Notes:

Ratios, Rates, & Proportions

Created for you by Ms. Nhotsoubanh

Definitions:

1. **Ratio:** A comparison of two numbers by division.
A ratio can be written in three ways:
   - as a fraction $\frac{17}{25}$,
   - with a colon 17:25, or
   - with words 17 to 25.

2. **Rate:** when the quantities in a ratio have ***different units.***

Example: $\frac{160\ miles}{2\ hours}$

3. **Unit rate:** when a rate has a denominator of 1. To find a unit rate, divide the numerator by the denominator.

Example: $\frac{\boldsymbol{160\ miles}}{\boldsymbol{2\ hours}}$ is the same as $\frac{\boldsymbol{80\ miles}}{\boldsymbol{1\ hour}}$ or 80 miles **per** hour.

4. **Proportion:** An equation that shows that two ratios are equivalent(equal).

Example: $\frac{\mathbf{16}}{\mathbf{20}} = \frac{\mathbf{4}}{\mathbf{5}}$

In a proportion, the **cross products** are equal. $\frac{\mathbf{16}}{\mathbf{20}} = \frac{\mathbf{4}}{\mathbf{5}}$

5. **Complex Fraction:** A fraction that has a fraction in its numerator, denominator, or both.

Examples:

1. $\frac{\frac{1}{2}}{10}$ is the same as $\frac{1}{2} \div 10$	2. $\frac{12}{\frac{2}{5}}$ is the same as $12 \div \frac{2}{5}$	3. $\frac{\frac{2}{3}}{\frac{4}{5}}$ is the same as $\frac{2}{3} \div \frac{4}{5}$

Name: Key

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Glue on page 30

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1. Do these ratios form a proportion? Explain.

$7(5)=35$ $12(4)=48$ no, b/c their cross products are not equal.

$\frac{7}{12}$ and $\frac{4}{5}$

"bottoms up" cross products

$35 \neq 48$

2. Solve for x.

cross mult, solve for x

$\frac{8}{2x-5}=\frac{2}{10}$

$2(2x-5)=8(10)$

$4x-10=80$

$+10 \quad +10$

$\frac{4x}{4}=\frac{90}{4}$

$x=22.5$ or $22\frac{1}{2}$

3. Three gallons of gas cost $9.45. At this rate, how much would 12 gallons of gas cost?

$\frac{\text{cost}}{\text{amount}}=\text{unit rate}$

$\frac{\$9.45}{3\text{gal}}=\$3.15/\text{gal}$

$3.15(12)$

$=\$37.80$ for 12 gallons

4. Which is the best buy? C cheaper

	Product	Amount	Price	Unit Price
A	Eggland's Best	1 Dozen (12 eggs)	$3.79	$0.32
B	Stop and Shop's Brand	0.5 Dozen (6 eggs)	$1.29	$0.22
C	Stop and Shop's Brand	1.5 Dozen ($12+6=18$ eggs)	$1.99	$0.11

A: $\frac{\text{cost}}{\text{amount}}=\text{unit rate}$; $\frac{\$3.79}{12}=\$0.32/\text{egg}$

B: $\frac{\$1.29}{6}=\$0.22$ per egg

C: $\frac{\$1.99}{18}=\$0.11/\text{egg}$

HOMEWORK

Use pages ~~31 – 33~~ 32 – 34 to show your work.

1. Translate the following sentence into an algebraic equation. Then solve the equation.

Five more than the product of a number and 3 is negative twelve.

2. At Faith's Farm, 70 ounces of dried cranberries costs $5.60. At Eneida's Farm, 25 ounces of dried cranberries costs $2.25. Which farm has the best price? Explain your answer.

3. Grant spent $524.00 for hockey tickets. This cost included a $8.20 service fee for the order, and the 4 hockey tickets. What is the cost of each ticket?

Solve for each proportion.

4. $\frac{x+4}{3}=\frac{7}{2}$	5. $\frac{5n+1}{8}=\frac{1}{2}$
6. $\frac{3x-2}{8}=\frac{5}{4}$	7. $\frac{2m+3}{6}=\frac{m-9}{8}$

8. Jaidan hikes $\frac{1}{2}$ mile every $\frac{1}{4}$ hour. Max hikes $\frac{1}{3}$ mile every $\frac{1}{6}$ hour. How far do they hike in 2 hours?

9. Graph the inequality: $-6 < x \leq 3$. Then state the solution set.

10. Solve for x:

$$\frac{2}{5}x+\frac{1}{6}>\frac{1}{2}x$$