

Mathematics and Associated Teaching Methods II

GEOMETRY MOVEMENTS/ ISOMETRIES

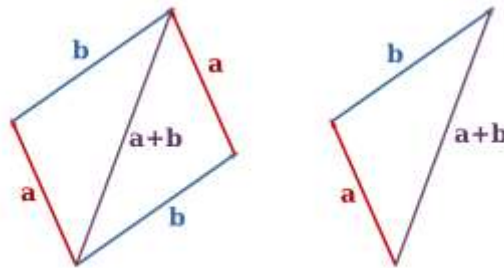
Degree in Primary Education Teaching

School year 2017-2018

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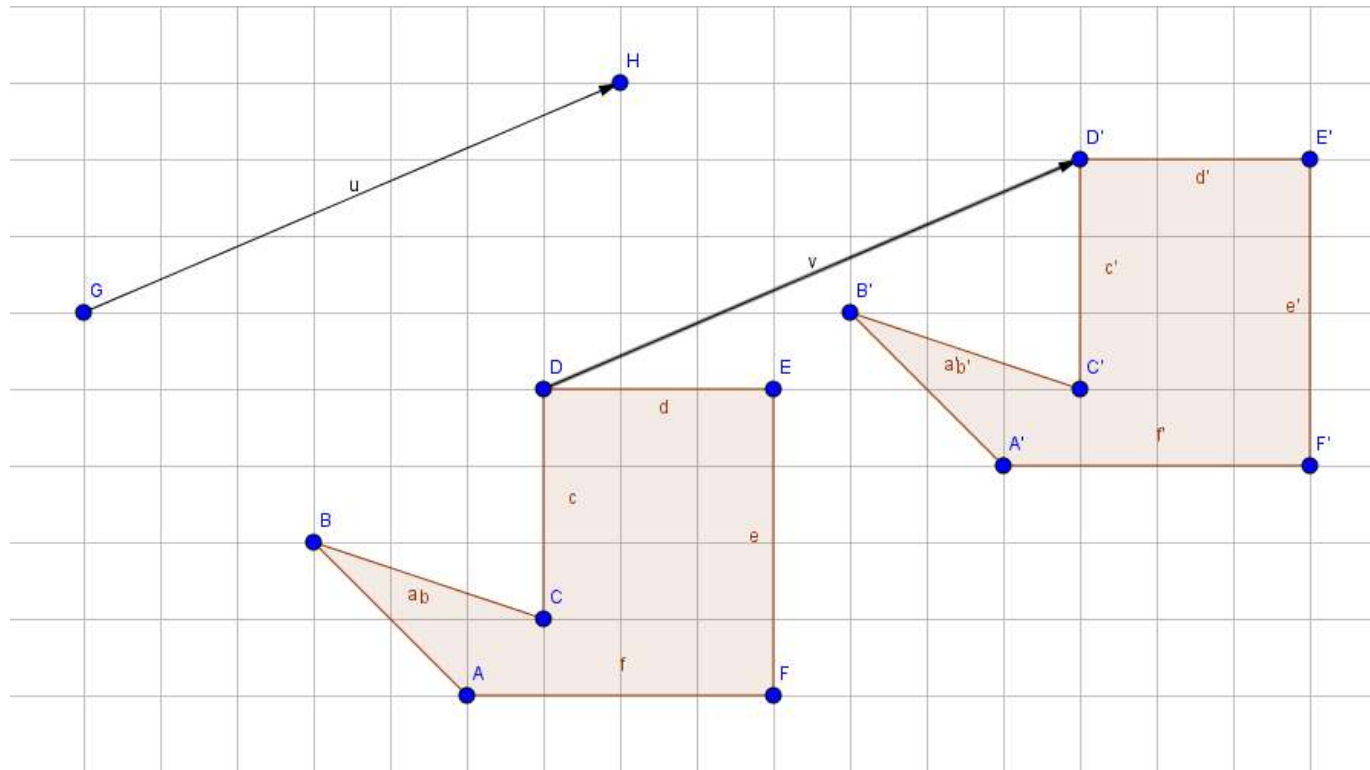
Basic Definitions

- Equal figures
- **Vector** vs **free vector**:
 - ❖ Direction (arrow).
 - ❖ Length.
 - ❖ **A initial point/ Any initial point**
- To sum vectors:



Translations

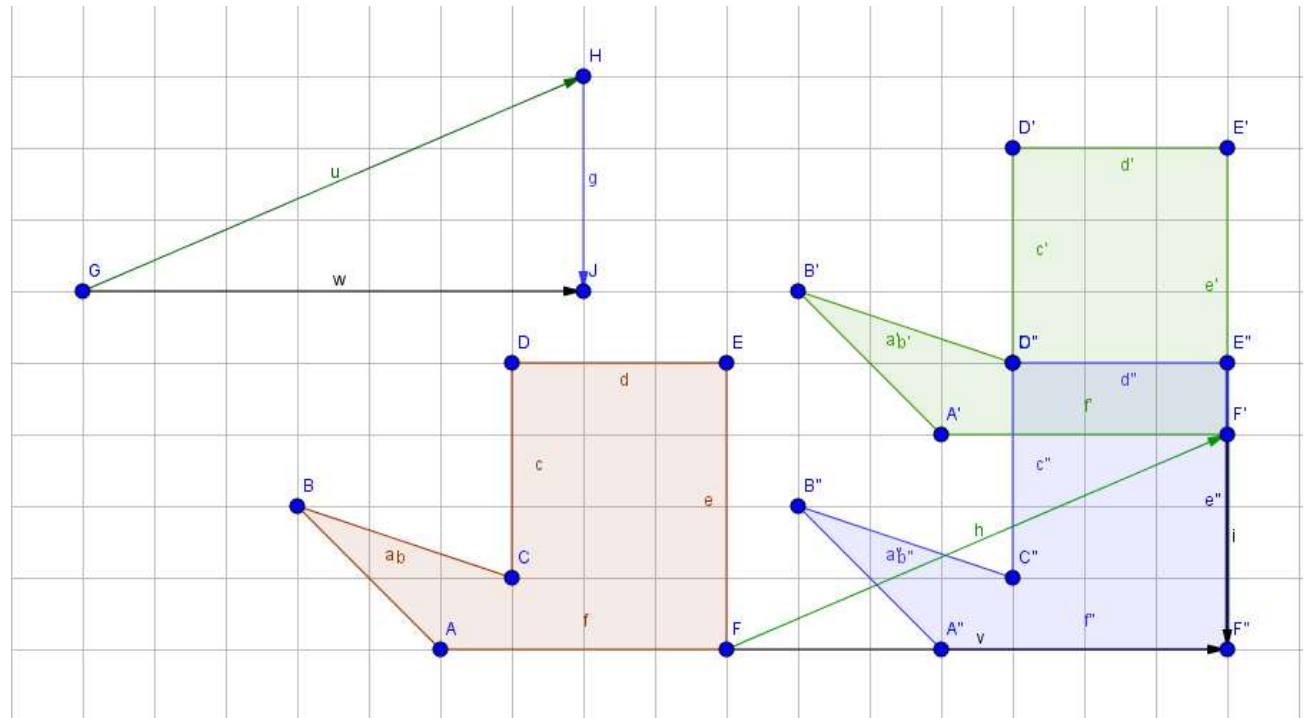
Traslating a figure consists on move all the points of the figure by a vector which is call the **translation vector**.



Translation- properties

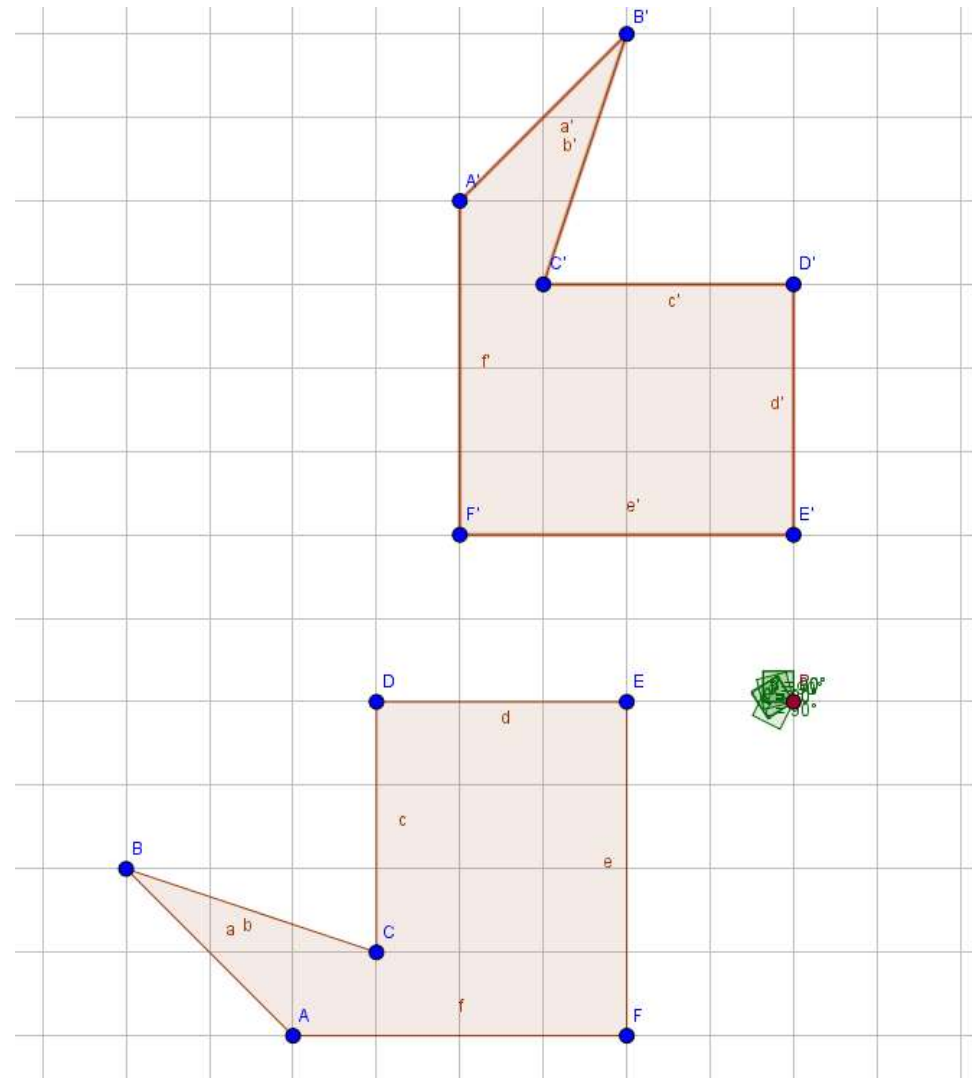
- A traslation:
 - Keeps the same figure
 - Keeps the same dimensions of the figure
 - Keeps the orientation of the figure

- To compose consecutively two translations, It is enough to sum the vectors of each translation.



Rotations

To rotate a figure about a point **P** called the center of rotation a concrete angle α consists on rotate all the points of the figure the angle α about P.



Rotation-properties

•A traslation:

Keeps the same figure

Keeps the same dimensions of the figure

Does not Keep the orientation of the figure

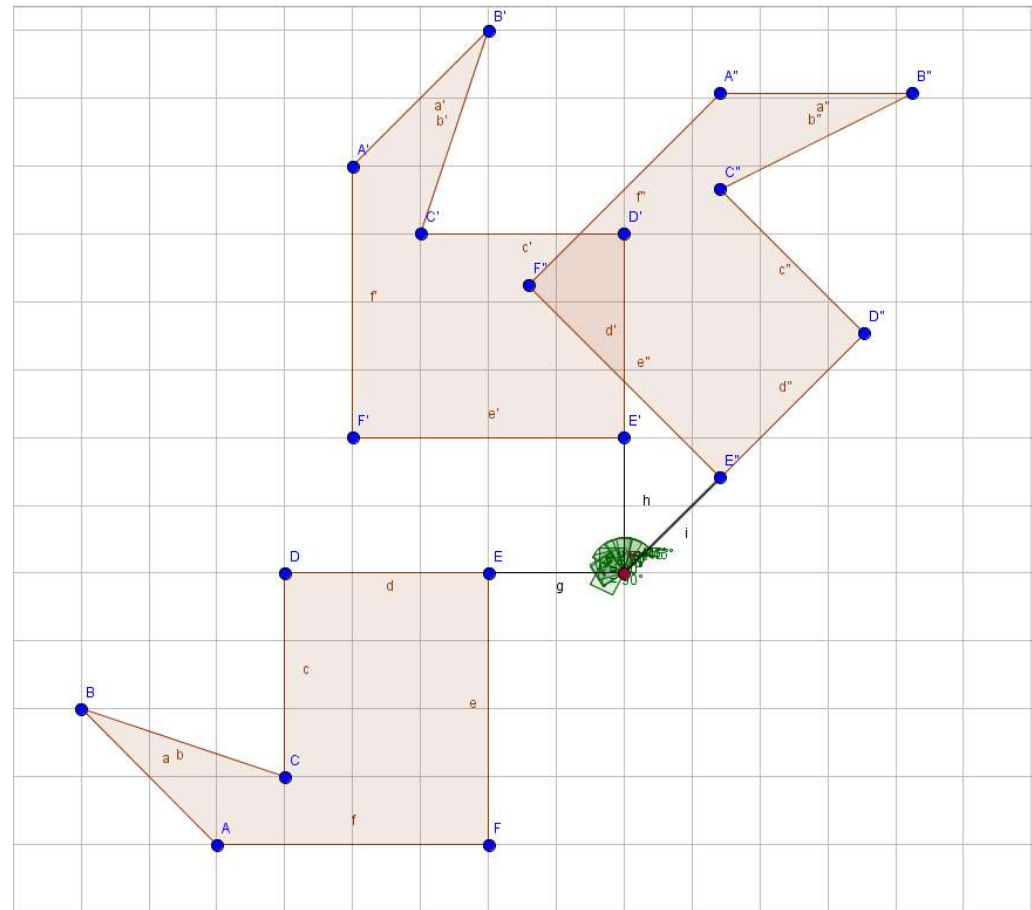
Notes:

The angle usually is taken in anticlockwise or couterclockwise direction.

In Primary school the Point P is usually a point inside the figure.

Rotation-properties

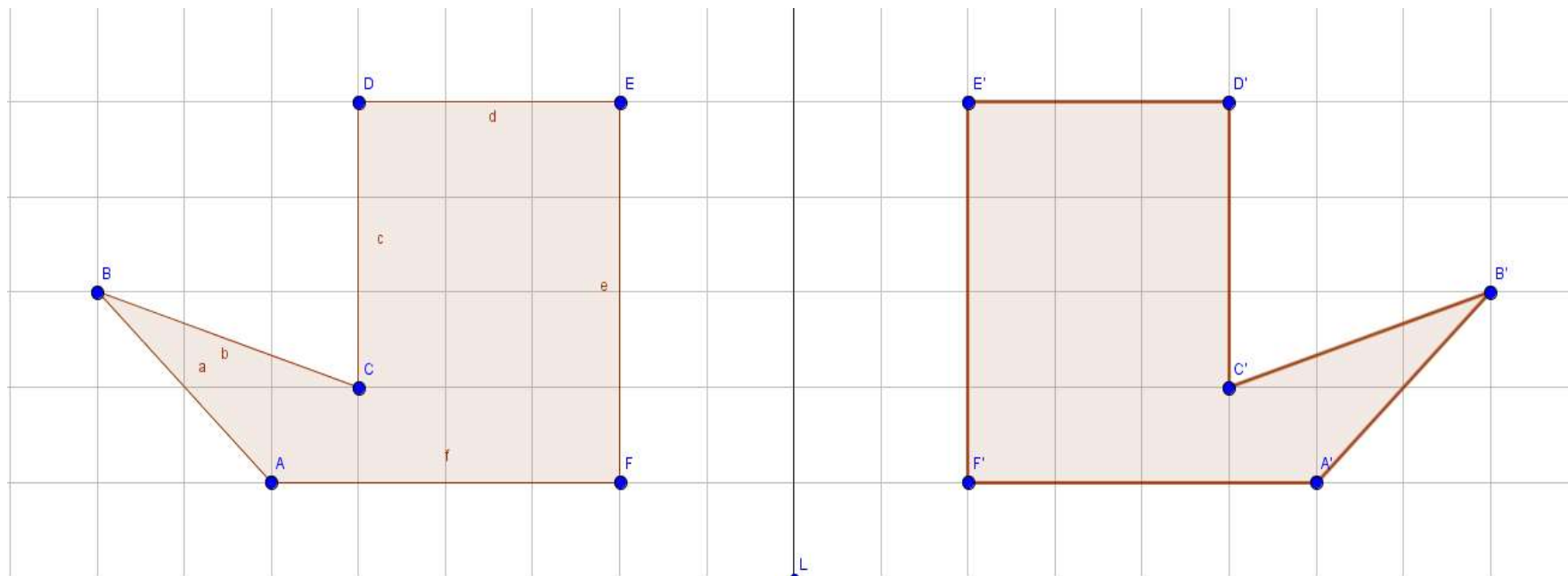
.To compose consecutively two rotations with the same center of rotations, It is enough to sum the angles of each rotation.



Symmetries or reflections

- To do the symmetric figure by a straight line called reflection line, you should make the symmetric of all the points of the figure. To do the symmetric for any point A , you should obtain another point A' such that the segment AA' is perpendicular to the reflection line and points A and A' are at the same distance of the reflection line.

Symmetries



Symmetries-properties

- A traslation:
 - Keeps the same figure
 - Keeps the same dimensions of the figure
 - Does not keeps the orientation of the figure
- To compose consecutively two symmetries of **two parallel reflection lines**, It is enough to do a **translation** with a vector that is perpendicular to reflection lines and the longitude is twice the longitude between the reflection lines.
- To compose consecutively two symmetries of **two not parallel reflection lines**, It is enough to do a **rotation** with center the intersection of the two reflection lines and the angle twice the angle between the reflection lines.

Reflection lines on a figure

- Lines that divides the figure in two equal parts that are symmetric.

It is possible to do not have any reflection line, to have only one, to have two,... to have infinite.

- **Question:** How many reflection lines have a regular n -gon?

Central symmetry

- It is equivalent to do a rotation about a point P , called center of symmetry with an angle of 180° .
- A figure can have a center of symmetry inside.