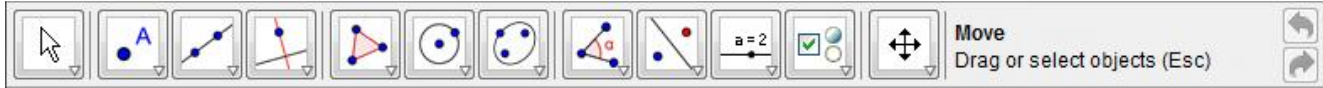




Basic Shape Transformations






Tool Group 1	Tool Group 2	Tool Group 3
<p>Tool Group 1</p> <ul style="list-style-type: none"> Move Rotate around Point Record to Spreadsheet 	<p>Tool Group 2</p> <ul style="list-style-type: none"> New Point Point on Object Intersect Two Objects Midpoint or Centre Attach / Detach Point 	<p>Tool Group 3</p> <ul style="list-style-type: none"> Line through Two Points Segment between Two Points Segment with Given Length from Point Ray through Two Points Vector between Two Points Vector from Point
<p>Tool Group 4</p> <ul style="list-style-type: none"> Perpendicular Line Parallel Line Perpendicular Bisector Angle Bisector Tangents Polar or Diameter Line Best Fit Line Locus 	<p>Tool Group 5</p> <ul style="list-style-type: none"> Polygon Regular Polygon Rigid Polygon PolyLine <p>Tool Group 7</p> <ul style="list-style-type: none"> Ellipse Hyperbola Parabola Conic through Five Points 	<p>Tool Group 6</p> <ul style="list-style-type: none"> Circle with Centre through Point Circle with Centre and Radius Compasses Circle through Three Points Semicircle through Two Points Circular Arc with Centre between Two Points Circumcircular Arc through Three Points Circular Sector with Centre between Two Points Circumcircular Sector through Three Points

Tool Group 8









-  Angle
-  Angle with Given Size

-  Distance or Length
-  Area
-  Slope


Tool Group 9









-  Reflect Object in Line
-  Reflect Object in Point
-  Reflect Point in Circle
-  Rotate Object around Point by Angle
-  Translate Object by Vector
-  Enlarge Object from Point by Factor

Tool Group 10






-  Slider

-  Insert Text
-  Insert Image
-  Pen Tool

-  Relation between Two Objects
-  Probability Calculator
-  Function Inspector




Tool Group 11







-  Check Box to Show / Hide Objects
-  Insert Button
-  Insert Textfield

Tool Group 12



-  Move Drawing Pad
-  Zoom In
-  Zoom Out

-  Show / Hide Object
-  Show / Hide Label
-  Copy Visual Style

-  Delete Object

Tool Usage Information (Displayed automatically)

Angle

Select three points or two lines



Drawing a general polygon

- Select the 1st icon in Tool Group 5.
- Click in the construction window of GeoGebra to place the first point of your polygon, continue to click the mouse another 4 or 5 times. You will see your polygon being created as you do this. When you are happy with your polygon shape click once again onto your starting point. This will close your polygon.
- PRESS THE ESCAPE BUTTON ON YOUR KEYBOARD: <esc>
This has the effect of quickly putting the mouse back in to Move (Drag or Select) Mode – Alternatively click on the 1st icon in Tool Group 1.

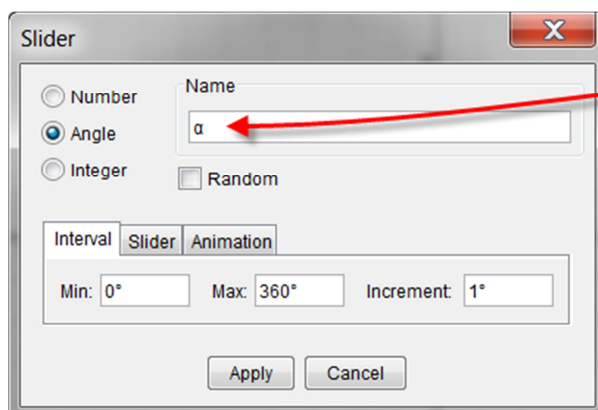
ISOMETRIES

Drawing a line and using it to produce a Reflection

- Select the 1st icon in Tool Group 3.
- Click the mouse twice in the construction window of GeoGebra to place your line.
- From Tool Group 9 select the 1st icon.
- Drag the mouse pointer around your entire polygon (don't worry if you also include your line just drawn).
- With your polygon highlighted click on your line – you should now see your polygon reflected in your (mirror) line.
- Press <esc> and drag the points of your mirror line.

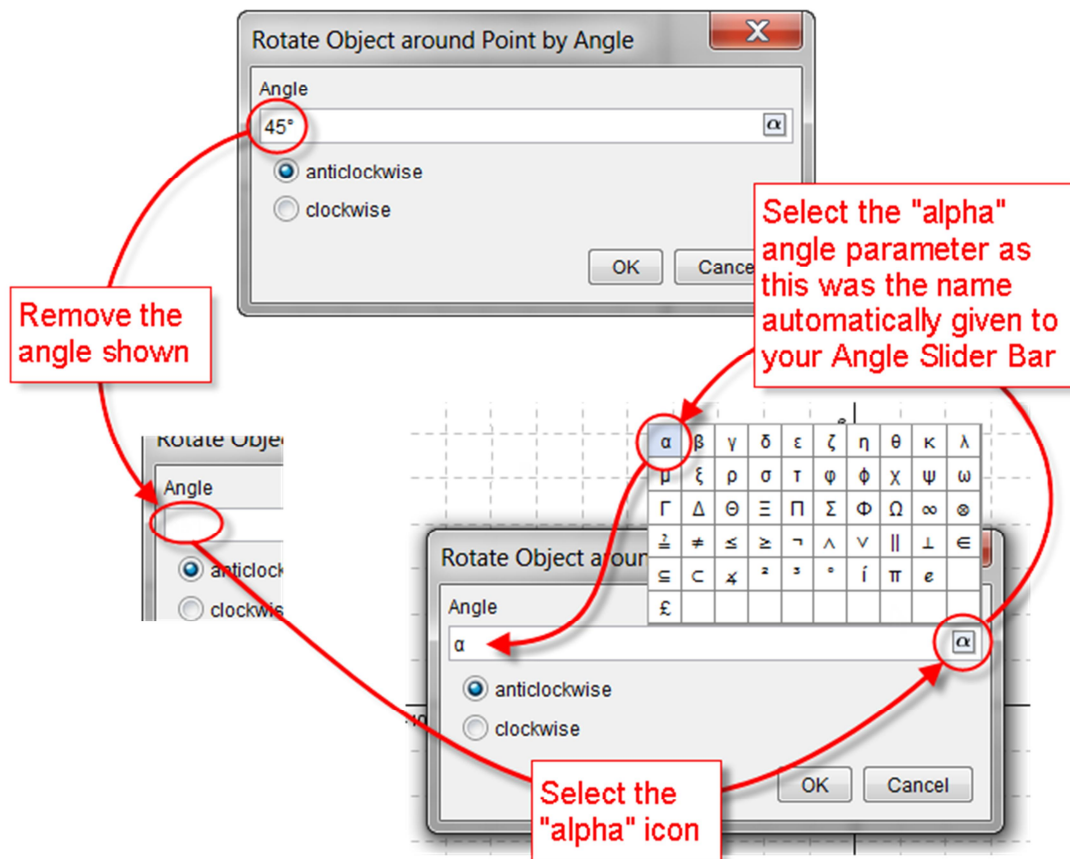
Creating an angle slider bar to produce a Rotation

- Select the 1st icon in Tool Group 11.
- Click on your screen where you wish your angle slider to be placed (it can be moved later). This will open the dialogue box below. Select the options as shown.



As this is the first angle slider bar created its name is automatically the first letter of the Greek alphabet: "alpha". (This can be altered later if required)

- Next, from Tool Group 2 select the 1st icon. Click on the screen where you want your Centre of Rotation point to be for your polygon.
- From Tool Group 9 select the 4th icon.
- Drag the mouse pointer around your entire polygon and then click on your Centre of Rotation point. These two actions will then automatically open the following angle choice dialogue box:



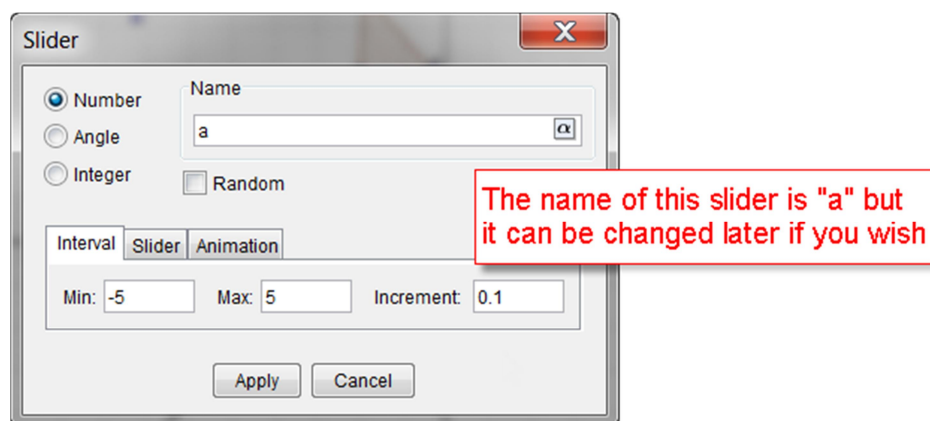
- Note that holding down the <ALT> Button and then pressing 'a' will also produce a Greek α too – it's a lot quicker!
- Press "OK" then <esc> and drag the handle on your angle slider bar to rotate your polygon.

Creating a vector to produce a Translation

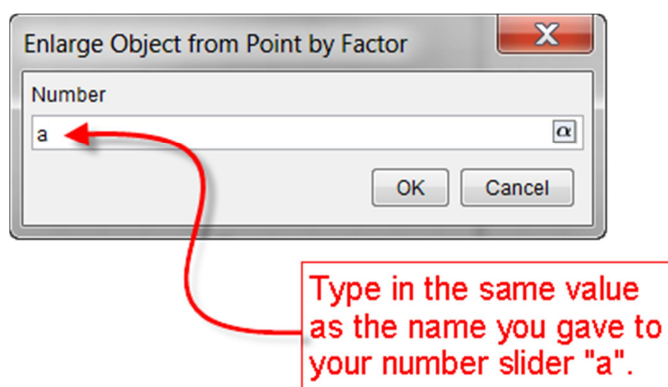
- Select the 5th icon from Tool Group 3.
- Click the mouse at two positions in the construction window of GeoGebra to construct your vector (These positions will become the tail and head of the vector).
- Select the 5th icon from Tool Group 9.
- Drag the mouse pointer around your entire polygon to select it all in one go. Release the mouse button and then click on your vector. These two actions will translate your polygon subject to the vector's direction and magnitude.
- Press <esc> and move each end of your vector. What do you notice?

Creating a length slider bar to produce a similarity (Enlargement/Reduction)

- Select the 1st icon in Tool Group 11.
- Click on your screen where you wish your number slider to be placed (it can be moved later). This will open the dialogue box below. Select the options as shown:



- Next, from Tool Group 2 select the 1st icon. Click on the screen where you want your Centre of Similarity point to be for your polygon.
- From Tool Group 9 select the 6th icon.
- Drag the mouse pointer around your entire polygon and then click on your Centre of Similarity point. These two actions will then automatically open the following Scale Factor choice dialogue box:



- Press "OK" then <esc> and drag the handle on your number slider bar to dilate your polygon.

Transforming a picture

We can import into GeoGebra any picture having extensions: jpg, jpeg, png, gif, tif and bmp. Once in GeoGebra we can attach it to 3 points and then proceed to transform it with the usual in-built GeoGebra transformation tools.

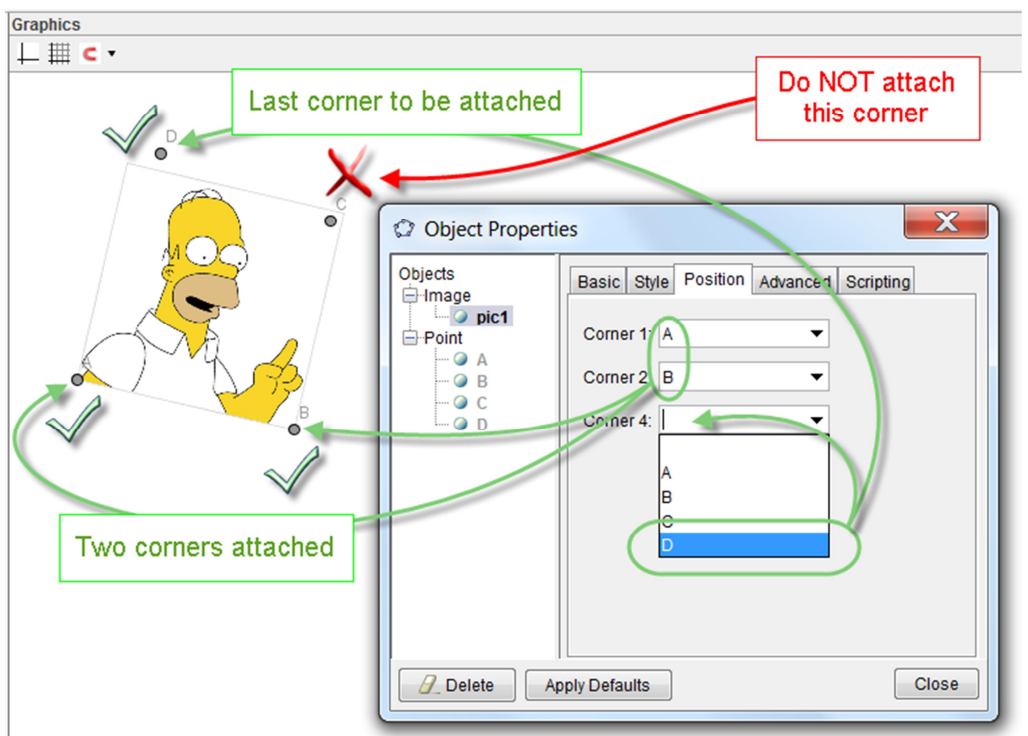
- Find any suitable picture to import into GeoGebra – non-symmetrical for our purposes here. Save it in a directory of your choice
- After selecting the 1st icon in Tool Group 2 click on the screen four times so as to *roughly* place the four corners of a square. Place your 4 points in an **anti-clockwise** manner as the picture to the right shows.
- Select the 2nd icon (Insert Image) in Tool Group 10 and then click anywhere in the Graphics Window. A dialogue box will automatically open and be waiting for you to find and open your recently saved picture file. On clicking Open your picture will now be placed where you originally clicked on the screen.

For example:



- Right-Click on your embedded picture file and from within the 'Position' Tab in its Object Properties dialogue box select corners as shown here to the right:

You must miss out the 3rd corner in the order as shown for the image to be "un-twisted"!



- You can now experiment with any of the above transformations but applied to your own picture instead of a drawn object! Notice also how your picture is distorted if any of its three anchor points are moved.