

## 6.4, 7.4 Notes

### 6.4, 7.4: Ratios, Proportions, and Percents

Definition: A ratio is a comparison between two given quantities and is usually written with a : or as a fraction.

Example: If there are 7 boys and 20 girls in a class, what is the

(a) boy to girl ratio?

(b) boy to class ratio?

(c) girl to class ratio?

Definition: A proportion is a statement that two given ratios are equal.

Example: Show that the ratio of 1 cup of orange juice concentrate to 2 cups water (1:2) is equivalent to 3 cups concentrate to 6 cups water.

Cross Multiplication is a nice method, but we should ensure that students gain understanding prior to teaching them this. Let's find some alternative methods in the following example.

Example: You go to the grocery store to buy a jar of peanut butter. The 16 oz jar costs \$1.79 and the 40 oz jar costs \$3.79. Which is a better deal?

Note: Ratios do not tell quantities but relative quantities.

Example: If just given a boy to class ratio of 1:2, we cannot determine how many boys are in the class.

Example: Given that the class size is 36 and the boy to class ratio is 1:3, determine the number of boys and girls in the class.

Fact: All rules of fractions apply to ratios, and all rules of equality of fractions apply to proportions.

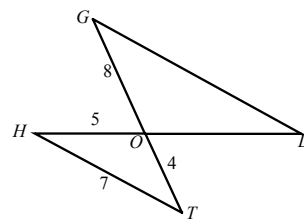
Theorem: If  $a, b, c,$  and  $d$  are real number with  $b \neq 0$  and  $d \neq 0$ , then the proportion  $\frac{a}{b} = \frac{c}{d}$  is true if and only if  $ad = bc$ .

Proof: Consider this as equality of fractions, which was already proven.

Example: If it takes 1 cup of flour to bake 24 cookies and you want to bake 60 cookies, how many cups of flour will you need?

Proportions come up in Math 222. Consider the following example.

Example: The two triangles below have the property that  $\triangle HOT \sim \triangle DOG$ . (Meaning corresponding sides have the same proportions.) Find the values of  $x$  and  $y$ .



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Definition: A percent, written with % at the end, is the number of parts out of 100 represented by a given number. That is  $n\% = \frac{n}{100}$ .

What is 1 whole as a percent?

What would 200% represent?

Example: Convert the following fractions to percents.

(a)  $\frac{2}{5}$

(b)  $\frac{3}{20}$

Example: Convert the following decimals to percents.

(a) 0.23

(b) 0.4785

(c)  $1.\overline{16}$

Example: Convert the following percents to fractions.

(a) 18%

(b)  $33.\overline{3}\%$

Let's come up with a rule for converting decimals to percents.

The following are types of problems your students may encounter.

What is 20% of 35?

14 is what percent of 35?

21 is 60% of what number?

At a local grocery store, 15% of the vegetables met the Organic classification. If the store has 2500 vegetables in stock, how many of the vegetables met the Organic classification?

The following are types of problems your students may encounter.

There are 320 frozen vegetables in a bag containing corn, green beans, and peas. If the bag contains 144 peas, what percentage of the vegetables in the bag are peas?

A laptop is bought and then sold one year later for \$630, 10% less than what was originally paid for it. How much was paid for the computer originally?

Wal-Mart has a discount item rack that has an old version of a calculator on sale for 10% off, which amounts to a \$5 discount. How much was the calculator originally? If the manager increases the discount to 20%, how much does the calculator cost now?