

Chapter 2: Rotational symmetry of order 2 (Symmetry with respect to a given point).

I. Symmetric of a point, of a shape.

Def 1: O is a point.

The point M' is called symmetrical of the point M with respect to O when O is the middle of the line segment [MM'].

We'll write: $M \xrightarrow{S_O} M'$. Where the arrow \mapsto means "has for symmetrical" (in French we also say "has for image").

We read it « M has for symmetrical M' in the symmetry with respect to the point O ».

Vocabulary: This is called rotational symmetry of order 2, or symmetry with respect to the point O, or, in French, « central symmetry » (and O is called symmetry centre).

See the diagram on the French version.

Methods :

If you want to draw the symmetric of a polygon, just construct (with a ruler and a compass).

« **Construct** »: dotted line + compass lines, otherwise you get a 0 mark to your drawing!

To draw the symmetric of a circle, just construct the symmetric of its centre, and draw around it a circle with the same radius as the initial one.

To draw the symmetric of a straight line, choose two points at random on it. Construct their symmetric, and then draw a line passing by those two points: this line is your symmetric; and it's parallel to the initial line.

See the diagram on the French version.

Comment 1 : Symmetry with respect to the point O can also be seen (it is so in the English lessons about symmetry) as a half-turn around the point O.

Comment 2 can't be translated because the English word for « transformation du plan » is actually « symmetry », so I'm really afraid it would mix up everything if I tried to translate it...

Comment 3: When a symmetry doesn't change the dimension or the angles of a shape, it's called an "isometric symmetry" (isometric comes from Latin and means "same measure"). Symmetry with respect to a point is an isometric symmetry.

Not changing the angles implies not changing the alignment (think about a 180° angle).

Not changing dimensions or angles implies not changing the areas (you calculate the area of a shape using its dimensions, and sometimes –parallelograms- its angles).

Pty 1: Symmetry with respect to a point preserves dimensions and angles, as well as alignment and areas.

II. Symmetry centre and axis of usual shapes.

Def 2: The point O is a « symmetry centre » of the shape when, in the symmetry with respect to O, each point of the shape has another point of the shape for its symmetric.

See the diagram on the French version.

Usual mistake: Carefully read the instructions of the exercise! If it's asking for rotational symmetry (symmetry with respect to a point), do NOT draw an axis!!! (That would be away from the point).