Name: ______________________________ Class: ____________

Intermediate II
Real Numbers (Chapter 1)

Note: All homework assignments are worth 10 points unless otherwise stated, and are due the next class day. No credit will be given for anything turned in after the test.

Date	Objective	Assign. #	Assignments	HW Checked
	8.NS.1 Rational Numbers	1.1	p. 11-14 (1-19, 22-40 evens)	
	8.EE.1 Multiply and Divide Monomials	1.3	p. 27-30 (1-23, 26-32 even, 34-44)	
	8.EE.1 Powers of Monomials	1.4	p. 35-38 (1-14, 20-22, 31-34, 39-47)	
	8.EE.1 Negative Exponents	1.5	p. 47-50 (2-18 even, 19-21, 23, 24-38 even, 39-44, 50-54 even)	
	Ch. 1 Quiz			
	8.EE.2 Roots	1.8	p. 75-78 (2-12 even, 13-19, 22, 23, 32-44, 47, 48, 51-54)	
	8.NS.2, 8.EE.2 Estimate Roots	1.9	p. 85-88 (1-8, 10-13, 15-17, 19, 22-34 even, 39-42)	
	8.NS.1, 8.NS.2, 8.EE.2 Compare Real Numbers	1.10	p. 93-96 (1-4, 8-18, 30, 34-43)	
	Review	1.R	Worksheet 1.R: Real Numbers Review	
	Real Numbers Test (Ch. 1)			

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Rational Numbers | Ch 1 Lesson 1

Definition: A rational number is a number that can be written as the ratio of two integers in which the denominator is not zero.

Every rational number can be expressed as a decimal by dividing the numerator by the denominator.

A. Write each fraction or mixed number as a decimal.

ex1.

ex2. $\frac{5}{8}$

The decimal form of a rational number is called a **repeating decimal**.

If the repeating number is zero, then the decimal is a **terminating decimal**.

ex3. $-1\frac{2}{3}$

ex4. $3\frac{1}{11}$

C. Write each decimal as a fraction.

1. 0.45
2. -0.14
3. 0.125
4. 0.32
5. $0.\overline{5}$
6. $0.\overline{2}\overline{7}$
7. $2.\overline{1}\,\overline{8}$
8. $0.\overline{4}\overline{5}$

Name: ________________________________ Date: __________ Class: ________

Rational Numbers | Ch 1 Lesson 1

You must answer the following question using your knowledge from today's lesson. After you do so, you can work on your homework for the rest of class.

(Note: You can WORK on your homework. If you are not working, I reserve the right to give you a worksheet instead, and you can do your homework at home.)

Explain why a rational number is either a terminating or repeating decimal.

Name: ________________________________ Date: __________ Period: ________

Rational Numbers | Unit 1 Lesson 1

You must answer the following question using your knowledge from today's lesson. After you do so, you can work on your homework for the rest of class.

(Note: You can WORK on your homework. If you are not working, I reserve the right to give you a worksheet instead, and you can do your homework at home.)

Explain why a rational number is either a terminating or repeating decimal.

Name: ____ Date: ___________ Class: _____

Multiply and Divide Monomials | Ch 1 Lesson 3

A. HALLOWEEN For a Halloween Party, Annie's dad decided to fill up a jar with candy corn for a guessing game. He decided to do this meticulously, with a measuring cup that is ¼ cup.

1. What do we need to know to determine how many candy corns fit in the entire jar?

2. What do we know now?

3. Estimate how many candy corns were inside the jar. Show all math that you used to estimate this number.

4. How many cups of candy corn are inside of the jar? Show all math used.

Whenever you're multiplying rational numbers, you have two choices:

1. You can choose to multiply and then reduce everything at the end.
2. You can choose to reduce at the beginning, and then multiply.

5. Which choice do you think is shorter? Why?

B. Evaluate the following expressions:

ex: $\frac{2}{3} \times \frac{6}{5}$

1. $\frac{4}{5} \times \frac{1}{4}$

2. $\frac{2}{9} \times \frac{6}{2}$

3. $\frac{14}{2} \times \frac{1}{7}$

4. $\frac{24}{9} \times \frac{6}{8}$

5. $\frac{16}{8} \times \frac{1}{2}$

6. $\frac{33}{5} \times \frac{13}{11}$

Name: ______________________________ Date: __________ Class: ______

Multiply and Divide Monomials | Ch 1 Lesson 3

Vocab: A **monomial** is a number, a variable, or a product of a number and one or more variables. You can use the Laws of Exponents to simplify monomials.

C. Simplify using the Laws of Exponents:

ex. 1: $5 \cdot 5^2$

ex. 2: $c^3 \cdot c^5$

ex. 3:. $-3x^2 \cdot 4x^5$

1. $9^3 \cdot 9^2$

2. $a^3 \cdot a^2$

3. $-2m(-8m^5)$

Simplify using the Laws of Exponents:

ex. 4: $\frac{4^8}{4^2}$

ex. 5: $\frac{n^9}{n^4}$

ex. 6:. $\frac{2^5 \cdot 3^5 \cdot 5^2}{2^2 \cdot 3^4 \cdot 5}$

4. $\frac{5^7}{5^4}$

5. $\frac{x^{10}}{x^3}$

6. $\frac{5^6 \cdot 7^4 \cdot 8^3}{5^4 \cdot 7^2 \cdot 8^2}$

D. Expand each of the following, then simplify to exponential form.

1. $k^8 \cdot k$

2. $t^7 \cdot t^3$

3. $2w^2 \cdot 3w^2$

4. $3e^3 \cdot 7e^3$

5. $4r^2 \cdot (-4r^3)$

6. $(-3l^2w^3)(2lw^4)$

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Multiply and Divide Monomials | Ch 1 Lesson 3

E. Read the following questions. Do not answer them yet.

Discuss your thoughts with your partner/group, and then together answer the questions.

1. What is the benefit of expanding out the monomials to factor form?

2. What operation (+, -, ×,÷) can we perform with the coefficients to the variables in problems **3-6** above?

3. What essentially are we doing with the exponents from the monomials when we combine like terms?

4. To multiply powers with the same base you can:

5. What do you <u>think</u> we could do with the exponents if we're dividing monomials?

F. Expand each of the following, then simplify to exponential form.

1. $\frac{b^6}{b^4}$

2. $2^{11} \times 2^3$

3. $\frac{4^2 \times 4^5}{4^4}$

Properties of Exponents

Product of Powers:

Quotient of Powers:

8.EE.1

Name: ____ Date: __________ Class: _____

Multiply and Divide Monomials | Ch 1 Lesson 3

G. Answer the following questions using our knowledge from above.

1. $9^2 \times 9^3$

2. $(-4b^6)(-b^2c^3)$

3. $(10t^4v^5)(3t^2v^5)$

4. $\frac{g^{15}}{g^7}$

5. $\frac{18v^5}{9v}$

6. $\frac{5^5 \cdot 6^3 \cdot 8^{10}}{5^3 \cdot 6 \cdot 8^9}$

7. $\frac{24a^6b^4}{6a^5b^2}$

8. A company has set aside 10^7 dollars for annual employee bonuses. If the company has 10^4 employees and the money is divided equally, how much of a bonus will each employee receive?

9. After making a down payment, Mr. Duckworth will make 6^2 monthly payments of 6^3 dollars each to pay for his new car. What is the total cost of his new car?

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Multiply and Divide Monomials | Ch 1 Lesson 3A

8.EE.1

Name: ____ Date: _____________ Class: _____

Powers of Monomials | Ch 1 Lesson 4

A.

The Marine Club at Westview Junior High purchased an aquarium. The aquarium is in the shape of a cube with a side length of 2^4 inches.

1. Using your knowledge of monomials, write an expression that can be *used* to solve for the volume of the aquarium.

2. Simplify this expression. What is the volume of the tank?

Now let's change things up.

3. How can we use exponents to write $2 \cdot 2 \cdot 2$?

4. Using #3 as an example, rewrite the volume of the cube (your expression from #1) with the base of our power being 2^4.

So, ___________=____________ .

B. Repeat and Practice

Expand each of the following using what you know about exponents, and then combine using the laws of exponents that we've already discussed. Then simplify.

1. $(6^4)^5$

2. $(8^3)^4$

3. $(k^7)^5$

4. $(2^5)^2$

5. $(w^4)^6$

6. $[(3^2)^3]^2$

7. Do you see a shortcut? If so, write down what you've noticed.

Power of a Power:

C. Products to Powers
Expand each of the following using what we know about powers and exponents. Then simplify.

1. $(3a^2)^5$

2. $(4p^3)^4$

3. $(8x^9)^2$

4. $(-2m^7n^6)^5$

5. $(6x^5y^{11})^4$

6. $(-5w^2z^8)^3$

7. How is doing these problems similar to finding the "power of a power"? How is it different?

Power of a Product:

Name: ____ Date: ____________ Class: ______

Negative Exponents | Ch 1 Lesson 5

Mrs. Claus made cookies. Santa Claus is absolutely obsessed with eating cookies, but his wife told him that he can only eat half of the entire amount every hour.

Mrs. Claus mom made 32 cookies total.

A. Use the table to track how long it will take for Paige to eat all of the cookies. Express everything as either a whole number or a fraction.

Hours	Cookies Left	Exponential
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

The "Cookies Left" row is written in "Standard Form".
Now add an extra row to the bottom of the table, called "Exponential Form".

1. Fill out each corresponding exponential form **for the first 5 hours.**
For example, $32 = 2^5$.

2. What pattern do you notice in the cookies left over as the exponents increase?

3. What is the pattern in the exponents as the number of cookies decreases?

4. If hour 4 is 2^1 and hour 5 is 2^0, what is hour 6? _______.

Complete the rest of the "Exponential Form" row.

5. We have been working with positive exponents. What is introduced in Santa's table?

Name: ____ Date: ____________ Class: ______

Negative Exponents | Ch 1 Lesson 5

B. An elf filled out his table differently than Santa did. You can see his table below.

Hours	0	1	2	3	4	5	6	7	8	9	10
Cookies Left	32	16	8	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{32}$
Exponential Form	2^5	2^4	2^3	2^2	2^1	2^0	$\frac{1}{2^1}$	$\frac{1}{2^2}$	$\frac{1}{2^3}$	$\frac{1}{2^4}$	$\frac{1}{2^5}$

1. Is the elf's table accurate? Is $\frac{1}{4}=\frac{1}{2^2}$? Explain.

2. Below is a table comparing Santa's entries to the elf's.

Santa	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}
Elf	$\frac{1}{2^1}$	$\frac{1}{2^2}$	$\frac{1}{2^3}$	$\frac{1}{2^4}$	$\frac{1}{2^5}$

What do you see in the table above?

C. Write each expression using a positive exponent.

1. 6^{-3}
2. a^{-5}

D. Write each fraction as an expression using a negative exponent other than -1.

1. $\frac{1}{5^2}$
2. $\frac{1}{36}$

E. The Laws we were quizzed on today (Product of Powers and Quotient of Powers) can be used to multiply and divide monomials with negative exponents.

Ex: $5^3 \cdot 5^{-5} = 5\cdot 5\cdot 5\cdot \frac{1}{5\cdot 5\cdot 5\cdot 5\cdot 5} = \frac{5\cdot 5\cdot 5}{5\cdot 5\cdot 5\cdot 5\cdot 5} = \frac{1}{5\cdot 5} = \frac{1}{5^2} = 5^{-2}$ which is 5^{3+-5}

Solve the following problems using Product of Powers and Quotient of Powers:

1. $\frac{w^{-1}}{w^{-4}}$
2. $3^{-8}\cdot 3$
3. $\frac{11^2}{11^4}$
4. $n^9\cdot n^{-4}$

Name: ____________________ Date: __________ Class: ______

Negative Exponents | Ch 1 Lesson 5

F. An American green tree frog tadpole is about 0.00001 km in length when it hatches. What is this decimal as a power of 10? ____________

Solve each of the following.

1. 5^{-3}

2. 6^{-10}

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

4. $(-3)^{-2}$

5. m^{-6}

6. g^{-2}

7. n^{-9}

8. r^{-8}

9. h^{-7}

10. $3^{-2} \cdot 3^{7}$

11. $5^{-3} \cdot 5^{5}$

12. $x^{-5} \cdot x^{-3}$

13. $a^{-2}b^{3} \cdot a^{-5}b$

14. $x^{2}y^{-2} \cdot x^{-5}y^{3}$

15. $\frac{7^{-2}}{7^{-6}}$

16. $\frac{x^{-4}}{x^{5}}$

17. $\frac{24a^{3}}{-6a^{2}}$

18. $\frac{18y^{4}}{3y^{10}}$

Name: ______________________________ Date: ____________ Class: __________

Roots | Ch 1 Lesson 8

Recall that in 4^5 the number 4 is the base and the exponent, 5, means how many times the base is a factor.

Label the following according to their meaning:

________________ x^m ________________

Below is a map of American Fork Junior High with a grid.

The math department decided that they want to create a square four-square court in the field using the vertices indicated as corners of the court.

Draw all possible four-square courts on the grid above.

Suppose instead that the math department has only a 6 x 6 grid space to work with.

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Roots | Ch 1 Lesson 8

1. How many different square-shaped parks could they create to fit within the grid? You may use all grids.

2. What would the area of each park be? You can fill out the areas in each of the squares above.

Name: ______________________________ Date: ______________ Class: ___________

Roots | Ch 1 Lesson 8

A. A square root of a number is one of its two equal factors. What are some examples of square roots?

What are some examples of perfect squares?

How do you see the perfect squares in the park problem?

What is the relationship between squaring a number and finding the square root?

A radical sign, $\sqrt{}$ is used to indicate the square root.

B. Find each square root.

1. $\sqrt{64}$
2. $\sqrt{121}$
3. $\sqrt{36}$
4. $\pm\sqrt{1.21}$
5. $-\sqrt{\frac{25}{36}}$
6. $\sqrt{-16}$

C. Solve each equation.

1. $t^2 = 169$
2. $289 = m^2$
3. $y^2 = \frac{4}{25}$

D. A cube root of a number is one of its three equal factors. What are some examples of cube roots?

What are some examples of perfect cubes?

What is the relationship between cubing a number and finding the cube root?

Name: ______________________________ Date: ____________ Class: __________

Roots | Ch 1 Lesson 8

E. Find each cube root.

1. $\sqrt[3]{125}$
2. $\sqrt[3]{-27}$
3. $\sqrt[3]{729}$
4. $\sqrt[3]{-64}$
5. $\sqrt[3]{1000}$
6. $\sqrt[3]{216}$

F. Solve each equation.

1. $m^3 = 8000$
2. $\frac{1}{8} = z^3$
3. $1.331 = c^3$

4. A concert crew needs to set up some chairs on the floor level. The chairs are to be placed in a square pattern consisting of four square sections. If one of the square sections holds 1600 chairs, how many chairs will there be along the total length of the larger square?

5. Dylan has a planter in the shape of a cube that holds 8 cubic feet of potting soil. Find the side length of the container.

6. The square base of the Great Pyramid of Giza covers almost 562,500 square feet. What is the length of each side of the base?

7. Frank wants to build a storage container in the shape of cube to hold 15.625 cubic meters of hay for her horse. Find the length of one side of the container.

Name: ______________________________________ Date: __________ Class: ________

Roots and Estimate Roots | Ch 1 Lesson 9

A. Get out your classwork titled: "Roots". Answer the following questions according to the work that has been done.

1. How did you find the areas of each of the squares? Describe below.

____
____
____

2. Is there a relationship between side lengths and areas?

____
____
____

3. What do you notice?

____
____
____

4. What do you think will be the relationship between EVERY side length and area?

____
____
____

5. Find the side-lengths of the squares with the following areas:

Area of 2:

Area of 5:

Area of 8:

Area of 10:

Area of 13:

Area of 17:

6. Relating this back to exponents, a ______________ __________ **of a number is one of its two equal factors.**

Every ____________________ number has both a __________________ and a

______________ square root.

B. Find each square root:

1. $\sqrt{64}$

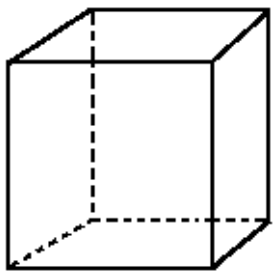
2. $\pm\sqrt{1.21}$

3. $-\sqrt{\frac{25}{36}}$

4. $\sqrt{-16}$

5. Solve $t^2 = 169$. Check your solutions.

6. Solve $y^2 = \frac{4}{25}$



C. So, we've found out that we can relate the side-length of a square to its area to find the square roots of numbers.

1. If the volume of the cube at left is 125 cubic inches, what is one side-length?

2. How do you know? ____
____
____

3. Relating this back to exponents, the __________ __________ of a number is one of its three equal factors.

4. Numbers such as 8, 27, and 64 are called ________________ __________ because they are the cubes of integers.

$\sqrt[3]{8} =$

$\sqrt[3]{27} =$

$\sqrt[3]{64}$

Name: ________________________________ Date: __________ Class: ________

Roots and Estimate Roots | Ch 1 Lesson 9

E. Find each cube root.

1. $\sqrt[3]{-27}$
2. $\sqrt[3]{729}$
3. $\sqrt[3]{216}$
4. $\sqrt[3]{-0.125}$
5. $\sqrt[3]{-343}$
6. $\sqrt[3]{1000}$

F. Fill in the table.

x												

G. You may recall at the beginning of the year estimating square roots. We can do this by comparing the number to the perfect squares it is closest to. Use the table to find the two integers that the square root or cube root falls between.

State the two integers that the square root or cube root falls between.

1. $\sqrt{35}$
2. $\sqrt{130}$
3. $\sqrt{102}$
4. $\sqrt{73}$
5. $\sqrt{68}$
6. $\sqrt{41}$
7. $\sqrt[3]{62}$
8. $\sqrt[3]{25}$
9. $\sqrt[3]{130}$
10. $\sqrt[3]{78}$
11. $\sqrt[3]{108}$
12. $\sqrt[3]{48}$

8.NS.2, 8.EE.2

H. Estimate to the nearest integer.

1. $\sqrt{44}$
2. $\sqrt{125}$
3. $\sqrt{23.5}$
4. $\sqrt{87}$
5. $\sqrt{26}$
6. $\sqrt{120}$
7. $\sqrt[3]{199}$
8. $\sqrt[3]{59}$
9. $\sqrt[3]{430}$
10. $\sqrt[3]{56}$
11. $\sqrt[3]{247}$
12. $\sqrt[3]{730}$

I. Estimate the solution of each equation to the nearest integer.

1. $y^2 = 55$
2. $d^2 = 95$
3. $p^2 = 6.8$
4. $k^3 = 210$
5. $c^3 = 520$
6. $a^3 = 999$

7. Kimball needs to fence in a square portion of the yard to make a play area for a new puppy. The area covered is 2 square meters. How much fencing should Kimball buy?

Name: ______________________________ Date: __________ Class: _______

Compare Real Numbers | Ch 1 Lesson 10

Throughout today's lesson, define the following:

Rational number: ____
____

Irrational number: ____
____

Real numbers: ____
____

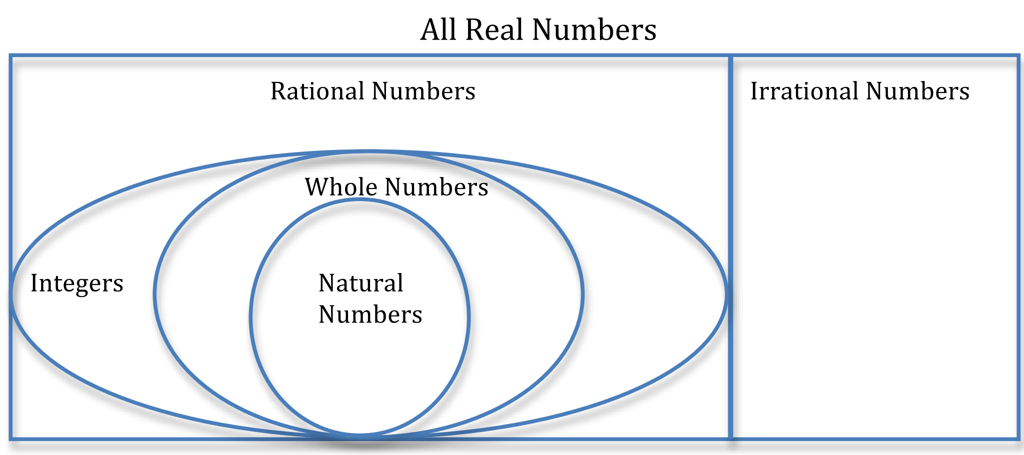
Give an example of a **rational number**. ________

Check back to page 7. Is your number a rational number? Why or why not?
____
____

Recall: A rational number is a number that can be expressed as a ratio $\frac{a}{b}$, where *a* and *b* are both integers.

Based on this definition, what do you think an **irrational number** is?
____
____

Complete the diagram below with examples:



Examples: *Name all sets of numbers to which each real number belongs.*

1. $0.2525\ldots$
2. $\sqrt{36}$
3. $-\sqrt{7}$
4. $\sqrt{10}$
5. $-2\frac{2}{5}$
6. $\sqrt{100}$

8.NS.1, 8.NS.2, 8.EE.2