

Math 4. Class Work 21

Ratios and percent

- **The ratio** of two numbers indicates how many times one number is larger than another or which part of one number the other number is. We can write the ratio of two numbers in the several ways:

a to b, a:b, $\frac{a}{b}$

- **1 percent** of quantity is a $\frac{1}{100}$ th part of it.

1% of this line is shaded green: it is very small, isn't it?



Examples.

Example 1. Find 15% of 200.

You can think about this in the following way: to find 15% of 200 we need to divide 200 in 100 parts (find 1% of 200) and then multiply the result by 15 (find how much are 15×1%)



$$\frac{200}{100} \cdot 15 = 2 \cdot 15 = 30$$

But since $\frac{200}{100} \cdot 15 = 200 \cdot \frac{15}{100} = 0.15 \cdot 200$

We will usually do: 15% is $\frac{15}{100}$ or 0.15 and multiply by the number, or 15% of 200 = $\frac{15}{100} \cdot 200 = 0.15 \cdot 200 = 30$ (so this is a multiplication problem)

Example 2.

If 8% of a number is 12, what is the number?

We need to solve the equation 8% of $x = 12$ or $\frac{8}{100} \times x = 12$

To find the unknown, divide 12 by 8%

$$12: \frac{8}{100} = 12 \times \frac{100}{8} = 150$$

Example 3.

Fresh cranberries contain 90% of water. How much water should be evaporated from 4.25 kg. fresh cranberries to obtain dry cranberries? This means that cranberries are 9 parts water and 1 part solid content! To find out how much water is in 4.25 kg. of fresh cranberries, we need to calculate:

$$4250 \cdot \frac{90}{100} = 4250 \cdot \frac{9}{10} = 3825g.$$

So, there are 3825 g. of water and 425 g. of fiber/sugar/vitamins and other minor components of cranberries.

Problems

1. **Multiply** the decimals (review)

a) $0.15 \times 30 =$

b) $23 \times 1.3 =$

c) $2.1 \times 0.90 =$

2. How many squares do we have to shade to show 10% of the line, 15%, 20%, 25%?



3. There are 200 pencils in the box. 3% of the pencils are red, 26% are yellow, and the rest are blue. How many red pencils are in the box?



4. Find the percent of a number

a. 1% of 100

b. 7% of 200

c. 100% of 49

d. 120% of 250

e. 5% of 50

5. What is the unknown number if

a. 1% of it is 2

b. 10% of it is 12

c. 15% is 150;

d. 3% of it is 0.24

6. Mrs Thomas used the following recipe to make a drink:

Pineapple juice: 2 parts

Mango juice: 3 parts

Apple juice: 5 parts

a) If she wants to make 5 liters of this drink, how much of each type of juice is needed?

b) What percentage of the 5-liter drink is pineapple juice?

7. 15% of the participants in a math Olympiad solved 1 problem, 25% of the participants solved 2 problems, and the rest 24 students solved all three problems. How many students participated in the math Olympiad?

8. Bronze is an alloy of tin and copper. (Tin and copper are metals; they are melted together to form an alloy called bronze). How much copper and how much tin are there in an 80 kg piece of bronze if the ratio of tin to copper in bronze is 3 to 17?



9. Density is defined as the mass of the object divided by its volume (the space it takes).

$$\text{density} = \frac{\text{mass}}{\text{Volume}}$$

Let us explore the Phet simulation about density (use the Google Classroom link)

Select **Intro** part and **Wood**.

- What is the density of wood?
- Increase the volume to maximum. What happens with the mass? What is the density?
- What will the mass of the wood be if the volume increases to 10 L?
- What is the density of an object so that it is just under the water line but doesn't sink?
- Can you tell how much of the volume is underwater?