

Lesson 8.1& 8.2a (F'11)

- Objective:
1. To form ratios
 2. To solve proportions
 3. To use proportions to solve problems
 4. To find the “best buy” using the scaling method” and the “unit rate strategy”
 5. To find the actual length of a scale drawing.
 6. To know the meaning of percents

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Ratio- For any two rational numbers a and b , the ratio of a to b is the fraction $\frac{a}{b}$, $b \neq 0$.

Ratios are often encountered in everyday life.

1. The student to teacher ratio is 24 to 1.
2. There is a 2-to 3 ratio of Democrats to Republicans in the state.
3. The ratio of males to females in this class is 1 : 15
Does this tell us the class size? _____
How many males and females are in the class if there are 32 students?

A ratio can be written in three ways $\frac{a}{b}$, a to b, or a:b

Ratios are usually used to compare quantities.

Example:

At a basketball practice Megan **missed** 18 free throws out of 45 attempts. How many did she **make**? _____

Try This—Find and reduce:

- a. The ratio of the number of shots made to the number of shots attempted. (part to whole)
- b. The ratio of the number of shots missed to the number of shots made. (part to part)
- c. The ratio of the number of shots made to the number of shots missed. (part to part)
- d. The ratio of the number of shot missed to the number of shots attempted.(part to whole)
- e. The ratio of the number of shots attempted to the number of shots missed. (whole to part)

One-ninth of the students at the local high school are non-swimmers.

What **fraction** of the students are swimmers? _____

What is the **ratio** of non-swimmers to swimmers? (simplify) _____

What is the **ratio** of swimmers to non-swimmers? (simplify) _____

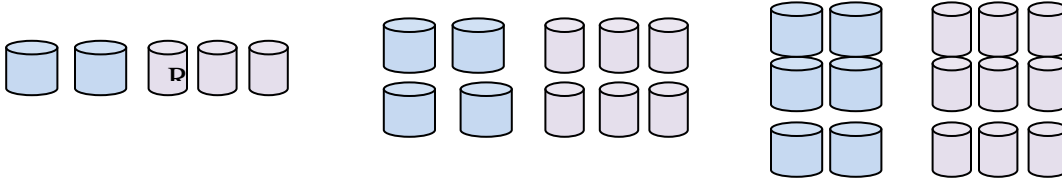
If 900 students attend, how **many** students are non-swimmers? _____

How **many** students are swimmers? _____

Proportions

If we want to make a recipe that calls for 2 cups of water for every 3 cups of rice, we can say that the ratio of water to rice is $\frac{2}{3}$. We can double the recipe by adding 4 cups of water and 6 cups of rice etc.

Let's look at this using a picture:



In table form:

Cups of water	2	4	6	8	10	12
Cups of rice	3	6	9	12	15	18

The ratios $\frac{2}{3}$, $\frac{4}{6}$, $\frac{6}{9}$ are equal and are said to be proportional.

If two ratios are equal, then they are **proportional** to each other.

Two ratios are proportional if, and only if, the fractions representing them are equal.

Try this--True or False

- $\frac{2}{3}$ and $\frac{8}{12}$ are proportional?
- $\frac{3}{4}$ and $\frac{4}{5}$ are proportional?
- At basketball practice, Megan made 27 of 45 free throws attempted and Sonja make 24 of 40 attempts. Which player appears to be the better shooter?

Property of Proportions

If a, b, c, and d are all real numbers, and $b \neq 0, d \neq 0$, then the proportions $\frac{a}{b} = \frac{c}{d}$ is true if, and only if, $ad = bc$.

Sometimes one term in a proportion is missing. We can use our proportion property to find it.

Try this--SOLVE:

1. $\frac{28}{49} = \frac{x}{21}$ 2. $\frac{35}{63} = \frac{20}{x}$ 3. $\frac{1}{2} = \frac{x}{\frac{1}{4}}$

4. David bought four shirts for \$100. How much would it cost him to buy nine shirts at the same price?
- a. Solve by setting up a table to form a proportion.

Number of shirts		
Cost		

The number of shirts and the cost **vary proportionally**.

Number of shirts (n)	4	9	8	12
Cost (c)	\$100	\$225	\$200	\$300

We say that n is proportional to c or n varies proportionally to c or n varies directly to n.

In this case , $c = 25n$ for every c and n. 25 is the **constant of proportionality**.

DEFINITION

If the variables x and y are related in the equality $y = kx$ ($k = \frac{y}{x}$), then y is said to be **proportional** to x and k is the **constant of proportionality** between y and x .

In the ratio of a/b , a and b do not have to be integers. Also it is important to note the units used in a proportion.

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Scaling Strategy or Unit Rate Strategy

Scaling Strategy

Scaling-(Cost for a common number of tickets)

If 12 tickets cost \$15.00 or 20 tickets cost \$23.00, then which is the better buy?

Find the LCM(12, 20) = _____

Then find the cost of _____ tickets at each rate.

Unit Rate Strategy

Unit rate—find the cost per ticket

If 12 tickets cost \$15.00 or 20 tickets cost \$23.00, then which is the better buy?

Try this--Use the scaling strategy and the unit-rate strategy to find the Best Buy for each of the following.

1. 16 books for \$19.20 or 20 books for \$25.00
2. 12 notebooks for \$15.60 or 15 notebooks for \$19.80.

Property

For any rational numbers $\frac{a}{b}$ and $\frac{c}{d}$,

1. $a \neq 0, c \neq 0$ $\frac{a}{b} = \frac{c}{d}$ if, and only if, $\frac{b}{a} = \frac{d}{c}$
2. $b, c, d \neq 0$ $\frac{a}{b} = \frac{c}{d}$ if, and only if, $\frac{a}{c} = \frac{b}{d}$

Scale Drawing

Scale- is the ratio of the size of a drawing to the size of the object.

EXAMPLE

1. On a map in an atlas, one centimeter represents 250 miles. If the straight line distance from Chicago to St. Louis measures $1\frac{1}{10}$ cm. On the map, what is the approximate distance from Chicago to St. Louis?

Percents

Percent-Comes from the Latin per centum which means per hundred

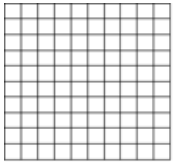
3% interest at a bank means the bank pays \$3 for every \$100 invested (yearly)

30% chance of rain

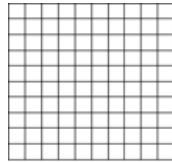
DEFINITION OF PERCENT: $n\% = \frac{n}{100}$

Examples: Represent each percent by using a hundred grid._(concrete)

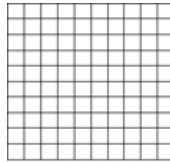
1. 15%



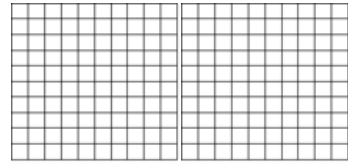
2. 50%



3. 100%



4. 200%



Since $n\% = \frac{n}{100}$ then $42\% = \underline{\hspace{2cm}}$ $19\% = \underline{\hspace{2cm}}$

$3.5\% = \underline{\hspace{2cm}}$ $200\% = \underline{\hspace{2cm}}$

$\underline{\hspace{2cm}}$

$\underline{\hspace{2cm}}$

$\underline{\hspace{2cm}}$

Convert each number to a percent.

1) $\frac{1}{4} =$

Method 1 $\frac{1}{4} \cdot \frac{25}{25} = \frac{25}{100} = 25\%$

Method 2 $\frac{1}{4} = \frac{1}{4} \times 100\% = 25\%$

Method 3 $\frac{1}{4} = \frac{n}{100}$

TRY THESE:

Convert to a percent.

1. $\frac{4}{5}$ 2. $\frac{7}{10}$ 3. $\frac{3}{8}$

Write each percent as a decimal.

4. 6% 5. 7.2% 6. $\frac{1}{3}\%$

Class work

Homework Course Compass Sections 8.1 and 8.2_(start) page
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