pays a simple interest rate of 3.5% annually. How much money will Theresa have after 4 years?

$I = Prt \quad \Rightarrow \quad I = 1425(0.035)(4) = \$199.50$

$\Rightarrow \quad P + I = \$1425 + \$199.50 = \$1624.50$

Theresa will have $1624.50 after 4 years.

EXPONENTS

Bases and exponents can be used to rewrite expressions that involve repeated multiplication by the same number or variable. The expression a^n is written in **exponent form**. The **base**, a, is a factor that is raised to a power. The **exponent**, n, is sometimes called the power. It shows how many times the base is used as a factor.

In general, a^n means a multiplied by itself n times.

For example, 2^4 means $2 \cdot 2 \cdot 2 \cdot 2$.

The base is 2 and the exponent is 4.

COMPOUND INTEREST

Compound interest is interest paid on both the original principal (amount of money at the start) and the interest earned previously.

The formula for compound interest is: $A = P(1+r)^n$ where

A = total amount including previous interest earned,
P = principal,
r = interest rate for each compounding period, and
n = number of time periods

Example: Theresa has a student loan that charges a 1.5% monthly compound interest rate. If she currently owes $1425.00 and does not make a payment for a year, how much will she owe at the end of the year (12 months)?

$A = P(1+r)^n \Rightarrow A = 1425(1+0.015)^{12}$

$\Rightarrow 1425(1.015)^{12} = 1425 \cdot 1.1956 = \$1703.73$

Theresa will owe $1703.73 after 12 months (1 year).

SCIENTIFIC NOTATION

Scientific notation is a way of writing very large and very small numbers compactly. A number is said to be in scientific notation when it is written as a product of two factors as described below.

The first factor is less than 10 and greater than or equal to 1.

The second factor has a base of 10 and an integer exponent.

The factors are separated by a multiplication sign.

Scientific Notation	**Standard Form**
5.32×10^{6}	5,320,000
3.07×10^{-4}	0.000307
2.61×10^{-15}	0.00000000000000261

Notes:

Notes:

LAWS OF EXPONENTS

Expressions that include exponents can be expanded into factored form and then rewritten in simplified exponent form.

Expression	**Factored Form**
$(5x)^3(2y)(x^2)y$	$5 \cdot x \cdot 5 \cdot x \cdot 5 \cdot x \cdot 2 \cdot y \cdot x \cdot x \cdot y$

Simplified Exponent Form

$$250x^5y^2$$

The **Laws of Exponents** summarize several rules for simplifying expressions that have exponents. The rules below are true if $x \neq 0$ and $y \neq 0$.

$x^a \cdot x^b = x^{(a+b)}$ $\quad (x^a)^b = x^{ab}$ $\quad \frac{x^a}{x^b} = x^{(a-b)}$

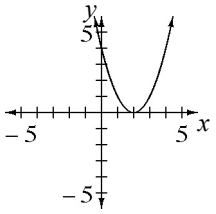
$x^0 = 1$ $\quad (x^a y^b)^c = x^{ac}y^{bc}$ $\quad x^{-a} = \frac{1}{x^a}$

FUNCTIONS

A relationship between inputs and outputs is a **function** if there is no more than one output for each input. A function is often written in a form where y is set equal to some expression involving x. In this "$y =$" form, x is the input and y is the output. Below is an example of a function.

$$y = (x-2)^2$$

x	–2	–1	0	1	2	3	4	5
y	16	9	4	1	0	1	4	9



In the example above the value of y depends on x. Therefore, y is called the **dependent variable** and x is called the **independent variable**.

The equation $x^2 + y^2 = 1$ is not a function because there are two y-values (outputs) for some x-values, as shown below.

$$x^2 + y^2 = 1$$

x	–1	0	0	1
y	0	–1	1	0