

Math 4c. Class work 21.



Let's talk a little more about ratio and solve a few more problems about it.

**Example 1:** There are 750 students in a school. The ratio of boys to girls in this school is 7:8 (7 to 8). How many girls and how many boys are in this school?

$$\frac{7}{8} = \frac{7x}{8x}$$

If  $x$  is 1, then there are 7 boys and 8 girls in the class. In any other cases number of girls and number of boys will be multiples of 7 and 8 with the same common factor  $x$ . For example, 14 and 16, or 21 and 24. The ratio of the number of boys to girls always the same:

$$\frac{7}{8} = \frac{14}{16} = \frac{21}{24}$$

$x$  is representing the "unit part" of the whole, in this case, the total number of students of the school. 7 such part are boys and 8 such part are girls.

Therefore, we can write the equation:

$$7x + 8x = 750, \quad x(7 + 8) = x \cdot 15 = 750, \quad x = 750:15 = 50$$
$$50 \cdot 7 = 350, \quad 50 \cdot 8 = 400$$

There are 350 boys and 400 girls in the school. The equation:

$$x(7 + 8) = 750$$

Shows that for each 7 boys there are 8 girls, and there are 50 such groups of 7 boys and 8 girls among 750 students of this school.

**Example 2:** If the ratio of chocolates to vanilla ice-cream cones in a box is 3:5 and the number of chocolates is 18, find the total number of ice-cream cones in the box.



As in the previous example, we can right an equation:

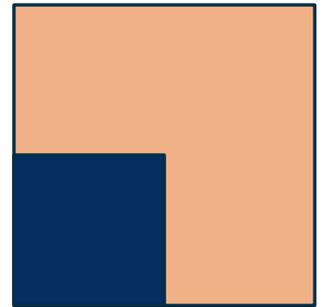
$$x(3 + 5) = \text{total number of cones.}$$

Were  $x$  represent the "unit part". Also, we know that  $x \cdot 3 = 18$ . And  $x = 18:3 = 6$ , there are 6 groups of 3 chocolate and 5 vanilla ice cream cones in the box. Total number of cones is  $6(3 + 5) = 6 \cdot 8 = 48$ . Ratio of *choc. to vanilla* =  $\frac{18}{30} = \frac{3}{5}$

The length of the side of one square is twice the length of the side of another square. What is the ratio of the area of the first square to the second?

We don't know the sides of the squares, so let's  $a$  be the side of the first square, and the side of the second square is  $2a$ . Area of the first square is  $a \cdot a$ . Such product is also called "second power" of  $a$ .

The area of the second square is  $2a \cdot 2a = 2 \cdot 2 \cdot a \cdot a = 4a \cdot a$ . The ratio of areas is  $\frac{a \cdot a}{4 \cdot a \cdot a} = \frac{1}{4}$ , the second square is 4 times as big as the first.



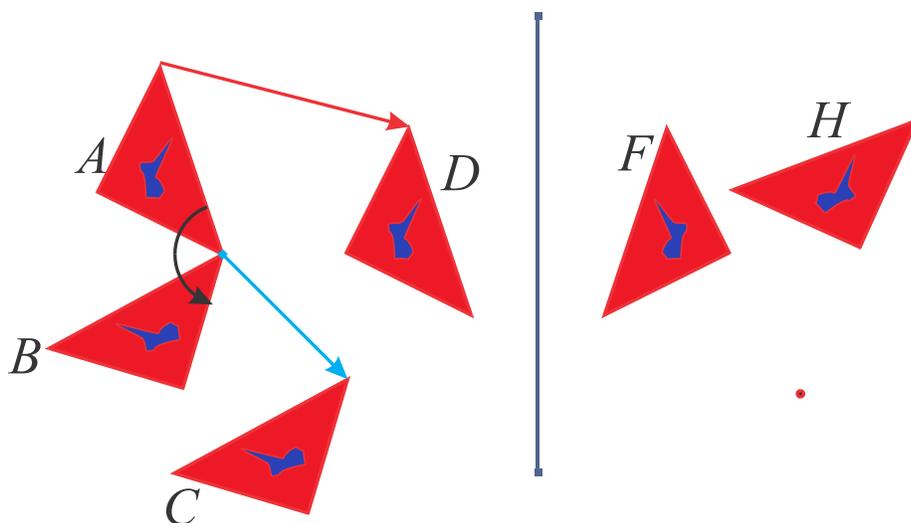
Exercises:

1. The length of the side of one square is half the length of the side of the second square. What is the ratio of the perimeter of first square to the perimeter of second?
2. The farmer had 18 cows. He decided to divide the cows between his three sons, in the ratio 1:2:3, from youngest to oldest. How many cows should each of them get?
3. The perimeter of a rectangle is 294 meters. The ratio of its length to its width is 5:2. Find the area of the rectangle.
4. The angles of a triangle are in the ratio 1:3:8. Find the measures of the three angles of this triangle.

Rigid Motion:

Any way of moving all the points in the plane such that

- a) the relative distance between points stays the same and
- b) the relative position of the points stays the same.



There are four types of rigid motions that we will consider: translation, rotation, reflection, and glide reflection.

