Exponents Exploration Name: _____

Prove your own properties! Period: _____

Power	Answer
2^5	
2^4	
2^3	
2^2	
2^1	

Power	Answer
3^5	
3^4	
3^3	
3^2	
3^1	

Power	Answer
4^5	
4^4	
4^3	
4^2	
4^1	

- Look at the tables above. What patterns do you see?

- Write your own "conjecture" about any number n raised to the 1^{st} power. Test your conjecture.

Utilizing the pattern that you found above, continue the tables below:

Power	Answer
2^0	
2^{-1}	
2^{-2}	
2^{-3}	
2^{-4}	

Power	Answer
3^0	
3^{-1}	
3^{-2}	
3^{-3}	
3^{-4}	

Power	Answer
4^0	
4^{-1}	
4^{-2}	
4^{-3}	
4^{-4}	

- What conjecture can you make about raising a number to the zero power?

- What does it mean to raise a number to a negative power?

Power	Answer
$4^{1/2}$	
$9^{1/2}$	
$16^{1/2}$	
$25^{1/2}$	
$36^{1/2}$	

Power	Answer
$4^{3/2}$	
$9^{3/2}$	
$16^{3/2}$	
$25^{3/2}$	
$36^{3/2}$	

Power	Answer
$0^{1/2}$	
$1^{1/2}$	
$2^{1/2}$	
$3^{1/2}$	
$5^{1/2}$	

- What conjecture can you make about raising a number to a fraction?

- What would happen if you raised a number to a NEGATIVE FRACTION?

Properties of exponents:
Expand first. Then, re-write as a new power:

1) $3^4 \bullet 3^5$

2) $x^8 \bullet x^5$

Property: $a^m \bullet a^n =$

3) $\frac{3^8}{3^2}$

4) $\frac{x^{12}}{x^7}$

Property: $\frac{a^m}{a^n} =$

5) $\frac{x^5}{x^5} = x^? =$

Property: $a^0 =$, $a \neq$

6) $\frac{x^5}{x^8} = x^? =$

Property: $a^{-n} =$

7) $(3^2)^4$

8) $(x^4)^6$

Property: $(a^m)^n =$

9) $(3x^2y)^4$

Property: $(a \bullet b)^n =$

10) $\left(\frac{5x^3}{y^4}\right)^2$

Property: $\left(\frac{a}{b}\right)^n =$

11) $3^{1/2}$

12) $16^{1/4}$

Property: $a^{1/n} =$

13) $9^{3/2}$

14) $x^{3/5}$

Property: $a^{m/n} =$

The formula below is used to estimate a person's surface area based on his or her weight and height. This formula is used to calculate dosages for certain medications:

$$S = 0.007184 \times W^{0.425} \times H^{0.725}$$

15) Estimate, to the nearest 10^{th} of a square meter, the surface area of a person who stands 152.5 centimeters tall and weighs 57.2 kilograms