Math 9 Muscardin

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Chapter 2 – Exponents**

Test Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

To do:

2.1 – Exponents

* Complete Notes ⃝

2.2 – BEDMAS

* Complete Notes ⃝

2.3 – Square Roots of Perfect Squares

* Complete Notes ⃝

2.4 – Square Roots of Whole Numbers

* Complete Notes ⃝
* Quiz 1 ⃝

2.5 – Pythagorean Theorem

* Complete Notes ⃝

2.6 – Cubes and Cube Roots

* Complete Notes ⃝

2.7/2.8 – Exponent Laws

* Complete Notes ⃝
* Quiz 2 ⃝

Chapter Assignment Handout ⃝

**Write Unit Test ⃝**

Math 9 **Lesson 2.1 - Exponents** Muscardin

When a number is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by itself 2 or more times we can write it a shorter way, by using a raised number, called an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The base in a power is the number being \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The exponent tells how many times to multiply the base by itself.

**A negative is included in the base only when there are brackets.**

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the number in front of the base, and is multiplied by the base.

**Examples:**

**Examples:** Evaluate $\left(-\frac{1}{2}\right)^{2}$ and $-\left(\frac{1}{2}\right)^{2}$

Expand and evaluate:

$-1^{6}$ $-(-4)^{3}$

Math 9 **Lesson 2.1 - BEDMAS** Muscardin

A special order of operations is to be done when there are several operations needed to simplify an expression.

**B**

**E**

**D**

**M**

**A**

**S**

**Examples:**

1. $6^{2}-2^{2}$ 3. $\left(7+6×4\right)-\left(\frac{9}{3}\right)^{4}$
2. $\frac{15+(2+3)^{2}}{16-7}$ 4. $1+\left[9+(8-5)^{2}\right]×2$

Math 9 **Lesson 2.3 – Square Roots of Perfect Squares** Muscardin

Finding the square root of a number is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a number squared. For example:

You can use prime factorization to find the square root of a perfect square. For example:

Another way to find the square root of a number is to find all the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the number. Factors are all the numbers that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into it. For example:

Whenever a number has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that factor is the square root of the number. So a perfect square will have an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ number of factors. For example:

**Examples:**

1. $\sqrt{81}$ $\sqrt{49}$ $\sqrt{400}$
2. Solve for $x$

$x^{2}=36$ $x^{2}=25$ $x^{2}=9$

1. Use prime factorization and factors to evaluate.

$\sqrt{332}$

Math 9 **Lesson 2.4 – Square Roots of Whole Numbers** Muscardin

The square root of a number can also be determined by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ whose area is equal to that number. For example:

We can approximate the square root of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that is not a perfect square by determining what \_\_\_\_\_\_\_\_\_ perfect squares it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. We use the perfect squares as benchmarks. For example:

Once you have an approximate value you can use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to be more accurate. (Use a number line)

A more accurate way of finding square roots of non-perfect numbers is to use a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It is important to understand how this tool works in order to correctly input the calculation to get the correct outcome! For example:

**Examples:**

1. Use your calculator to evaluate. Round your answer to 2 decimal places.

$\sqrt{88}$ $\sqrt{32}$

1. Approximate:

$\sqrt{41}$ $\sqrt{13}$ $\sqrt{82}$

Math 9 **Lesson 2.5 – Pythagorean Theorem** Muscardin

Pythagoras, a Greek mathematician, showed that in any right triangle, there is a special relationship among the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. A right triangle is one that has two sides that form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The side opposite the right angle is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the two shorter sides are called \_\_\_\_\_\_\_\_\_\_\_.



He found that: *The area defined by the square of the hypotenuse equals the sum of the areas defined by the squares of the other two sides.*



Hence,

**Examples:**

1. Solve for the unknown in each of these right triangles:





1. Determine whether or not the following triangle has a right angle (Is it a **Pythagorean triplet**?):



Math 9 **Lesson 2.6 – Cubes and Cubes Roots** Muscardin

Any **whole** number multiplied by itself “twice” will result in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Perfect Cubes:

|  |  |  |
| --- | --- | --- |
| **Number** | **Number Cubed** | **Perfect Cube** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**\*\* You can use similar techniques for evaluating and estimating as you did with perfect squares and square roots \*\***

**Examples:**

1. Estimate:

$\sqrt[3]{46}$ $\sqrt[3]{24}$

1. Evaluate using calculator. Round answer to the nearest hundredth.

$\sqrt[3]{50}$ $\sqrt[3]{74}$

Math 9 **Lesson 2.7/2.8 – Exponent Laws** Muscardin

You can use the exponent laws to simplify an expression involving powers:

* To multiply powers with the same base, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the exponents
* To divide powers with the same base, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the exponents
* To raise a power to an exponent, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the exponents

Hence,

**Product of Powers** $(a^{m})(a^{n)}=a^{m+n}$

**Quotient of Powers** $\frac{a^{m}}{a^{n}}=a^{m-n},a\ne 0$

**Power of a Power** $(a^{m})^{n}=a^{mn}$

**Raising a power to a Product** $\left(a×b\right)^{n}=a^{n}×b^{n}$

**Raising a power to a Quotient** $\left(\frac{a}{b}\right)^{n}=\frac{a^{n}}{b^{n}}$

**Zero Power** $a^{0}=1$

**Negative Power** $a^{-1}=\frac{1}{a}$

**Examples:** Simplify

1. $\left(3^{2}\right)\left(3^{4}\right)$

1. $6^{5}÷6^{3}$
2. $\left(4^{2}\right)^{5}$
3. $\left(x^{6}\right)\left(x^{5}\right)$
4. $x^{7}÷x^{2}$
5. $\left(x^{5}\right)^{4}$
6. $\left(-2\right)^{7}\left(-2\right)^{3}÷\left[\left(-2\right)^{2}\right]^{3}$
7. $\frac{\left(y^{3}\right)^{5}}{(y)\left(y^{4}\right)}$
8. $-(453)^{0}$
9. $(2^{3}×3^{2})^{2}$