



Create Tessellations with Excel

CREATE TESSELLATIONS WITH EXCEL

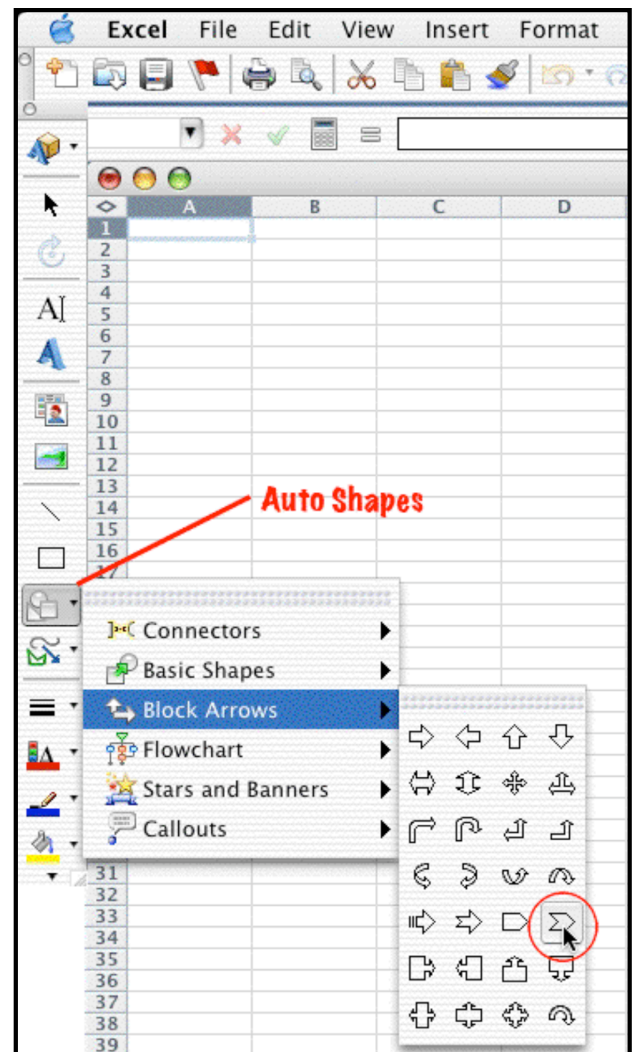
What's a tessellation? Tessellations are patterns of a repeated shape arranged so they cover a complete plane leaving no space. A checkerboard is a tessellation

Tessellations are not just pretty to look at; they are a great way to teach such concepts as reflection, rotation, and translation. And...they're fairly easy to make. Walk your middle or high school students through the steps below to create their own tessellation with Excel.

STEP ONE: CREATE THE BASIC POLYGON

Have students follow the steps below to create the basic polygon they will use in their tessellations.

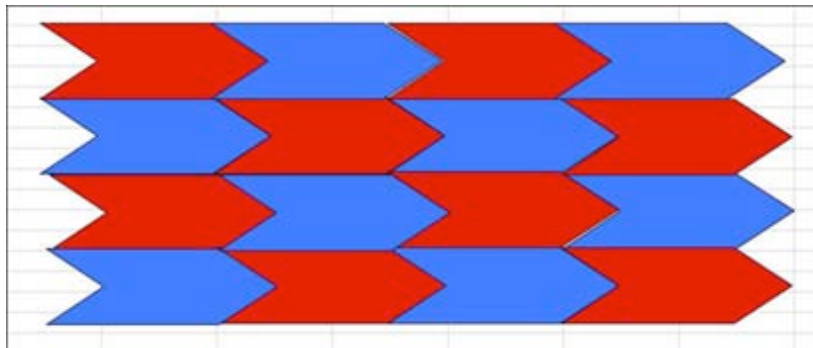
- Open Microsoft Excel.
- Click View>Toolbars>Drawing.
- Click File>Page Setup; click the button next to Landscape (for page orientation); and then click OK.
- On the Drawing toolbar, find the Autoshapes button, click it, click Basic Arrows, and choose the **chevron**.
- Draw a chevron on the spreadsheet. Make it about two columns wide and four rows tall. Leave it white with a black border.
- Save your work. (Be sure to tell students where to save it and what to name the file.)



STEP TWO: CREATE THE TESSELLATION

Have students follow the steps below to create their tessellation.

- Click View > Zoom, select 150 percent (or greater) and click OK.
- Press CTRL D (Mac: Apple/Command Key and D) to duplicate the chevron. (That both copies and pastes in only one step.)
- Duplicate the chevron 15 times.
- Arrange the chevrons in a pattern so they are end-to-end and row-upon-row, with no spaces in between. (There should be four chevrons on each of four rows.)
- Use the paint can icon on the Drawing toolbar to color the polygons. (Alternate two colors for best effect.) Hint: Hold down the shift key while selecting every other polygon, and then click a color to quickly paint half the polygons.
- The complete tessellation will look something like the following:



- Save your work!

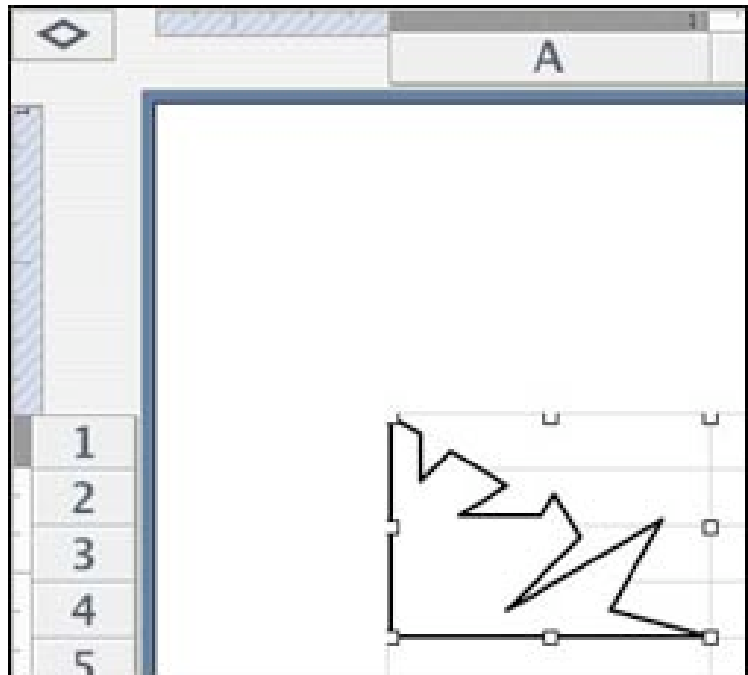
STEP THREE: CREATE A TESSELLATION WITH YOUR OWN POLYGON

As you can see, it's pretty simple to create a tessellation with regular polygons. But what about irregular ones? Follow the steps below to create a shape all your own and then make a very individualized tessellation from it!

- Click Sheet 2 at the bottom of your spreadsheet. You now have a clean slate to work on.
- Click View > Zoom > 200 percent, and then click OK. (You need to be very close up for this!)
- Click the Lines tool on the Drawing toolbar, and then click Freeform.



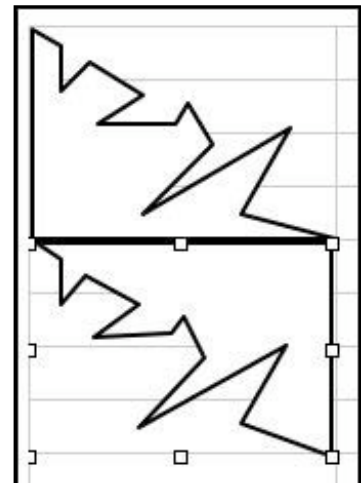
- The freeform tool allows you to create a polygon with straight lines. We want to draw a three-sided polygon with two straight sides and one jagged side. So, holding down the shift key (which keeps the lines straight), draw a line from the top left corner of cell A1 to the bottom left corner of cell A4.
- Don't stop yet! Keep drawing to the far right corner of cell A4.
- Don't stop yet. This is the fun part! Draw a zigzag pattern of your own choice -- one that eventually will connect your last line's endpoint to your first line's starting point.
- When you've connected the end of the zigzag line to the starting point...click. Your polygon should look something like this:



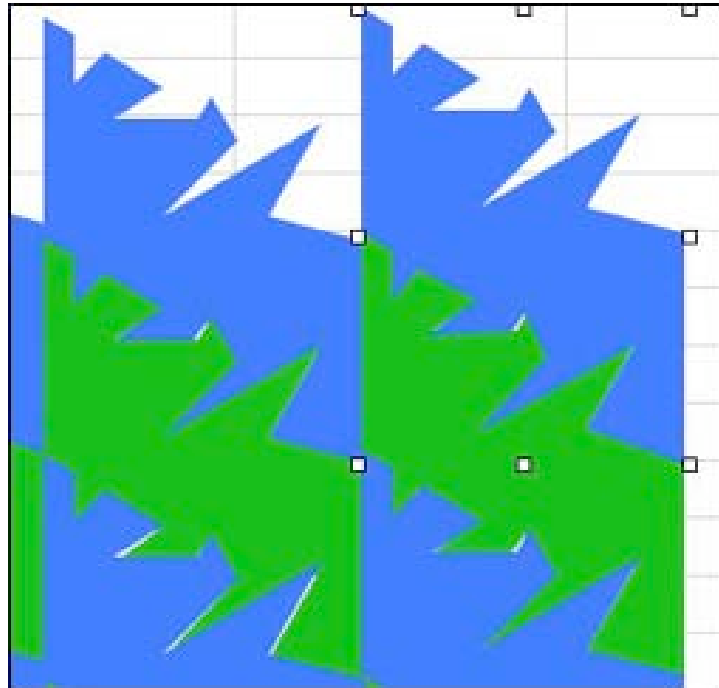
STEP THREE: CONTINUED

Next, to complete the tessellation, you need to make a mirror image of the polygon:

- Click the Freeform line again and draw a straight line from the top left corner of A1 to the top right corner, then down to the bottom right corner of A4.
- Now, follow **EVERY** zig and zag you made previously. Be as exact as possible. Click when the line is completed.
- You should have two polygons one on top of the other, and connected at the jagged edge. Click and drag the top polygon to just below the bottom one, carefully lining up the straight horizontal edges of the polygons.
- Hold down the shift key and click both polygons.
- Click the first icon on the Drawing toolbar (the word Draw on a PC; the blue A on a beige square on a MAC), and then click Group. Your two polygons have become one!
- Fill with a color of your choice.
- Remove the border by clicking the line paint tool and selecting No Line.



- Duplicate
- Now, it's time to tile! Repeat step two of the lesson to duplicate the polygon. Your page should look something like this:



Save your work!