Math 4a. Class work 16.

Algebra.

Ratio and percent.

There are two ways to compare natural numbers. We can subtract the larger number from the smaller one and we can divide one number by another. In the former case, we will find how much the first number is bigger than the second number and in the latter case we will know what part of the second number the first number is (or how many times the first number contains the second). For example: in a fourth grade, there are 80 boys and 100 girls. So, there are 20 more girls than boys ($100 - 80 = 20$), and the number of boys is $\frac{4}{5}$ of the number of girls ($80 \div 100 = \frac{80}{100} = \frac{4}{5}$), number of boys (80) contains number of girls (100) $\frac{4}{5}$ times. When we compare things using the division we also use the word *ratio*.

> 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:

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

Example: To make pancakes we use 3 cups of flour and 2 cups of milk.

So the ratio of flour to milk is **3 : 2,** which means that for each 2 cups of milk we need to have 3 cups of flour. To make pancakes for a LOT of people we might need 4 times the quantity, so we multiply the numbers by 4:

$$(3 \cdot 4) : (2 \cdot 4) \; = \; 12 : 8 \qquad \left(\frac{3 \cdot 4}{2 \cdot 4} = \frac{12}{8}\right)$$

In other words, 12 cups of flour and 8 cups of milk.

The ratio is still the same, so the pancakes should be just as yummy.

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

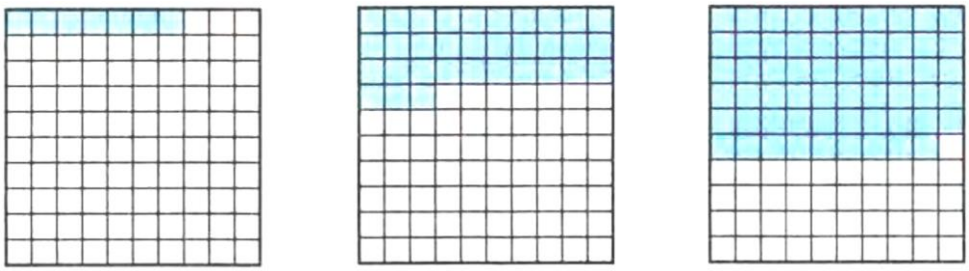
1. One percent (**1%**) means 1 per 100.

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

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

3. In a department store, there is a sale of 25% off on everything. How much does the dress cost if its price before sale was $80? How much this dress will cost if an additional sale of 30% of will be applied?

4. What percent of each square is shaded on the picture below?



5. There are 40000 books in a library. 75% of all books are in English,10% of all books are in Spanish and the rest of the books are in French and German. How many books are there in the library in English and in Spanish?

6. Grapes were dried to resin. During the process, the weight of grapes was reduced by 70%. How many kilograms of resin was produced from 200 kg of grapes? How many kilograms of grapes were dried if the weight of obtained resin is 15 kg?

7. Julia have to write a 32-pages paper in 3 days. On the first day she wrote $\frac{3}{8}$ of the whole paper, one the second day she wrote $\frac{1}{4}$ of the paper. How many pages does she need to write on the third day?

8. In a dried fruit mix, there are 7parts of dried apples, 4 parts of dried pears and 5 parts of dried apricots. What is the weight (how many grams) of apples, pears, and apricots in the fruit mix, if the total weight of the mix is 1600g?

9. In order to prepare a homemade dried fruits and nuts mix Mary took 6 parts of raisins, 5 parts of dried cranberries and 3 parts of walnuts. Cranberries and walnuts altogether weighted 2 kg 400 g. What was the weight of the mix that Mary prepared?

10. Evaluate:

$$\frac{2.7}{3.6};\quad \frac{7.2\cdot 2.8}{3.5\cdot 0.64};\quad \frac{5\frac{1}{7}}{3\frac{3}{14}};\quad \frac{1\frac{1}{3}\cdot 2\frac{3}{11}\cdot 3\frac{1}{2}}{\frac{1}{2}\cdot 4\frac{1}{6}\cdot 3\frac{9}{11}}$$

11. How the square was cut to combine the figures below.