5.1 Rational Numbers

* Sets of numbers you have learned:
* Natural: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Whole: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Integers: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Rational (Can be expressed as a fraction)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Irrational: (Can not be expressed as a fraction; Infinite, non-repeating decimal)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Real: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which number set(s) would these belong in?

1. 0 2. -3 3. π

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. ½ 5. 1.9 6. 0.3333…

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Show that each of the following numbers is rational by writing it as the quotient of two integers:

* In other words: Write as a fraction (use an improper fraction if the value is greater than one).

7. -5 = 8. $1\frac{1}{10}$ = 9.$ -3\frac{2}{7}$ =

Converting Fractions to Decimals:

¾ = 3 ÷ 4 = \_\_\_\_\_\_\_\_\_\_

* Divide the numerator by the denominator; or write an equivalent fraction with a denominator of 10, 100, 1000, etc.

Write the following fractions as decimals:

10. $\frac{19}{21}$ = \_\_\_\_\_\_\_\_ 11. $\frac{3}{5}$ = \_\_\_\_\_\_\_\_ 12. $-5\frac{1}{9}$ = \_\_\_\_\_\_\_\_

Converting Decimals into Fractions:

0.21 = $\frac{ }{100}$ 🡨 Write it as fraction with the denominator being the last place value.

* + - It sounds the same, but is written as a fraction.
		- Simplify if possible.

Write the following decimals as fractions. Final answer must be in lowest terms.

13. 0.35 = 14. 2.122 = 15. -0.375 =

Comparing and Ordering Rational Numbers:

Which is larger: 0.66 or $\frac{2}{3}$? It is not obvious at first. So we change the fraction to a decimal using the calculator:

2/3 = = \_\_\_\_\_\_\_\_\_

Compare: \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_.



You can also use long division if you do not have calculator. .

Practice:

16. $\frac{4 }{5}$, 0.81, $\frac{3}{4}$ , 0.72, 0.705, 0.715

Least to greatest: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

17. 3 $\frac{1}{2}$ , 3.503, $3\frac{2}{5}$ , $3\frac{1}{8}$ , $3\frac{3}{4}$, $3\frac{2}{3}$, 3.67, 3.66

Least to greatest: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What happens when we throw negative numbers in the mix? The easiest thing to do is DRAW A NUMBER LINE!!!

18. -2, -2.1, -2.01, -1.99, -1.8, -1, 0

Least to greatest: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

19. 1, ½ , - ¾ , 0.7 , -0.62, -2/3, 0.5003, -1

Least to greatest: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

HW: 5.1 (page 224) # 20 – 44 even, 45-48, 57 – 58

Challenge problems: #61-64

5.1 - Day 2: Converting Repeating Decimals to Fractions

We must use algebra to convert repeating decimals into fractions.

Example: (all digits after the decimal repeat)

$$0.\overbar{12}$$

Step 1: Let $x= 0.\overbar{12}$

Step 2: Multiply $x$ by a power of 10 so that all of the repeating digits are to the right of the decimal.

* In this example, we must multiply by 100.
* Therefore: $100x=12. \overbar{12}$

Step 3: Subtract your equations

 $ 100x=12. \overbar{12}$

 - $x= 0.\overbar{12}$

Step 4: Solve the equation. Your final answer is the fraction. Simplify if necessary.

Practice:

1. $0.\overbar{351}$ 2. $2.\overbar{7}$ 3. $0.\overbar{89}$

HW: (Page 225) 5.1 #49-56

Challenge problem: #65

5.2 Adding and Subtracting Fractions with Common Denominators

Note that negative fractions are handled the same way that negative numbers are. Here are some pointers.

* The WHOLE fraction or mixed number is negative. -1¾ = $\frac{-7}{4}$.
* Do not multiply -1 by 4 and then add 3. Multiply 1 times 4, then add 3. Now make the whole thing negative.
* When adding and subtracting mixed numbers, turn them into improper fractions FIRST, then find common denominators and add or subtract as needed. DO NOT try to do it the old fashioned way by borrowing, etc. You WILL make mistakes that way.

Examples:

$\frac{3}{5}- 2\frac{4}{5}$ Turn into improper fraction(s).

 Add /subtract the numerators. Remember your integer rules!

I like to do a quick check – The above problem should have a negative answer.

Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

$6\frac{2}{9}-10 \frac{5}{9} $ Should the final answer be positive or negative? \_\_\_\_\_\_\_\_\_\_

DO NOT ATTEMPT THIS TYPE OF PROBLEM THE OTHER WAY!!!

Practice:

1. $\frac{8}{9}-\left(-\frac{2}{9}\right)$ 2. $5\frac{5}{6}-6\frac{1}{6}$

3. $-4\frac{1}{4}-3\frac{1}{4}$ 4. $-5\frac{1}{7}-3\frac{3}{7}$

Simplify the following expressions:

Example:

$\frac{3a}{20}+\frac{5a}{20}$ 🡨 Since the denominators are the same, just add the numerators.

* Remember to Simplify your final answer.

Practice:

5. $\frac{-8}{3b}- \left(-\frac{2}{3b}\right)$ 6. $\frac{3k}{28}+ \left(\frac{9k}{28}\right)$

HW: 5.2 (page. 232) #10-42 even

Challenge problems: #44-53

5.3 Adding and Subtracting Unlike Fractions

Remember what we learned yesterday:

* The WHOLE fraction or mixed number is negative. -1¾ = $\frac{-7}{4}$.
* Do not multiply -1 by 4 and then add 3. Multiply 1 times 4, then add 3. Now make the whole thing negative.
* When adding and subtracting mixed numbers, turn them into improper fractions FIRST, then find common denominators and add or subtract as needed. DO NOT try to do it the old fashioned way by borrowing, etc. You WILL make mistakes that way.

Today we are going to work on addition and subtraction problems that have unlike denominators.

Example:

$\frac{1}{2}-3\frac{1}{3}$ Step 1: Convert to improper

Step 2: Find the common denominator: \_\_\_\_\_\_\_ then make equivalent fractions.

Step 3: Add/subtract the numerators. (Don’t forget your integer rules!)

Practice:

1. $\frac{1}{2} - \frac{3}{4}$ 2. $-\frac{3}{8}-\frac{4}{7}$

3. $-3\frac{1}{3}+2\frac{4}{5}$ 4. $-3\frac{1}{3}+2\frac{1}{2}$

5. $2\frac{3}{4}-5\frac{1}{3}$ 6. $-\frac{1}{2}-\frac{2}{3}+\frac{3}{4}$

Simplify the following expression:

Example:

$\frac{a}{2}- \frac{a}{6}$ 🡨 You must convert the fractions to have a common denominator.

 🡨 LCD = \_\_\_\_\_\_\_\_\_. Multiply the first fraction by \_\_\_\_\_\_\_\_\_.

Practice:

7. $\frac{m}{5}- \frac{2m}{3}$ 8. $\frac{5x}{12}+\frac{3x}{16}$

HW: 5.3 (page 238) # 12 – 32 even and 36-50 even

Challenge problems: #35, 51-52

5.4 / 5.5 Multiplying and Dividing Fractions

You do NOT need a common denominator to multiply or divide fractions.

There are two ways to do this:

1. Multiply across the top and bottom and then reduce:

2

2. Cancel from top to bottom where there are common factors:

1

The rules for negative numbers still apply 🡪

Negative times/divided by a negative makes a positive.

Negative times/divided by a positive makes a negative.

1. 2. 3.

To divide fractions you must remember the rule the dividing by a fraction is the same as multiplying by the reciprocal.

Practice:

4. 5. 6.

When multiplying or dividing mixed numbers by fractions or other mixed numbers, we ***must*** make the mixed number into an improper fraction and then follow the previous rules.

Practice:

7. 8.

9.



HW: 5.4 (page 244) # 8 – 18 even AND 5.5 (page 251) # 16 – 26 even

Day 2: 5.4 #20 – 34 even AND 5.5 # 28 – 34 even

Challenge problems: 5.4: #29, 36, 41; 5.5 #36-37

Day 3: Fraction Review (All operations)

Fraction Review: All operations

(Homework after Ch.5, Lesson 5)

1. $\frac{8}{9}+ \left(-\frac{10}{21}\right)$ 2. $\frac{3}{4}-\left(-\frac{5}{18}\right)$

3. $-\frac{11}{12}- \frac{7}{15}$ 4. $-\frac{5}{14}-\left(-\frac{9}{10}\right)$

5. $-2\frac{8}{9}+2\frac{5}{6}$ 6. $-1\frac{5}{8}- \left(-2\frac{1}{5}\right)$

7. $4\frac{9}{16}+ \left(-3 \frac{3}{10}\right)$ 8. $1\frac{3}{4}-4\frac{3}{14}$

9. $\frac{20}{33}∙ \left(-\frac{3}{11}\right)$ 10. $-\frac{7}{22} ∙(-4)$

11. $-6\frac{3}{16} ∙5\frac{3}{7}$ 12. $-5\frac{1}{9} ∙2\frac{4}{13}$

13. $\frac{4}{7} ∙\left(-\frac{1}{8}\right)- \frac{3}{4}$ 14. $\frac{1}{4} ∙ \frac{8}{9} ∙\left(-\frac{3}{5}\right)$

15. $-\frac{11}{24} ÷ \frac{7}{10}$ 16. $-\frac{7}{8} ÷ \frac{19}{40}$

17. $10\frac{9}{14} ÷ \left(-3\frac{1}{2}\right)$ 18. $48 ÷ \left(-\frac{4}{5}\right)$

19. $-\frac{18}{35}÷\left(-2\frac{4}{5}\right)$ 20. $6\frac{7}{8} ÷\left(-1\frac{5}{6}\right)- \frac{11}{20}$

Converting Temperatures (pages 246-247)

Converting between Celsius and Fahrenheit requires choosing the correct formula:

$C= \frac{5}{9} \left(F-32\right)$ OR $F= \frac{9}{5}C+32$

If I give the Fahrenheit and ask you to put into Celsius, use the FIRST formula:

How many oC is 82oF? C = 5/9 (82 – 32)

If I give you Celsius, use the second formula:

Convert 20 degrees Celsius to degrees Fahrenheit: F = 9/5 20 + 32

Make sure you choose the formula that is already SOLVED FOR the one you want to convert to.

Also note there are NO parentheses in one of the formulas. Don’t insert them into the formula incorrectly.

1. Convert 140oF to Celsius 2. Convert 60oC to Fahrenheit

Class work: Worksheet on next page

Homework: page 247 #1-16 all

Converting Temperatures

Round to the nearest tenth of a degree

Convert these to oC Convert these to oF

1. 68oF 2. 110oC

3. 145OF 4. -20oC

5. -10oF6. 34oC

7. 78oF8. 56oC

9. 14oF10. 5oC

5.6 Using Multiplicative Inverses to Solve Equations

Solve this problem: $\frac{3}{5}∙\frac{5}{3}$ =

Those two fractions are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

They are also called\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Note that when they are multiplied, the answer is always \_\_\_\_\_\_\_\_\_\_\_.

Write the reciprocal of: – ½ \_\_\_\_\_\_\_\_\_\_\_\_ -5 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 ¾ \_\_\_\_\_\_\_\_\_\_\_\_\_ ⅔ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*Remember the reciprocal has the same sign (positive or negative) that the original fraction had.

$\frac{2}{3}x = 12$ How do you solve this? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Practice:

1. $-\frac{4}{5}x = -16$ 2. $\frac{5}{8}x = -\frac{1}{4}$

3. $-\frac{2}{5}x – 1 = -23$ 4. $-\frac{2}{3}x – 2 = -8$

5. $-\frac{5}{6}x – 3 = 12$ 6. $7 – \frac{3}{4}x = -2$

HW: 5.6 (page 255) Guided Practice # 3-8,

Practice and Problem Solving #11-18, 20 – 25, 30

Challenge: #26-29, 31-34