EXPONENTS AND ROOTS

Exponents *are used when you* **multiply a number by itself** *the exponent can be found raised to the upper right of the base number*

All exponents can be expressed as a number **to the power of** *another number*

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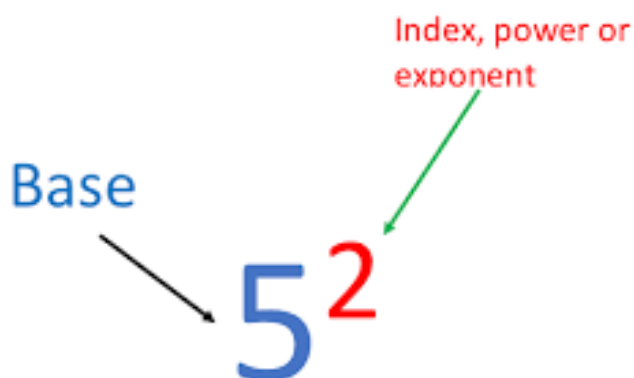
- $2^2 = 2 \; x \; 2 = 4$ *this can also be expressed as: two* **squared**

- $2^3 = 2 \; x \; 2 \; x \; 2 = 8$ *this can also be expressed as: two* **cubed**

- $3^4 = 3 \; x \; 3 \; x \; 3 \; x \; 3 = 81$ *this is expressed as: three to the power of four*

Roots *(sometimes known as radicals) can be seen as the opposite of exponent.*

The answer of a square root can be determined by finding what two identical numbers multiply with each other to create the number within the square root.

The square root of 4 is 2 because 2 x 2 or $2^2 = 4$

The square root of 9 is 3 because 3 x 3 or $3^2 = 9$

The square root of 16 is 4 because 4 x 4 or $4^2 = 16$

The square root of 25 is 5 because 5 x 5 or $5^2 = 25$

Exponent and Root Comparisons

$3^2 = 3 \times 3 = 9$ and $\sqrt{9} = 3$

$4^3 = 4 \times 4 \times 4 = 64$ and $\sqrt[3]{64} = 4$

$5^4 = 5 \times 5 \times 5 \times 5 = 625$ and $\sqrt[4]{625} = 5$

$2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$ and $\sqrt[5]{32} = 2$

$7^6 = 7 \times 7 \times 7 \times 7 \times 7 \times 7 = 117649$ and $\sqrt[6]{117649} = 7$

Examples

Example #1

$$\sqrt{81} - (4^3) + 3^4$$

$$= 9 - (64) + 81$$

$$= 9 - 64 + 81$$

$$= 9 + 81 - 64$$

$$= 90 - 64$$

$$= 26$$

Example #2

$$\sqrt[3]{27} + 2\sqrt{169} - (5^4)$$

$$= 3 + 2(13) - (625)$$

$$= 3 + 26 - 625$$

$$= 29 - 625$$

$$= -596$$

Example #3

$$\sqrt{36} + 3^4$$

$$= 6 + 81$$

$$= 87$$

Example #4

$$\sqrt[3]{216} - 3\sqrt[3]{512} + \sqrt{81}$$

$$= 6 - 3(8) + 9$$

$$= 6 - 24 + 9$$

$$= 6 + 9 - 24$$

$$= 15 - 24$$

$$= -9$$

Student Name: _____   Teacher: _____

Class: _____   Date Submitted: _____

General Instructions
   a) Solve all questions and **show working.**
   b) Take a picture of your work and email to **Oberlin.math@gmail.com** to be graded.

Evaluate the following:

1. $\sqrt{144} + 3^4$

2. $\sqrt[3]{343} - \sqrt[3]{125} + \sqrt{81}$

3. $(-3^2) - 2^5$

4. $\sqrt{49} - (3^3) + 2^4$

5. $\sqrt[3]{1} + \sqrt{225} - (3^4)$

6. $(5^3) - (4^4) + \sqrt{100}$

7. $(-4^3) + 4\sqrt[3]{216}$

8. $7^3 + (-3^4) + 6^3$

9. $\sqrt[3]{729} + \sqrt[3]{8} - 2\sqrt{64}$

10. $\sqrt{36} - (3^5) + \sqrt[3]{43}$