

The European Centre for Modern Languages of the Council of Europe

Teaching geometry (for second language learners,
also for weak students) – an example

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Languages at the heart of learning
Les langues au cœur des apprentissages
Sprachen als Herzstück des Lernens

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Studying maths second language learners face difficulties:

1. Language related
2. Related to knowledge of maths



Language in mathematics lessons

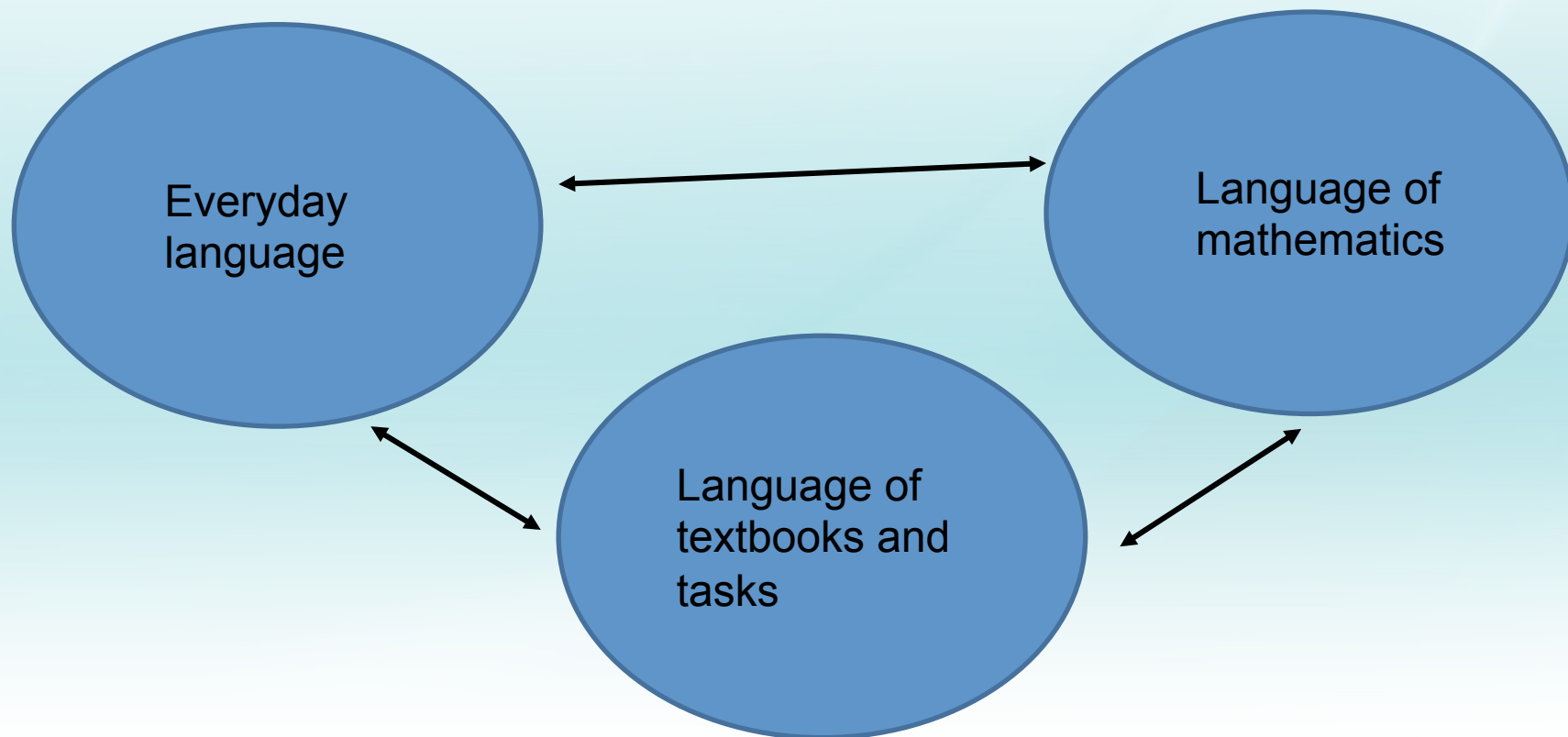
Everyday
language

Language of
mathematics

Language of
textbooks and
tasks



Language in mathematics lessons



Let's analyze:

1) What does it mean to “**understand**” or know a word:

This means that students should be able to

- Understand it's meaning in particular context
- read and understand text where the word is used
- Know how to pronounce the word
- Use the word when writing

And



2) What do students need **to be able to do** in mathematics:

- Understand what the teacher says (definitions, examples, properties)
- Understand written explanations / problems on the (smart) board, chalkboard, textbooks, questions etc.
- Understand specific vocabulary (phrases)
- Express understanding: answer questions, solve simplest tasks, make reasoning, justify an answer (orally)
- Write short texts, short explanations



Work with subject specific language

Characteristic features

- Difference between everyday meaning and mathematical meaning of words
- Abstract language
- Definition of concepts
- Density of information
- ...

Method

- Underline the difference between everyday use and the mathematical use of words and work with this in class
- Work with the linguistic context of concepts



Reading in mathematics

- Read mathematical formulas out loud, connect the mathematical language with the language of communication

$A, B \in L_1$ (A, B which belong to the line L_1)

- Read textbooks and teaching materials



Talk about topics in class

- Answer questions from the teacher.
- Repeat something the teacher has said to others (task instructions, tasks, definitions etc.)
- Formulate hypotheses.
- Discuss with teacher or/and peers how to solve a task.
- Justify an answer.



Write in mathematics

- Notes
- What is given (give a shortened version of a problem)
- Explanations (justifications)
- ...



Express chains of reasoning

- (if... then...; ... hence...; ...therefore...; ... follows...; etc.)

Example:

if $\angle A$ is acute and $\angle B$ is obtuse then $\angle A < \angle B$

(if angle A is acute and angle B is obtuse, then it follows that angle A is less than angle B)



A lesson of geometry

- Topic: lines and angles
- Students: 12-13 years

Expected outcomes

1. Definition of content outcome:
2. Definition of language outcome (by scrutinizing content outcome):



1. Definition of content outcome:

Students are able to

- Speak about points, lines, half lines
- distinguish different types of dispositions of points and lines
- define angles and their classification
- distinguish different types of angles
- solve simple problems, calculate angles measures with help of their properties



2. Definition of language outcome:

Students are able to:

- read about the topic in the textbook (e.g. by being able to solve a simple worded problem)
- show their knowledge by reading out loud math tasks, explaining (orally) what they do (e.g. by drawing a half-line)
- learn content specific vocabulary
- talk about the topic (discuss) in class /in pairs/ in small groups / with the teacher



- say and write simple sentences (This is a ...)
- express chains of reasoning (if... then...; ... hence...; ... therefore...; ...follows...; etc.)
- read specific symbols and fixed phrases
- express comparative of the adjective like larger than, smaller than, bigger than...



Overview of the lesson

- Basic concepts (points and lines)
- Definition of angles
- Properties of angles
- Problem solving



Basic concepts

1. List and explain specific vocabulary (words with meanings which are different of meanings of everyday use)

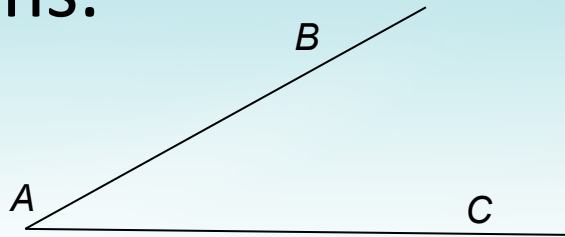
- nouns : *point, line, half-line, vertex, arm*
- verbs: *belong, intersect, define*
- adjectives: *acute, obtuse, right, adjacent, supplementary, complementary*



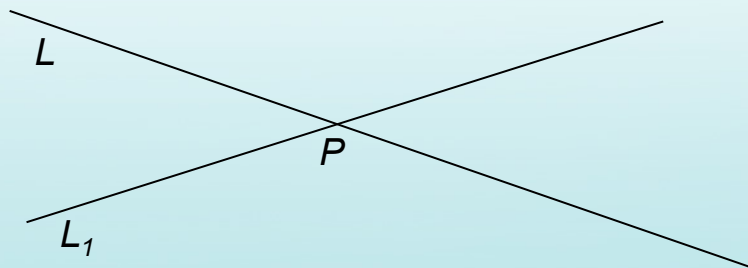
Definition of angles

Angle $\angle A$ ($\angle BAC$) is a complex which consists of a point A and two half-lines (arms) which start from point A .

Point A is a vertex of an angle. The half-lines AB and AC are arms.



Property of angles

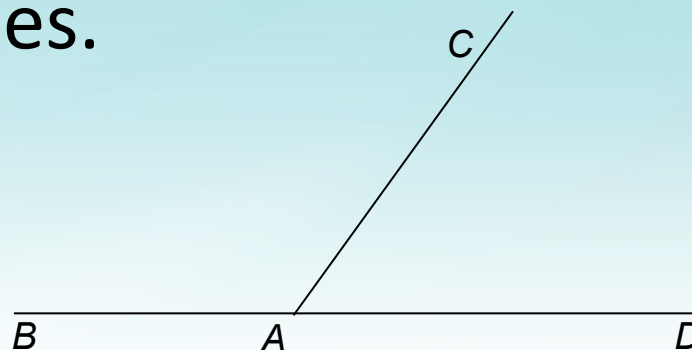


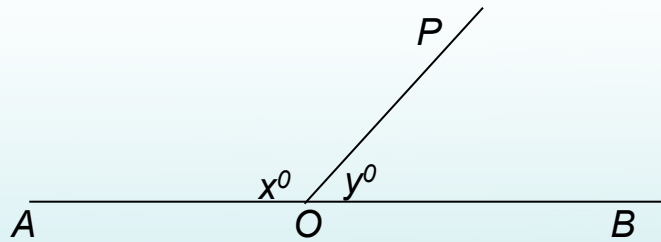
If the line L and the line L_1 intersect at the point P , we say that P belongs to L (or P lies on L) and P belongs to L_1 (or P lies on L_1).

When we talk about how two angles are related, we say:



- Definition: two angles with sizes which add to 180° are called supplementary angles (the picture is given).
- Definition: Two angles which have the same vertex and share a common arm are called adjacent angles.





- Exercise for adjacent angles on a straight line:
- 1. If $x=136^\circ$, find y
- 2. If $y=58^\circ$, find x
- 3. What is x if y is 39°
- 4. If x is 0° what is y
- 5. If $x=81^\circ$, find the y
- 6. If $x=y$, what is the value of each?
- Students should solve and explain orally their solutions



The end of the lesson

Thank You for Your kind attention

