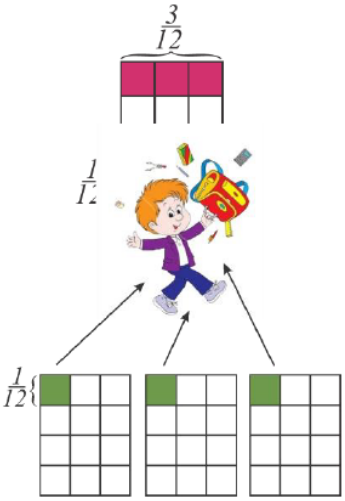
Fractions.

A fraction (from Latin: fractus, "broken") represents a part of a whole.

Look at the picture on the right:

the whole chocolate bar is divided into 12 equal pieces:

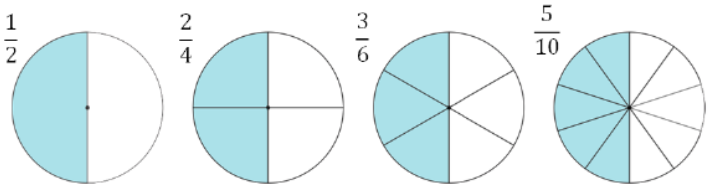
$$1\ (whole\ chocolate\ bar): 12(equal\ parts) = \frac{1\ (whole\ chocolate\ bar)}{12(equal\ parts)} = \frac{1}{12}(of\ the\ whole\ chocolate\ bar)$$



To divide 3 chocolate bars among 12 kids we can give each kid $\frac{1}{12}$ of each chocolate bar, altogether

$$\frac{1}{12}+\frac{1}{12}+\frac{1}{12}=3\times\frac{1}{12}=\frac{3}{12}=\frac{1}{4}=3\div 12$$

Some fractions can look different, but represent exactly the same part of the whole.



$$\frac{1}{2}=\frac{2}{4}=\frac{3}{6}=\frac{5}{10};\qquad \frac{1}{2}=\frac{1\cdot 2}{2\cdot 2}=\frac{1\cdot 3}{2\cdot 3}=\frac{1\cdot 5}{2\cdot 5}$$

We can multiply the numerator and denominator of a fraction by the same number (not equal to 0), and the fraction will not change; it's still the same part of the whole. We are only dividing the whole into smaller parts and taking more such parts: if parts are twice smaller (denominator is multiplied by 2), we need twice more such parts to keep the fraction the same (numerator is multiplied by 2).

This property of fractions can be used to reduce fractions. If there are common factors in the numerator and denominator, both numbers can be divided by common factors.

$$\frac{25}{35}=\frac{5\cdot 5}{7\cdot 5}=\frac{5}{7};\qquad \frac{77}{352}=\frac{7\cdot 11}{32\cdot 11}=\frac{7}{32}$$

Addition and subtraction of fractions with unlike denominators.

Let's try to add $\frac{2}{9}$ and $\frac{2}{3}$. What should we do? Why do we need to bring both fractions to the same denominator? We can add together only similar objects: apples to apples and oranges to oranges. Are two fractions $\frac{2}{9}$ and $\frac{2}{3}$ similar objects?

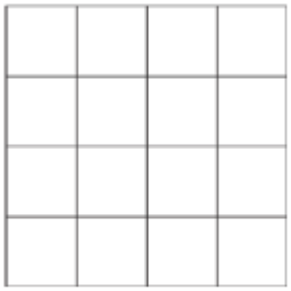
$$\frac{2}{3}=\frac{2\cdot 3}{3\cdot 3}=\frac{6}{9}$$

$$\frac{2}{9}+\frac{2}{3}=\frac{2}{9}+\frac{6}{9}=\frac{8}{9}$$

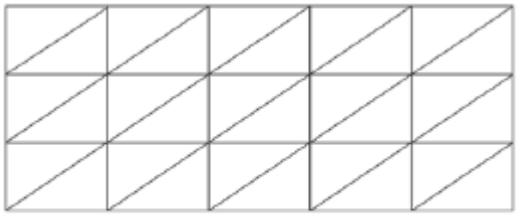
Homework:

Please, always do all the calculations carefully, step by step on a separate sheet of paper/notebook. Do not use this page for the answers

1) Shade the corresponding part of the figure (please, draw the pictures in your notebook):



$\frac{3}{8}$



$\frac{3}{15}$

2) Compare:

$d.\ \frac{1}{5}\ and\ \frac{5}{1};$ $e.\ \frac{4}{12}\ and\ \frac{3}{4};$ $f.\ \frac{2}{11}\ and\ \frac{1}{12};$

3) Bring the fractions to the common denominator:

$a.\ \frac{3}{5}\ and\ \frac{2}{3};$ $b.\ \frac{3}{4}\ and\ \frac{5}{16};$ $c.\ \frac{1}{4}\ and\ \frac{1}{6};$

4) Calculate:

$a.\ \frac{1}{5}+\frac{1}{2};$ $b.\ \frac{2}{5}+\frac{3}{10};$ $c.\ \frac{5}{9}-\frac{1}{3};$