

LEARNING OBJECTIVE: We will evaluate complex fractions and explore ratios involving fractions. (Lesson 37)

CONCEPT DEVELOPMENT:

Complex Fractions: A fractions whose numerator or denominator is itself a fraction.

Examples:

$$\frac{3\frac{2}{3}}{1\frac{4}{5}}$$

← NUMERATOR
← DENOMINATOR

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

NUMERATOR
DENOMINATOR

$$3\frac{2}{3} \div 1\frac{4}{5} \qquad \frac{3}{2} \div \frac{3}{4}$$

Fractions are...

- DIVISION PROBLEMS
- PARTS OF A WHOLE
- RATIO
- RATES
- DECIMALS
- PERCENT

Refresher on Unit Rates and Constant of Proportionality:

Unit Rates are ratios where the denominator is 1. When comparing two quantities (time and distance for example), the unit rate is calculated as $\frac{y}{x}$. The result is the constant of proportionality (k) (which is the SAME as the unit rate).

Two formulas to remember:

$$y = kx$$

$$\frac{y}{x} = k$$

Example: The chart below shows the balance in Atenea's savings account over time:

Time (in Months)	Amount (in Dollars)
0	0
1	40
2	80
3	120
6	240
18	720

$$y = kx$$

$$y = 40x$$

GUIDED PRACTICE:

Steps for Evaluating Complex Fractions and Rates Involving Fractions

1. Read the Problem Carefully and set up an equation to find the unit rate ($\frac{y}{x} = k$)
2. Rewrite the complex fraction as a division problem.
3. Evaluate the division problem (multiply by the reciprocal) to find the unit rate.

$\frac{\frac{2}{9}}{\frac{8}{3}}$ $\frac{2}{9} \div \frac{8}{3}$ $\frac{2}{9} \cdot \frac{3}{8} = \frac{2 \cdot 3}{9 \cdot 8} = \frac{6 \div 6}{72 \div 6} = \frac{1}{12}$ <p style="text-align: center;">Simplify??</p>	<p style="text-align: center;">Simplify num & denom.</p> $\frac{4}{5} \div \frac{1}{4}$ $\frac{4}{5} \times \frac{4}{1} = \frac{16}{5}$																					
$\frac{\frac{3\frac{3}{5}}{1\frac{1}{3}}}{\frac{18}{5} \div \frac{4}{3}}$ $\frac{18}{5} \div \frac{4}{3} = \frac{18}{5} \cdot \frac{3}{4}$ $\frac{18}{5} \cdot \frac{3}{4} = \frac{18 \cdot 3}{5 \cdot 4} = \frac{54 \div 2}{20 \div 2} = \frac{27}{10}$ <p style="text-align: center;">3x5=15+3</p>	$\frac{10\frac{1}{2}}{1\frac{3}{4}}$ $\frac{21}{2} \div \frac{7}{4}$ $\frac{21}{2} \cdot \frac{4}{7} = \frac{21 \cdot 4}{2 \cdot 7} = \frac{84}{14} = 6$																					
<p>A turtle walks $\frac{7}{8}$ of a mile in 50 minutes. What is the unit rate expressed in miles per hour?</p> <table border="0" style="width: 100%;"> <tr> <td style="border-right: 1px solid black; padding-right: 10px;">hr</td> <td style="padding-right: 10px;">miles</td> <td></td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 10px;">$\frac{5}{6}$</td> <td style="padding-right: 10px;">$\frac{7}{8}$</td> <td>$\frac{7}{8} \div \frac{5}{6}$</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 10px;">1</td> <td style="padding-right: 10px;">$\frac{21}{20}$</td> <td>$\frac{7}{8} \cdot \frac{6}{5} = \frac{42}{40} = \frac{21}{20}$</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 10px;">$\frac{10}{6}$</td> <td style="padding-right: 10px;">$\frac{14}{8}$</td> <td></td> </tr> </table> <p>Turtle walks $\frac{21}{20}$ miles/hr.</p>	hr	miles		$\frac{5}{6}$	$\frac{7}{8}$	$\frac{7}{8} \div \frac{5}{6}$	1	$\frac{21}{20}$	$\frac{7}{8} \cdot \frac{6}{5} = \frac{42}{40} = \frac{21}{20}$	$\frac{10}{6}$	$\frac{14}{8}$		<p>You recently bought a $3\frac{1}{4}$ pound tri tip for eighteen and one-half dollars. How much is your tri tip per pound?</p> <table border="0" style="width: 100%;"> <tr> <td style="border-right: 1px solid black; padding-right: 10px;">\$18.50</td> <td style="padding-right: 10px;">$3\frac{1}{4}$ lbs</td> <td></td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 10px;">$\frac{18\frac{1}{2}}{3\frac{1}{4}}$</td> <td style="padding-right: 10px;">Price per pound</td> <td>$\frac{37}{2} \div \frac{13}{4}$</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 10px;"></td> <td style="padding-right: 10px;"></td> <td>$\frac{37}{2} \cdot \frac{4}{13} = \frac{74}{13} = 5.69$</td> </tr> </table> <p>Tri-tip costs \$5.69/lb.</p>	\$18.50	$3\frac{1}{4}$ lbs		$\frac{18\frac{1}{2}}{3\frac{1}{4}}$	Price per pound	$\frac{37}{2} \div \frac{13}{4}$			$\frac{37}{2} \cdot \frac{4}{13} = \frac{74}{13} = 5.69$
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Izzy ran $6\frac{3}{4}$ miles in 45 minutes.

RATE: MILES PER HOUR.
 $\frac{\text{MILES}}{\text{HOUR}}$
 NUMERATOR FRACTION DENOMINATOR
 BAR BAR

$$\frac{6\frac{3}{4}}{\frac{3}{4}} = \frac{27}{4} \div \frac{3}{4} = \frac{27}{4} \cdot \frac{4}{3}$$

$$\frac{27}{\cancel{4}^1} \cdot \frac{\cancel{4}^1}{3} = \frac{9}{1} = 9$$

Izzy ran at a rate
 of 9 MPH
 1
1
5

Julia ran $3\frac{3}{4}$ miles in 25 minutes. Who ran at a faster pace?

RATE: MILES PER HOUR

$$\frac{3\frac{3}{4}}{\frac{5}{12}} = \frac{15}{4} \div \frac{5}{12}$$

$$\frac{15}{4} \div \frac{5}{12} = \frac{15}{4} \cdot \frac{12}{5} = \frac{180}{20} = 9$$

Julia runs at 9 MPH

$1\frac{2}{3}$ pounds of turkey cost five and a quarter dollars.

DOLLARS PER POUND

$$\frac{\text{DOLLARS}}{\text{POUND}} \quad \frac{5\frac{1}{4}}{1\frac{2}{3}} = \frac{21}{4} \div \frac{5}{3}$$

$$\frac{21}{4} \div \frac{5}{3} = \frac{21}{4} \cdot \frac{3}{5} = \frac{63}{20}$$

$$= 3\frac{3}{20} = 3.15$$

TURKEY COSTS
 \$3.15/lb.

$7\frac{1}{2}$ pounds of turkey cost eighteen and three-quarter dollars. Which is a better buy?

DOLLARS PER POUND

$$\frac{18\frac{3}{4}}{7\frac{1}{2}} = \frac{75}{4} \div \frac{15}{2}$$

$$\frac{75}{4} \div \frac{15}{2} = \frac{75}{4} \cdot \frac{2}{15} = \frac{5}{2} = 2\frac{1}{2}$$

\$2.50

TURKEY IS \$2.50/lb.
 THIS IS CHEAPER!

NAME: _____

Math 7.1, Periods 1 and 2

Mr. Rogove

Date: _____

INDEPENDENT PRACTICE:

$$\frac{10\frac{1}{2}}{3\frac{1}{3}} = 3\frac{3}{20}$$

$$\frac{6\frac{1}{4}}{2\frac{1}{2}} = 2\frac{1}{2}$$

For Anthony's birthday his mother is making cupcakes for his 12 friends. The recipe calls for $3\frac{1}{3}$ cups of flour. The recipe makes $2\frac{1}{2}$ dozen cupcakes.

Anthony's mother only has 1 cup of flour. Is there enough flour for each of Anthony's friends to get a cupcake?

Not enough

Sally is mixing red and blue paint for a painting. The table below shows the different mixtures being used.

Red Paint (quarts)	Blue Paint (quarts)
$1\frac{1}{2}$	$2\frac{1}{2}$
$2\frac{2}{5}$	4
$3\frac{3}{4}$	$6\frac{1}{4}$
1.2	2
1.8	3

Is the amount of blue paint proportional to the amount of red paint? What is the unit rate?

UNIT RATE IS $\frac{3}{5}$

3Q Red paint
5Q Blue paint

NAME: _____

Math 7.1, Periods 1 and 2

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ACTIVATING PRIOR KNOWLEDGE:

We can look at charts and determine the constant of proportionality

Time (minutes)	Distance (in miles)	Pencils sold	Money spent
12	0.3	3	0.57
16	0.4	11	2.09
28	0.7	5	0.95
36	0.9	7	1.33
48	1.2		

CLOSURE:

In order to brew $11\frac{1}{4}$ cups of coffee, I need $4\frac{1}{2}$ tablespoons of coffee grinds. How much coffee can I make with 1 tablespoon of coffee grinds? ~~How much coffee grinds do I need for 1 cup of coffee?~~

$$\frac{11\frac{1}{4}}{4\frac{1}{2}} = \frac{\frac{45}{4}}{\frac{9}{2}} = \frac{45}{4} \div \frac{9}{2} = \frac{45}{4} \cdot \frac{2}{9} = \frac{5}{2} = 2\frac{1}{2} \text{ cups}$$

TEACHER NOTES:

Need to teach complex fractions before teaching ratios of complex fractions. Maps to lesson 11 of Mod 1, Grade 7. Paired with lesson 12 also.

Give Lesson 11 Exercises as HW.

Or Glowing rectangles as classwork/HW?