Unit 12
Ratios and Percentages

Math Essentials

1

Ratios

Ratio: the quotient of two quantities.

$\frac{a}{b}$, or a:b is the ratio of a to b

Example: The ratio of 7 to 8 is $\frac{7}{8}$ or 7:8

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Practice   12.1

Write 1/5 using two other notations.

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Practice 12.2

There are 7 roses in a vase of 12 flowers. The rest are daisies.

1. What is the ratio of daisies to roses?
2. What is the ratio of daisies to all flowers in the vase?

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Rates

Rate: a ratio is used to compare two different kinds of measure

Examples:
- He drove the car at 50 mph.
- She drank 5 cups of coffee per day.
- The bananas cost 50 cents per pound.

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Practice 12.3

Round answers to the nearest hundredth.

1. A color printer prints 13 pages in 7 minutes. How many pages does it print per minute?
2. It takes 40 pounds of seed to completely plant a 7-acre field. How many acres can be planted per pound of seed?

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Remember?

True or false?

1. $\dfrac{4}{5} = \dfrac{8}{10}$

2. $\dfrac{2}{3} = \dfrac{8}{15}$

3. $\dfrac{1}{6} = \dfrac{5}{35}$

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Cross Multiply

$$\dfrac{2}{3} \neq \dfrac{4}{6}$$

$$2 \times 6 = 3 \times 4$$

8

ONLY cross multiply over an…

EQUAL SIGN!!!!!

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Proportions

•When two numbers have the same ratio,
 they are proportional.

To check if two fractions are equal, you can…

1. **Simplify** each fraction   OR

2. Check if their **cross products** are equal.

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Practice   12.4

What value for x would make this proportion true?

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

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Solving Proportions

To solve proportions, set the cross products equal to each other and divide to isolate the variable.

In other words,

1. Cross multiply

2. Divide

12

ONLY cross multiply over an...

==EQUAL SIGN!!!!!==

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Practice   12.5

Solve the following for the variable.

1. $\dfrac{x}{7} = \dfrac{5}{3}$

2. $\dfrac{3.4}{4.93} = \dfrac{10}{n}$

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Practice 12.6

Donna drives her delivery van 800 mi in 3 days. At this rate, how far will she drive in 15 days?

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Practice 12.7

To control a fever, a doctor suggests that a child who weighs 28 kg be given 320 mg of a liquid pain reliever. If the dosage is proportional to the child's weight, how much of the medication is recommended for a child who weighs 35 kg?

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A	90% - 100%
B	80% - 89%
C	70% - 79%
D	60% - 69%
F	0% - 59%

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Percent Notation

n% means "n per hundred"

Examples:

- Humans start 84% of the wildfires in the United States.
  Data: Proceedings of the National Academy of Sciences
- Over an average lifetime, a person spends 29.7% of the time sitting and 0.69% of the time exercising.
  Data: CensusWide/Reebok poll of 18,000 people in nine countries

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Percent Notation

$n\%$ means "n per hundred"

$n\% =$ the ratio of n to $100 = \dfrac{n}{100}$ (ratio)

$n\% = n \times \dfrac{1}{100}$ (fraction)

$n\% = n \div 100$ (decimal)

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Practice   12.8

Write 67.8% as a ratio, fraction, and decimal.

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Converting Percents to Decimals

1. Replace the percent symbol (%) with $\div\ 100$

$$36.5\% = 36.5 \div 100 = \dfrac{36.5}{100}$$

2. Divide by 100
    (move decimal two places left)

$$0.365$$

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Practice   12.9

Write each of the following as decimals.

1. 78%

2. 4.9%

3. 6%

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Converting Decimals to Percents

1. Multiply by 100
    (Move the decimal two places to the right)
    $$0.675 \times 100\%$$
2. Write a % symbol.
    $$67.5\%$$

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Practice   12.10

Write each of the following as percents.

1. 0.8

2. 5.6

3. 0.149

4. 0.00325

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Practice   12.11

1. Write 1.32 as a percentage.
2. Write 0.3% as a decimal.

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Converting Percents to Fractions

1. Write the percent as a ratio.

$$30\% = \frac{30}{100}$$

2. Simplify, if possible.

$$\frac{30}{100} = \frac{3}{10}$$

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Practice   12.12

Write each as a simplified fraction.

1. 3%
2. 78%
3. 4.9%

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Practice 12.13

Write as a percentage.

1. $\dfrac{9}{100}$

2. $\dfrac{5}{10}$

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Converting Fractions to Percents

1. Divide to find the decimal.

   $\dfrac{3}{5} = 0.6$

2. Convert the decimal to a percent.

   $0.6 = 0.60 = 60\%$

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Practice 12.14

Write as a percentage. Round your answer to the nearest tenth of a percent.

$$\dfrac{4}{41}$$

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Practice   12.15

Write the fraction as a percentage.

In a certain class, $\frac{13}{50}$ of the students got problem wrong on Friday's math test.

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