

## Geometry.

A **definition** is a statement of the meaning of a something (term, word, another statement).

### **Desk**    *noun*

noun: **desk**; plural noun: **desks**

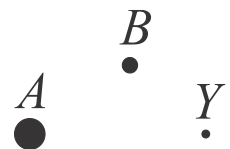
1. a piece of furniture with a flat or sloped surface and typically with drawers, at which one can read, write, or do other work.
- Music  
a position in an orchestra at which two players share a music stand.  
"an extra desk of first and second violins"
- a counter in a hotel, bank, or airport at which a customer may check in or obtain information.  
"the reception desk"

In mathematics everything (mmm,,,, almost everything) should be very well defined. In our real life, it is also very useful and convenient to agree about terms and concepts, to give them a definition, before starting using them just to be sure that everybody knows what they are talking about. Now we move to geometry.

Can we give a definition to a point? Can we clearly define what a point is?

What a line is? What a plane is? Mathematicians decided do not define terms

"point", "straight line", and "plane" and to rely upon intuitive understanding of these terms.

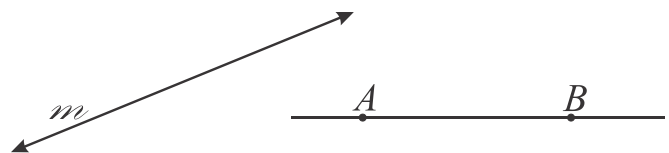


**Point** (an undefined term).

In geometry, a point has no dimension (actual size), point is an exact location in space. Although we represent a point with a dot, the point has no length, width, or thickness. Our dot can be very tiny or very large and it still represents a point. A point is usually named with a capital letter.

**Line** (an undefined term).

In geometry, a line has no thickness but its length extends in one dimension and goes on forever in both directions. Unless otherwise stated a line is drawn as a straight

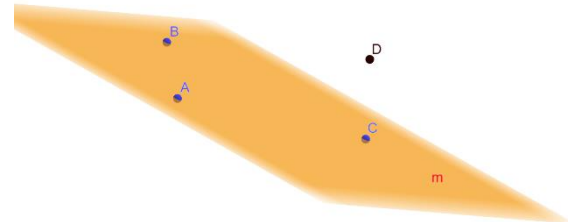
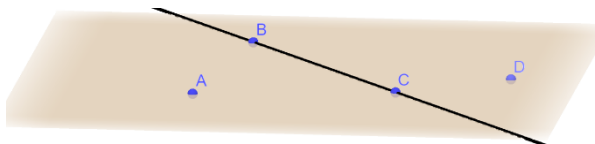


line with two arrowheads indicating that the line extends without end in both directions (or without them). A line is named by a single lowercase letter,  $m$  for example, or by any two points on the line,  $\overleftrightarrow{AB}$  or  $AB$ .

**Plane** (an undefined term).

In geometry, a plane has no thickness but extends indefinitely in all directions. Planes are usually represented by a shape that looks like a parallelogram. Even though the diagram of a plane has edges, you must remember that the plane has no boundaries. A plane is named by a single letter (plane  $p$ ) or by three non-collinear points (plane  $ABC$ ).

Points can belong to the plane or can be outside of the plane. On a plane, points can belong to the straight line, or can be positioned on either half-plane.



A set of all points of a straight line between two specific points. These points are called endpoints.

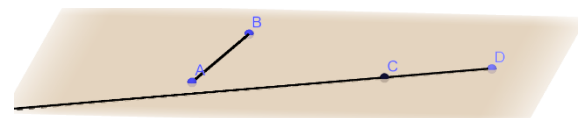
A ray is a part of a straight line consisting of a point (endpoint) and all points of a straight line at one side of an endpoint. Ray is named by endpoint and any other point, ray  $\overrightarrow{AB}$  or  $AB$  (where A is an endpoint)

Draw a point on a sheet of paper.

- How many straight lines can you draw through this single point?

Draw another point.

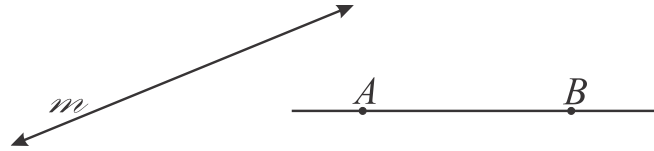
- How many straight lines can you draw through these two points?



Through two points we always can draw a line (straight) and we can draw only one line.

If the line is drawn on plane, a point can be marked on this plane. This point can either lie on a line or not.

Draw a line and mark two points on the line. The part of the line between two points is a segment ( $[AB]$ ).



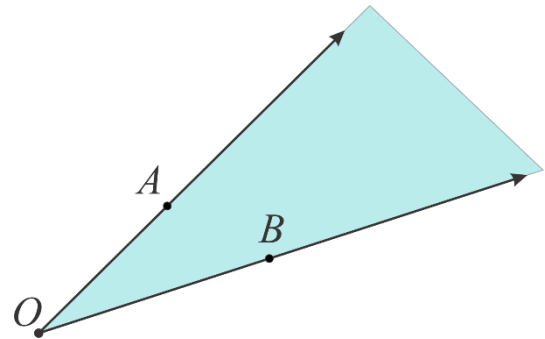
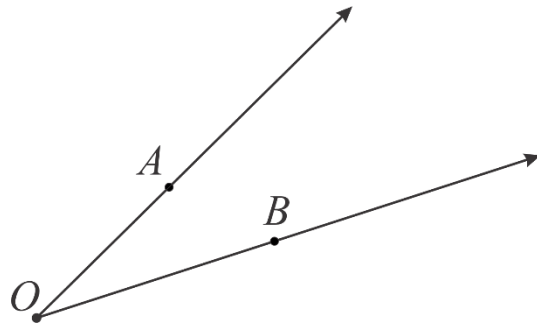
Part of a straight line on one side of a chosen point is a ray ( $\overrightarrow{AB}$ ).



If we draw two rays from the same endpoint, we will get an angle.

- *Into how many parts does an angle divide a plane?*

We can consider an angle to be two rays or two rays and the part of the plane they limit together. The difference only important when we look for the intersection of an angle and another geometrical figure.



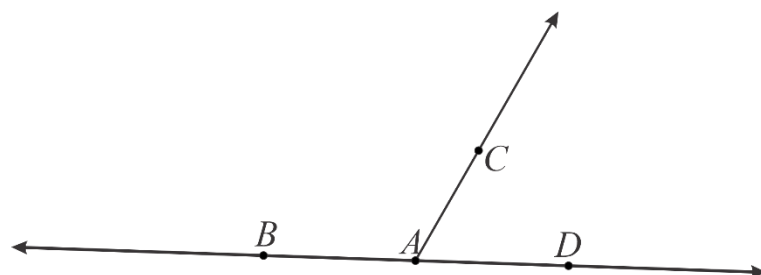
Angles notations are usually three capital letters with vertex letter in the middle or small Greek letter:  $\angle ABC$ ,  $\alpha$ .

If a point marked on a line, it produces two rays with the common vertex, an angle. This angle has its own name: a straight angle.

If another ray is coming from the



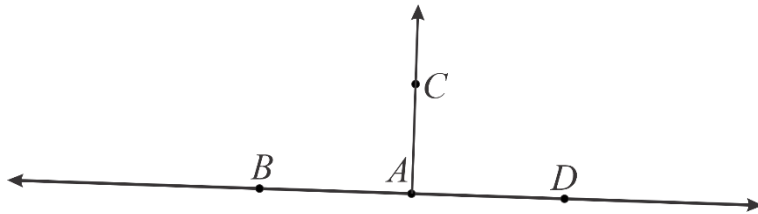
vertex of a straight angle, we now have three angles,  $\angle CAB$ ,  $\angle CAD$ ,  $\angle BAD$ .



- *What can you say about these angles?*

Such angles we call supplementary angles.

There is only one angle which supplement itself to a straight angle. In this case supplementary angles are equal, and we call this angle a right angle. Measure of the straight angle is  $180^\circ$ , measure of the right angle is  $90^\circ$



### Exercises:

1. Draw a segment 2 cm long, 5 cm long, a square with the side 4 cm. (use ruler, pencil).
2. Draw two line segments AB and CD in such way that their intersect
  - a. by a point
  - b. by a segment
  - c. don't intersect at all.
3. Using a ruler draw a straight line, put on it 3 points, A, B, and C so that 2 rays are formed, BC and BA.
4. Draw two rays AB and CD in such way that their intersect
  - d. by a point
  - e. by a segment
  - f. by a ray
  - g. don't intersect at all.
5. Through which points does the line m passes?  
Through which points does the line a passes?  
What is the intersection of the lines m and l?

