Lesson 2.1 – Comparing and Ordering Rational Numbers (pt. 1)

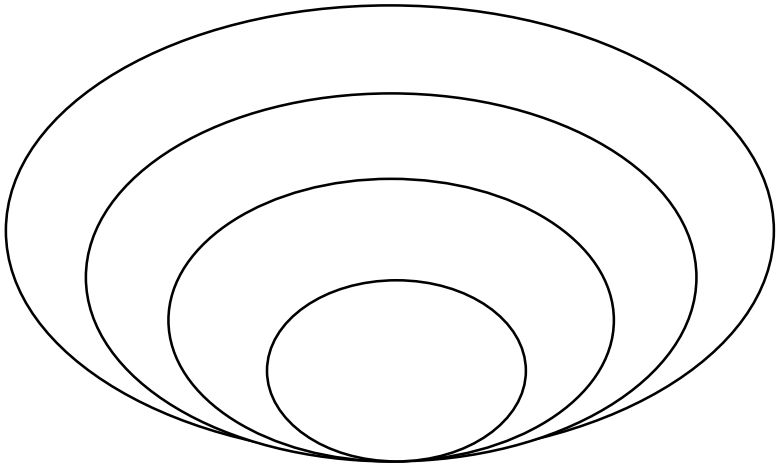
Outcome:

- *Demonstrate an understanding of rational numbers by: comparing and ordering rational numbers and solving problems that involve arithmetic operations on rational numbers.*

Rational numbers? What are those?!

Definition:

Below is a diagram of the different number systems. Fill it in and add three examples of each type of number in the appropriate circle.



What is the difference between $\mathbb{N}$ and W?

What is the same between $\mathbb{Z}$ and $\mathbb{Q}$?

Classifying examples: which of the above system or systems do these numbers belong?

a) 17

b) –3

c) 0.75

d) 0.666 666 …

e) $\frac{1}{\sqrt{3}}$

Bonus: can a number belong to a bigger circle/number system, but not a smaller one?

Converting Fractions to Decimals

What does the fraction sign mean?

Fraction	Calculation	Decimal
$\frac{5}{8}$		
$\frac{7}{15}$		
$\frac{18}{7}$		
$3\frac{7}{10}$		

Converting Decimals to Fractions

For terminating decimals, say them using place value, then translate to a fraction.

Decimal	In Words	Fraction
0.74		
5.7		
0.185		

For repeating decimals, the denominator will always be 9, 99, 999, … To determine how many 9's you need, look at the place value of when the decimal starts to repeat.

Decimal	Fraction
$0.777\ldots$	
$0.545454\ldots$	
$3.\overline{5}$	

Ordering Decimals

Ascending: Put the numbers in order from _____ to _____.
Descending: Put the numbers in order from _____ to _____.

Put the following numbers in ascending order:
$0.3, 3.3, 0.\overline{3}, -0.03, -3, 0.003$

Put the following numbers in descending order:
$1\frac{2}{5}, \ \frac{7}{6}, \ \frac{1}{2}, \ \frac{3}{4}$

Comparing Numbers

What do each of the following signs mean?

$<$ $>$

$\leq$ $\geq$

Compare the following numbers using the above signs:

a) 0.35 0.05

b) -14.2 -13.9

c) $\frac{1}{3}$ $\frac{1}{2}$

d) $-\frac{3}{4}$ $-\frac{3}{7}$

e) 1.5 $\frac{5}{4}$

f) $\frac{11}{12}$ 0.2

ASSIGNMENT: pg. 51-53 #4-9, 18-23

Lesson 2.1 – Comparing and Ordering Rational Numbers (pt. 2)

Outcome:

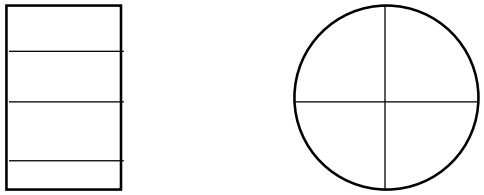
- *Demonstrate an understanding of rational numbers by: comparing and ordering rational numbers and solving problems that involve arithmetic operations on rational numbers.*

Review of Fractions

What is a fraction?

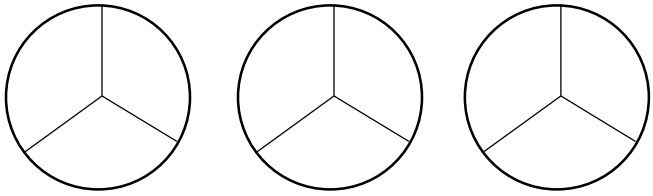
- Proper Fractions

$\frac{1}{4}$



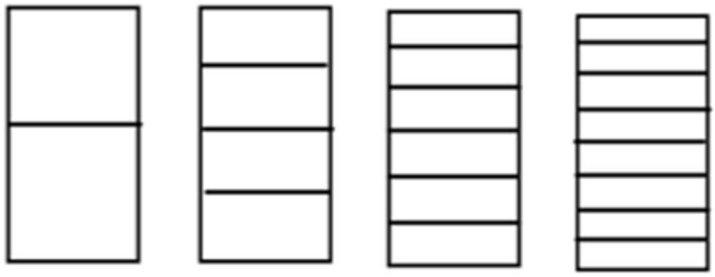
- Improper and mixed fractions

$\frac{8}{3}$



Equivalent Fractions

Definition:



Write an equivalent fraction for the following:

a) $2\frac{3}{4}$

b) $\frac{7}{2}$

Give 5 examples of equivalent fractions for the following:

a) $\frac{1}{5}$

b) $\frac{6}{10}$

c) $\frac{5}{3}$

d) $1\frac{1}{4}$

Fraction	Lowest Terms/Simplest Form/Reduced
$\frac{50}{100}$	
$1\frac{13}{26}$	
$\frac{24}{36}$	

Provide a rational number ($\mathbb{Q}$) between the following numbers in both fraction and decimal form.

a) $3.4 \quad 3.5$

b) $-0.003 \quad -0.004$

c) $\frac{2}{5} \quad \frac{3}{5}$

ASSIGNMENT: pg. 51-53 #10-16, 25, 27, 30

Lesson 2.2 – Problem Solving with Decimals

Outcome:

- *Demonstrate an understanding of rational numbers by: comparing and ordering rational numbers and solving problems that involve arithmetic operations on rational numbers.*
- *Explain and apply the order of operations, including exponents, with and without technology.*

Operations with Integers

Being able to perform simple operations with integers can help with estimation. Note that there is more than one way to think about these operations!!

Examples:

a) $(-5) + 6$

b) $(-3) - 4$

c) $(2)(-4)$

d) $(-3)(5)$

e) $(-2)(-3)$

Order of Operations

Examples

$\frac{6^2-6(2)^2}{12-(9-5)^2\div 2}$

B
E
D
M
A
S

$-5.23 + 2.1[1.9 + (-2.8)]$

Word Problems

A hot air balloon climbed at 0.8 m/s for 10s. It then descended at 0.6m/s for 6s.
a) What was the overall change in altitude?

b) What was the average rate of change in altitude?

Melanie for the following marks on math exams: 75%, 92%, 38%, and 62%. What is her overall average?

ASSIGNMENT: pg. 59-62 #1-11, 13, 14, 16-20, 22-24

Lesson 2.3 – Problem Solving with Fractions (pt. 1)

Outcome:

- *Demonstrate an understanding of rational numbers by: comparing and ordering rational numbers and solving problems that involve arithmetic operations on rational numbers.*

Definitions

Numerator:

Denominator:

Improper fraction:

Proper fraction:

Mixed fraction:

1) How do you go from an improper fraction to a mixed fraction? Explain.

Ex. $\frac{25}{4}$

2) How do you go from a mixed fraction to an improper fraction? Explain.

Ex. $3\frac{2}{3}$

Like Fractions:

Adding and Subtracting Fractions

To add and subtract fractions, you need to find a common _____.
The fractions need to be LIKE FRACTIONS!!

If you are struggling to find a common denominator, just multiply the two denominators to get a common one :)

Solve:

a) $\frac{1}{5}+\frac{1}{5}$

b) $\frac{1}{10}+\frac{7}{10}$

c) $\frac{3}{7}-\frac{1}{2}$

d) $\frac{2}{5}-\left(-\frac{1}{10}\right)$

e) $3\frac{2}{3}+\left(-1\frac{3}{4}\right)$

f) $-\frac{2}{5}-\frac{3}{4}$

g) $2\frac{5}{6}+3\frac{1}{5}$

h) $-2\frac{1}{2}+1\frac{7}{8}$

ASSIGNMENT: pg. 67-68 #1, 5, 6

Lesson 2.3 – Problem Solving with Fractions (pt. 2)

Outcome:

- *Demonstrate an understanding of rational numbers by: comparing and ordering rational numbers and solving problems that involve arithmetic operations on rational numbers.*

Multiplying Fractions

How to: multiply the _____ and the _____ and simplify!!

Solve:

a) $\frac{4}{5} \times -\frac{3}{4}$

d) $-\frac{3}{4} \times \frac{-2}{3}$

b) $\frac{-1}{5}\left(\frac{-5}{6}\right)$

e) $-2\frac{2}{3} \times 2\frac{1}{6}$

c) $2\frac{1}{2} \times \frac{1}{3}$

f) $\frac{7}{8} \times 3$

Dividing Fractions

To divide fractions, we multiply by the _____.

Basically, you _____ the first fraction, _____ the division sign, and

_____ the second fraction. Then multiply as per usual!!

Solve:

a) $\frac{5}{6} \div \frac{2}{3}$

b) $\frac{9}{-16} \div \frac{-1}{3}$

c) $-1\frac{1}{2} \div -2\frac{3}{4}$

d) $-2\frac{1}{10} \div 1\frac{1}{3}$

e) $\frac{1}{3} \div \frac{3}{9}$

f) $\frac{1}{4} \div 5$

Word Problem

At the start of the week, Mackenzie had $30 of her monthly allowance left. That week, she spends $\frac{1}{5}$ of the money on bus fares, another $\frac{1}{2}$ on shopping, and $\frac{1}{4}$ on snacks. How much did she have left at the end of the week?

ASSIGNMENT: pg. 67-70 #2, 4, 7-10, 13, 14, 16-21, 24, 26

Lesson 2.4 – Determining Square Roots of Rational Numbers

Outcome:

- *Determine the square root of positive rational numbers that are perfect squares.*
- *Determine an approximate square root of positive rational numbers that are non-perfect squares.*

Opposites:

Square root:

Example:

Recall: when you multiply two positive or two negative numbers together, the product will be a positive number.

Examples:

- The square root of a positive number is both a POSITIVE and a NEGATIVE number.
- We CANNOT take the square root of a negative number!!

Perfect Squares

A perfect square is a number that is a product of two identical factors. These are the numbers you get when you multiply two of the exact same number. The numbers must be integers or rational numbers.

Square Root	-0.5 or 0.5	-0.6 or 0.6	-0.7 or 0.7	-1 or 1	-2 or 2	-3 or 3	-4 or 4	-5 or 5	-6 or 6	-7 or 7	-8 or 8	-9 or 9	-10 or 10	-11 or 11	-12 or 12
Perfect Square	0.25	0.36	0.49	1	4	9	16	25	36	49	64	81	100	121	144

Examples: Determine w $\frac{1}{2}\times\frac{1}{2}=\frac{1}{4}$ $\sqrt{\frac{1}{4}}=\frac{\sqrt{1}}{\sqrt{4}}=\frac{1}{2}$ ollowing numbers are perfect squares.

a) 64

b) 61

c) $\frac{36}{49}$

d) 0.3

Word Problem (Determine a rational number from its square root)
A square trampoline has a side length of 2.6 m. Estimate and calculate the area of the trampoline.

Estimate:

Calculate:

Examples: Estimate, then calculate.

a) $\sqrt{1.69}$

b) $\sqrt{0.72}$

c) $\sqrt{0.33}$

Example
Determine the side length of a square whose area is 81 cm^2.

ASSIGNMENT: pg. 78-79 #5-21, 24, 29, 31