Math 4b.   **Fractions division**
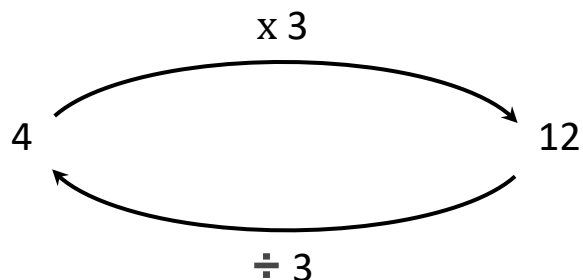
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Let's have a look at the example:

$$4 \times 3 = 12$$
$$12 \div 3 = 4$$
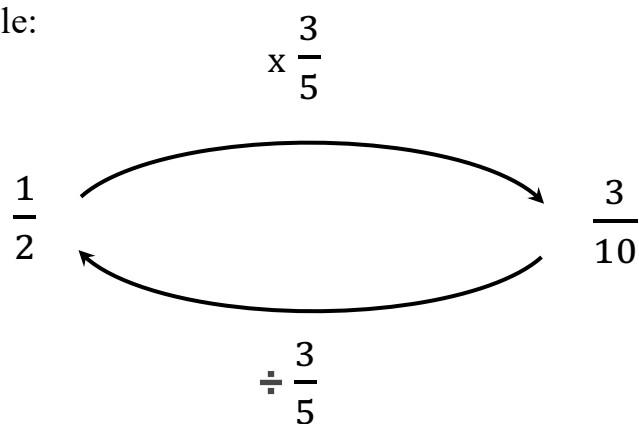
x 3

4   12

$\div$ 3

'Multiplying by 3' changes 4 to 12. But 'dividing by 3' changes 12 to 4 again.

We can use this idea to fractions. For example:

$$\frac{1}{2} \times \frac{3}{5} = \frac{3}{10}$$

$$\frac{3}{10} \div \frac{3}{5} = \frac{1}{2}$$

x $\frac{3}{5}$

$\frac{1}{2}$ $\frac{3}{10}$

$\div \frac{3}{5}$

We can notice that the multiplication of $\frac{3}{10}$ by the fraction $\frac{5}{3}$ will bring exactly $\frac{1}{2}$:

$$\frac{3}{10} \times \frac{5}{3} = \frac{1}{2}$$

$\frac{5}{3}$ is an **inverse** fraction of $\frac{3}{5}$, they are also called **reciprocals** of each other.

To divide one fraction by another we need to multiply the dividend by the inverse (reciprocal) fraction.

Two fractions are reciprocals (or inverse) if their product is 1. Examples of reciprocals:

$$\frac{1}{4} \cdot \frac{4}{1} = 1 \qquad \frac{3}{5} \cdot \frac{5}{3} = 1 \qquad \frac{4}{7} \cdot \frac{7}{4} = 1$$

Let's solve a problem with fractions:

Peter solved 12 math problems, and it's $\frac{3}{5}$ of his assignment. How many problems Peter need to solve to do his assignment?

If 12 is $\frac{3}{5}$, one fifth will be 12:3, and then it needs to be multiple 5, to find out how much the whole assignment is.

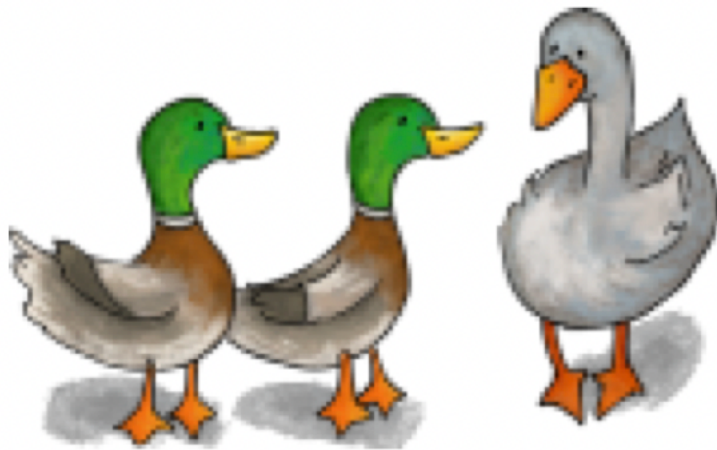$$12:3\cdot 5 = \frac{12}{3}\cdot 5 = 12\cdot \frac{5}{3} \quad \text{or} \quad 12:\frac{3}{5};$$

To find a number by its known part, we need to divide the known part by a fraction representing this part.

Homework

1. 60 fourth graders like the "Harry Potter" movie. This is 3/5 of the number of students in the 4th grade. How many students are there in the 4th grade?

2. Painter painted $\frac{2}{7}$ of the house in 4 days. How many days will it take him to paint the whole house?

3. Evaluate:

   a) $\frac{3}{3}:\frac{5}{7}$ b) $\frac{1}{4}:\frac{1}{2}$ c) $\frac{3}{4}:\frac{1}{2}$ d) $\frac{4}{9}:\frac{8}{9}$

   e) $2:\frac{1}{7}$ f) $4:\frac{3}{5}$ g) $\frac{2}{3}:4$ h) $\frac{10}{21}:5$

4. $\frac{1}{7}$ of all students in the class is 4. How many students are there in the class?

5. $\frac{2}{5}$ of all students in a class is 10. How many students are there in a class?

6. 4 little ducklings and 5 little geese weight 4 kg and 100 g. 5 little ducklings and 4 little geese weight 4 kg. How much does one little goose weight?

7. Fill the shapes A, B, and C with five four-cell shapes provided on the right (using each of 5 shapes only once). Illustrate the solution on quadrille paper, using colored pencils to distinguish 5 shapes.