

# 7A - CHAPTER 3: OPERATIONS WITH RATIONAL NUMBERS - NOTE PACKET

NAME: \_\_\_\_\_

HOUR: \_\_\_\_\_

## Lesson 3.1: Fractions and Decimals

DO FIRST

Write each fraction in simplest form. If the fraction is already in simplest form, write <i>simplified</i> .		
1. $\frac{12}{80}$ $\frac{3}{20}$	2. $\frac{17}{36}$ <i>simplified</i>	3. $\frac{40}{50}$ $\frac{4}{5}$

Find the least common multiple for each pair of numbers.		
4. 3, 5 15	5. 12, 36 36	6. 14, 21 42

Vocabulary		
Term	Definition	Example
Repeating Decimal	a decimal that repeats in a pattern.	0.333... 0.733... 0.121212...
Terminating Decimal	decimals that end	0.25 0.4 0.375
Bar Notation	Signifies a repeat pattern in a decimal	0. $\overline{3}$ 0.7 $\overline{3}$ 0. $\overline{12}$

Write each fraction as a decimal.

1a.  $\frac{4}{5}$  0.8  $\begin{array}{r} 0.8 \\ 5 \overline{) 40} \end{array}$ 
 1b.  $\frac{3}{16}$  0.1875  $\begin{array}{r} 0.1 \\ 16 \overline{) 30} \\ \underline{-16} \\ 14 \end{array}$

2a.  $-\frac{5}{6}$  -0.8 $\overline{3}$ 
 2b.  $\frac{7}{9}$  0. $\overline{7}$

Fraction-Decimal Equivalents					
$\frac{1}{2} = 0.5$	$\frac{1}{3} = 0.\overline{3}$	$\frac{1}{4} = 0.25$	$\frac{1}{5} = 0.2$	$\frac{1}{10} = 0.1$	$\frac{1}{100} = 0.01$
$\frac{2}{3} = 0.\overline{6}$	$\frac{3}{4} = 0.75$	$\frac{2}{5} = 0.4$	$\frac{3}{5} = 0.6$	$\frac{4}{5} = 0.8$	$\frac{5}{6} = 0.8\overline{3}$



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3. In a recent Masters Tournament, Zach Johnson's fist shot landed on the fairway 45 out of 56 times. To the nearest thousandth, what part of the time did his shot land on the fairway?

$$\frac{45}{56}$$

$$0.804$$

4a.  $\frac{7}{8} \bullet 0.87$

$$0.875 > 0.870$$

4b.  $-\frac{7}{15} \bullet -\frac{5}{12}$

$$-0.4\bar{6} < -0.41\bar{6}$$

5. Over the weekend,  $\frac{16}{28}$  of the eighth grade girls and  $\frac{19}{30}$  of the eighth grade boys went to see a new comedy movie. Did a greater fraction of girls or boys see the movie?

## Lesson 3.2: Rational Numbers

### DO FIRST

Write each fraction as a decimal. Use bar notation to show a repeating decimal.	
1. $\frac{5}{16}$  0.3125	2. $-\frac{7}{9}$  -0. $\bar{7}$
3. In one season, the New England Patriots converted 16 of 20 fourth downs. What part of the time did the Patriots convert on fourth down?  $\frac{16}{20} = 0.8$ 80%	
Replace each $\bullet$ with $<$ , $>$ , or $=$ to make a true sentence.	
4. $0.89 \bullet \frac{11}{13}$  $0.89 \boxed{>} \frac{11}{13}$	5. $-\frac{2}{3} \bullet -\frac{3}{5}$  $-\frac{2}{3} \boxed{<} -\frac{3}{5}$



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Vocabulary		
Term	Definition	
Natural Numbers	$N = \{1, 2, 3, \dots, \infty\}$	
Whole Numbers	$W = \{0, 1, 2, 3, \dots, \infty\}$	
Integers	$Z = \{-\infty, \dots, -2, -1, 0, 1, \dots, \infty\}$	
Rational Numbers	can be written as fractions $Q = \{-\infty, \dots, -2, -1, -\frac{1}{2}, 0, 0.5, 0.75, \dots, \infty\}$	

1a.  $4\frac{2}{3}$

$$\frac{14}{3}$$

1b. 7

$$\frac{7}{1}$$

2a. 0.84

$$\frac{21}{25} = \frac{84}{100}$$

2b. 5.875

$$5\frac{7}{8} = \frac{875 \div 5}{1000 \div 5} = \frac{175 \div 5}{200 \div 5} = \frac{35 \div 5}{40 \div 5}$$

2c. Rock music accounted for 0.35 of the total music sales in a recent year. Write this decimal as a fraction in simplest form.

$$\frac{7}{20}$$

3. Write  $0.\overline{42}$  as a fraction in simplest form.

$$\frac{14}{33}$$

Identify all sets to which each number belongs.

4a. 0

$$W, Z, Q$$

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

$$Q$$

4c. 1.414213562...

$$Q$$



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## Lesson 3.3: Multiplying Rational Numbers

DO FIRST

Write each number as a fraction.		
1. $3\frac{3}{4}$	$\frac{15}{4}$	2. $-9$
		$\frac{-9}{1}$
		3. $-1\frac{3}{4}$
		$-\frac{7}{4}$

Write each decimal as a fraction or mixed number in simplest form.		
4. 0.07	$\frac{7}{100}$	5. $-3.\overline{85}$
		$-3\frac{85}{99}$
		6. $0.\overline{78}$
		$\frac{26}{33}$

Identify all sets to which each number belongs.		
7. $-632$		8. $0.\overline{56}$
$\mathbb{Z}, \mathbb{Q}$		$\mathbb{Q}$
		9. 21
		$\mathbb{N}, \mathbb{W}, \mathbb{Z}, \mathbb{Q}$

Key Concepts	
To multiply fractions, multiply the numerators multiply the denominators	
	$\frac{-3}{-4} \cdot \frac{-7}{-12} \rightarrow \frac{21}{48} = \frac{7}{16}$

1a.  $\frac{1}{2} \cdot \frac{4}{10}$

$$\frac{1}{5}$$

1b.  $\frac{5}{12} \cdot \frac{6}{10}$

$$\frac{1}{4}$$

1c.  $\frac{8}{4} \cdot \frac{8}{21}$

$$\frac{24 \div 12}{84 \div 12} = \frac{2}{7}$$

2a.  $-\frac{9}{12} \cdot -\frac{2}{3}$

$$\frac{-9}{12} \cdot \frac{-2}{3} = \frac{1}{2}$$

2b.  $\frac{6}{9} \cdot -\frac{3}{11}$

$$\frac{-6 \div 3}{33 \div 3} = -\frac{2}{11}$$

2c.  $3\frac{3}{8} \cdot 2\frac{1}{3}$

$$\frac{63}{8}$$

Evaluate each expression if  $x = \frac{3}{8}$ ,  $y = -2\frac{2}{9}$ , and  $z = -\frac{7}{10}$ . Write in simplest form.

3a.  $xy$

$$-\frac{5}{6}$$

3b.  $5x$

$$1\frac{7}{8}$$

3c.  $yz$

$$1\frac{5}{9}$$

4a. The Willis Tower in Chicago is about 1450 feet tall. The Empire State Building in New York City is about  $\frac{4}{5}$  as tall. About how tall is the Empire State Building?

$$1,160 \text{ feet}$$



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4b. The longest suspension bridge in the United States is the 4260-foot Verrazano-Narrows Bridge in New York City. The Tacoma Narrows Bridge in Tacoma, Washington, is about  $\frac{11}{12}$  of that length. About how long is the Tacoma Narrows Bridge?

3,905 feet

## Lesson 3.4: Dividing Rational Numbers

DO FIRST

1. $\frac{7}{8} \cdot \frac{1}{2}$ $\frac{1}{2}$ $\frac{7}{16}$	2. $-4\frac{1}{2}(-1\frac{1}{9})$ 5
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Evaluate each expression if  $x = \frac{14}{15}$ ,  $y = -1\frac{2}{5}$ , and  $z = -\frac{3}{7}$ . Write the product in simplest form.

3. $\frac{3}{4}xz$ $-\frac{3}{10}$	4. $\frac{7}{3}z$ -1
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5. "Midway" is the name of 252 towns in the United States. "Pleasant Hill" occurs  $\frac{5}{9}$  as many times. How many towns named "Pleasant Hill" are there in the United States?

$$140 \quad \frac{252}{1} \cdot \frac{5}{9} = \frac{28}{1} \cdot \frac{5}{9} = \boxed{140}$$

### Vocabulary

Term	Definition
Multiplicative Inverses	Reciprocal; Flip a number $\frac{a}{b} ; b \neq 0$ $\frac{2}{3} \cdot \frac{3}{2} = 1$

### Key Concept

Inverse Property of Multiplication: Product of a number and its multiplicative inverse equals 1.

1a.  $-\frac{7}{9}$

$-\frac{9}{7}$

1b.  $2\frac{1}{12}$

$\frac{12}{25}$



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To divide fractions, multiply by the second number's  
Keep multiplicative inverse  
Change  
Flip

Divide by a Whole Number:

$$\frac{2}{3} \div 7 = \frac{2}{3} \div \frac{7}{1} = \frac{2}{3} \cdot \frac{1}{7}$$

$$\frac{\frac{2}{3}}{7} = \frac{2}{3} \cdot \frac{1}{7}$$

How to change mixed numbers to improper fractions:

$$4\frac{2}{5}$$

$$4 \cdot 5 = 20$$

$$20 + 2 = 22$$

$$\frac{22}{5}$$

How to change improper fractions to mixed numbers:

$$\frac{56}{12}$$

$$12 \cdot 4 = 48$$

$$56 - 48 = 8$$

$$4\frac{8}{12} = 4\frac{2}{3}$$

2a.  $\frac{1}{3} \div \frac{7}{15}$

$$\frac{5}{7}$$

2b.  $\frac{5}{8} \div \left(-\frac{3}{4}\right)$

$$-\frac{5}{6}$$

2c.  $\frac{3}{4} \div 11$

$$\frac{3}{4} \cdot \frac{1}{11}$$

$$\frac{3}{44}$$

2d.  $-\frac{6}{7} \div 12$

$$-\frac{6}{7} \cdot \frac{1}{12}$$

$$-\frac{1}{14}$$

3a.  $6\frac{3}{8} \div \left(-4\frac{1}{4}\right)$

$$-\frac{1}{2} - 1\frac{1}{2}$$

3b.  $-6\frac{4}{5} \div \left(-2\frac{2}{5}\right)$

$$2\frac{5}{6}$$

4. A box of cereal contains  $15\frac{3}{5}$  ounces. If one bowl holds  $2\frac{2}{5}$  ounces of cereal, how many bowls of cereal are in one box?



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Find each quotient. Write in simplest form.

5a.  $\frac{5ab}{6} \div \frac{10b}{7}$

$$\frac{\cancel{5}ab}{6} \cdot \frac{7}{\cancel{10}b} = \frac{7a}{12}$$

5b.  $\frac{mn}{4} \div \frac{m}{8}$

$$\frac{\cancel{m}n}{\cancel{4}} \cdot \frac{8}{\cancel{m}} = \frac{2n}{1} = 2n$$

## Lesson 3.5: Adding and Subtracting Like Fractions

DO FIRST

Find the multiplicative inverse of each number.

1.  $-5\frac{1}{2}$        $-\frac{2}{11}$

2.  $-63$        $-\frac{1}{63}$

Find each quotient. Write in simplest form.

3.  $\frac{7}{9} \div (-14)$        $-\frac{1}{18}$

4.  $-2\frac{1}{5} \div (-3\frac{2}{3})$        $\frac{3}{5}$

5.  $\frac{4ab}{c} \div \frac{3a}{2c}$        $\frac{8b}{3} = 2\frac{2b}{3}$

6.  $\frac{3xy}{yz} \div \frac{6y}{5}$        $2\frac{x}{2yz}$

### Vocabulary

Term	Definition
Like Fractions	Fractions with the same denominator

### Key Concepts

To add fractions with like denominators,

add the numerators

Keep the denominator

$$\frac{7}{8} + \frac{2}{8} = \frac{9}{8} = \boxed{1\frac{1}{8}}$$

1a.  $\frac{5}{6} + \frac{4}{6}$

$$1\frac{1}{3}$$

$$\frac{9}{6} = 1\frac{3}{6} = \boxed{1\frac{1}{2}}$$

1b.  $\frac{4}{7} + (-\frac{6}{7})$        $\frac{4}{7} + \frac{-6}{7} = \boxed{\frac{-2}{7}}$

1c.  $\frac{1}{5} + \frac{4}{5}$

$$\boxed{1}$$

1d.  $-\frac{5}{8} + \frac{11}{8}$

$$\frac{6}{8} = \frac{3}{4}$$

$$-5 + 11 = 6$$



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2a.  $1\frac{3}{4} + 4\frac{3}{4}$        $5\frac{6}{4} = 6\frac{2}{4} = 6\frac{1}{2}$       2b.  $3\frac{2}{5} + 8\frac{1}{5}$   
 $(1+4) + (\frac{3}{4} + \frac{3}{4})$

2c.  $-2\frac{3}{7} + (-4\frac{5}{7})$

To subtract fractions with like denominators,

Subtract the numerators

Keep the denominator

$$\frac{7}{8} - \frac{2}{8} = \boxed{\frac{5}{8}}$$

3a.  $\frac{5}{15} - \frac{10}{15}$        $\frac{-5}{15}$   
 $-\frac{1}{3}$

3b.  $\frac{3}{9} - \frac{4}{9}$

$$-\frac{1}{9}$$

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

Evaluate each expression if  $a = \frac{3}{8}$ ,  $b = -\frac{5}{8}$ , and  $c = \frac{7}{8}$ .

4a.  $a - b$        $\frac{3+5}{8}$   
 $\frac{3}{8} - (-\frac{5}{8})$

4b.  $b - c$

4c.  $c - a$

5. The Daytona International Speedway is one of the longest tracks used in NASCAR races. It is  $2\frac{2}{4}$  miles long. Richmond International Speedway is  $\frac{3}{4}$  mile long. How much longer is the Daytona Speedway than the Richmond Speedway?

### Lesson 3.6: Adding and Subtracting Unlike Fractions

DO FIRST

1. $\frac{3}{6} + \frac{5}{6}$	2. $\frac{4}{12} - \frac{10}{12}$
3. $3\frac{3}{8} + 6\frac{5}{8}$	4. $12\frac{5}{9} + (-1\frac{1}{9})$



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Vocabulary	
Term	Definition
Unlike Fractions	are fractions with different denominators.

Key Concept
<p><u>To add fractions with unlike denominators,</u>          rewrite both fractions with the LCM in the denominator. Add the numerators and simplify</p>

1a.  $\frac{1}{6} + \frac{3}{4}$  4: 4, 8, 12, 16, 20, 24  
 6: 6, 12, 18, 24

$\frac{1 \times 2}{6 \times 2} = \frac{2}{12}$   $\frac{3 \times 3}{4 \times 3} = \frac{9}{12}$   $\frac{2}{12} + \frac{9}{12} = \boxed{\frac{11}{12}}$

1c.  $\frac{2}{5} + \frac{3}{10}$

$\frac{4}{10} + \frac{3}{10} = \frac{7}{10}$

1b.  $\frac{2}{7} + \frac{3}{14}$

$\frac{1}{2}$

1d.  $\frac{3}{8} + \frac{5}{24}$

$\frac{7}{12}$

2a.  $3\frac{3}{4} + \frac{5}{14}$   $\frac{15 \times 7}{4 \times 7} + \frac{5 \times 2}{14 \times 2}$

$4\frac{11}{28}$   $\frac{105}{28} + \frac{10}{28}$   
 $4\frac{3}{28}$   $\frac{115}{28}$

2b.  $-6\frac{8}{9} + 7\frac{5}{12}$

$\frac{19}{36}$

2c.  $3\frac{3}{5} + (-4\frac{5}{6})$

$-1\frac{7}{30}$

Key Concept
<p><u>To subtract fractions with unlike denominators,</u>          rewrite both fractions with the LCM in the denominator. Subtract the numerators + simplify</p>

3a.  $\frac{3}{4} - \frac{8}{9}$

3b.  $7\frac{1}{6} - 6\frac{5}{8}$

3c.  $5\frac{1}{3} - (-4\frac{5}{9})$



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4. At a recent frog-jumping contest, the winning frog jumped  $21\frac{1}{3}$ . The second-place frog jumped  $20\frac{1}{2}$  feet. How much farther did the first-place frog jump?

## Review Day 1

DO FIRST

1. $-2\frac{1}{3} + (-7\frac{1}{2})$ $-9\frac{5}{6}$	2. $4\frac{3}{8} + 10\frac{5}{12}$ $14\frac{5}{24}$ $14\frac{19}{24}$
3. $-1\frac{1}{3} - 4\frac{2}{7}$ $-5\frac{13}{21}$	4. $5\frac{5}{6} - (-2\frac{1}{4})$ $8\frac{1}{12}$

$$\frac{-4 \times 7}{3 \times 7} - \frac{30 \times 3}{7 \times 3}$$

$$-28 - 90 = -28 + -90$$

$$\frac{-28}{21} - \frac{90}{21} = \frac{-28 - 90}{21} = \frac{-118}{21}$$

$$\boxed{-5\frac{13}{21}}$$

$$\frac{35 \times 2}{6 \times 2}$$

$$\frac{70}{12} + \frac{-27}{12}$$

$$70 + 27 = 97$$

$$\frac{-9 \times 3}{4 \times 3}$$

$$\frac{70 + -27}{12} = \frac{43}{12}$$

$$8\frac{1}{12}$$

$$3$$