A speech of a person or a text written on paper contain sentences. This is the way how we exchange the information between us. The information in every sentence can be a true fact, false, or sometime we just can't say anything about it. For example, the sentence:

"The Earth is rotating around the Sun" is true.

"Paris is the capital of Germany" is false.

"Math is fun!" or "What time is it?" are the sentences we can't tell either it's true or false. Can you tell which sentence is "true", "false", or we can't tell:

    a. "22 is an even number"
    b. "44 is an odd number"
   c. "1001 is a cool number!"

Let's define "a statement" as a sentence about which we can tell (sometime after difficult process of proving) either it is true or false. For example, our first sentence "The Earth is rotating around the Sun" was proved to be true after hundreds of years of discussions. The second sentence, "Paris is the capital of Germany", can be proved wrong after we will check it in the dictionary (assuming that we never took geography class). As for the third example, how we can tell is 1001 a cool number? What is "cool"? for whom?

Base on the definition, the sentence "22 is an even number" is a statement, and this is a true statement. "44 is an odd number" is also a statement, but the false one. "1001 is a cool number!" is not a statement at all.

    1. Which of the following sentences are statements?
      a. When is first day of school this year?
      b. The 4th of July is Independence Day.
      c. How beautiful is it!
      d. Washington, DC is a capital of the United States.
      e. The sum of five and three.
      f. Three times five is twenty-six.

2. Which of the following statements are true, and which are false?

   a. There are 31 days in each January.
   b. There are 28 days in each February.
   c. Sunday is followed by Tuesday.
   d. There are 7 days in each week.
   e. There are 7 letters in the word "table"
   f. The sum of all single digit natural numbers is equal to 45.
   g. Every 3-digit natural number is grater then 100.
   h. There is a greatest 5-digit natural number.
   i. There is a greatest natural number.
   j. There is a smallest natural number.
   k. $\frac{8}{15}$ of the picture are shaded.
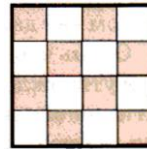
3. Come up with the true and false statements, also with the sentence, which are not statement.

4. False or true statements are following stamens?

   1) $12 + 17 = 29;$
   2) $12 + 17 \neq 29;$
   3) $12 + 17 > 29;$
   4) $12 + 17 < 29;$

   5) $12 + 17 = 28;$
   6) $12 + 17 \neq 28;$
   7) $12 + 17 > 28;$
   8) $12 + 17 < 28;$

   9) $12 + 17 \geqslant 29;$
   10) $12 + 17 \leqslant 29;$
   11) $12 + 17 \geqslant 28;$
   12) $12 + 17 \leqslant 28.$

What do you see in common among the following statements?

   a. There is 7 days in each week.
   b. The product of any number and 0 will be equal to 0.
   c. The sum of any 2 numbers does not depend on the order of numbers.
   d. Perimeter of any rectangle is equal to the sum of the lengths of its sides.
   e. The sum of 2 natural number is always divisible by 3.
   f. The product of any 2 natural numbers is greater then the sum of these numbers.
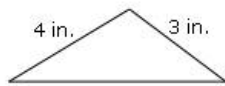
Exercises:

1. Write the algebraic expression for the following problems and evaluate it for given values of variables:

   a. There are n rears in the basket, which is $\frac{3}{7}$ of all fruits in the basket. How many fruits are there in the basket? $(n = 21)$

   b. There is x candy in a box. Chocolate candies are $\frac{4}{9}$ of all candies. How many not chocolate candies are there in the box? $(x = 36)$

   c. There are a math textbooks and b english textbooks on the shelf. 4 textbooks are for 4th grade. Which part of the textbooks are 4th grade textbooks? $(a = 5, b = 2)$

2. The volume of water increases by $\frac{1}{11}$ when it freezes. By how much the volume of ice does decrease when it melts?
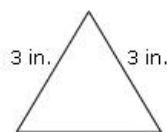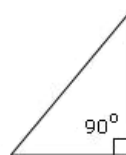
Geometry.

Triangle.

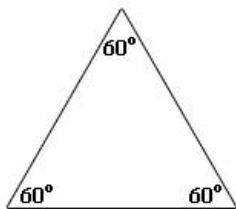Triangle is a closed figure consisting of three line segments linked end-to-end.
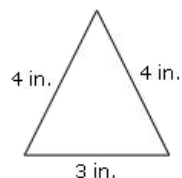
Acute triangle has all acute angles, not only 60°. Obtuse triangle has an obtuse angle. Can a triangle have more than one obtuse angle? Isosceles triangle has two equal sides. Equilateral triangle has all three sides equal. Right triangle has a right angle.

The line segment from a vertex of the triangle to the line containing the other two vertices and perpendicular to that line is called the altitude (the height). The length of this segment is also called the height of a triangle relative to its base.
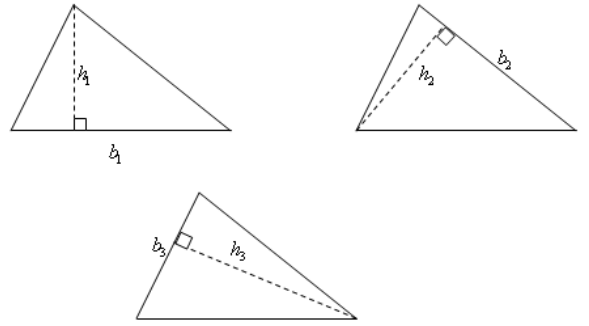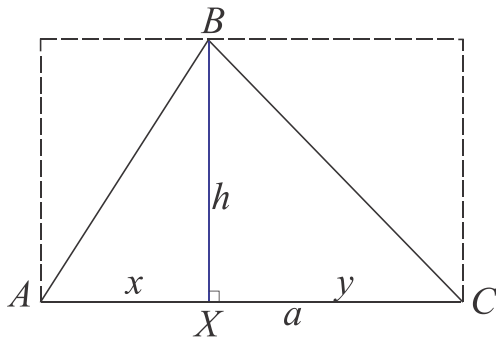
Three angles of any triangle sum to a straight angle.

Line l is parallel to line AC. Angles (3) are equal as vertical angles, angles (2) are equal and angles (1) are equal because line l is parallel to line AC.
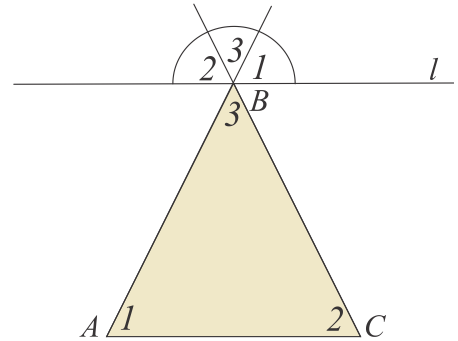
Area of the triangle.

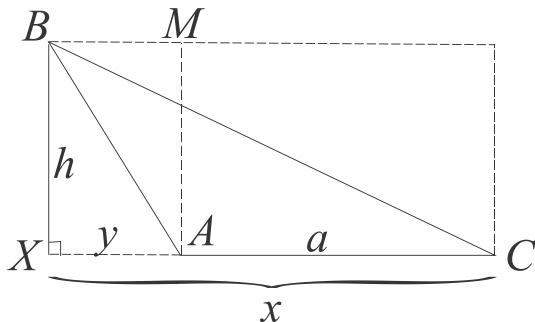$$S_\Delta = \tfrac{1}{2} h \times a$$

The area of a triangle is equal to half of the product of its height and the base, corresponding to this height.

For the acute triangle it is easy to see.

$$S_\square = h \times a = x \times h + y \times h$$

$$S_{\Delta ABX} = \frac{1}{2} h \times x, \qquad S_{\Delta XBC} = \frac{1}{2} h \times y, \qquad S_{\Delta ABC} = S_{\Delta ABX} + S_{\Delta XBC}$$

$$S_{\Delta ABC} = \frac{1}{2} h \times x + \frac{1}{2} h \times y = \frac{1}{2} h(x + y) = \frac{1}{2} h \times a$$

For an obtuse triangle, for one out of the three heights, it is not so obvious.

$$S_{\Delta XBC} = \frac{1}{2} h \times x, \qquad S_{\Delta XBA} = \frac{1}{2} h \times y$$

$$S_{\Delta ABC} = S_{\Delta XBC} - S_{\Delta XBA} = \frac{1}{2} h \times x - \frac{1}{2} h \times y$$

$$= \frac{1}{2} h \times (x - y) = \frac{1}{2} h \times a$$