

GEOMETER'S SKETCH PAD LESSON #1

Flying Geese Quilt Block

Lesson Overview:

Using The Geometer's Sketchpad students will create various quilt patterns found on the Freedom Quilt. This lesson will walk them through creating the Flying Geese Quilt Block using transformational geometry.

Length of Lesson: 45 minutes

Notes: This lesson is particularly suitable for grades 5-8


Instructional Objectives:

Students need to have prior knowledge of using The Geometer's Sketchpad. Students will use transformational geometry to create patterns on the Freedom Quilt. This lesson uses rotations, and translations.


Supplies:

Computer, the Geometer's Sketchpad v4.03.

Instructional Plan:

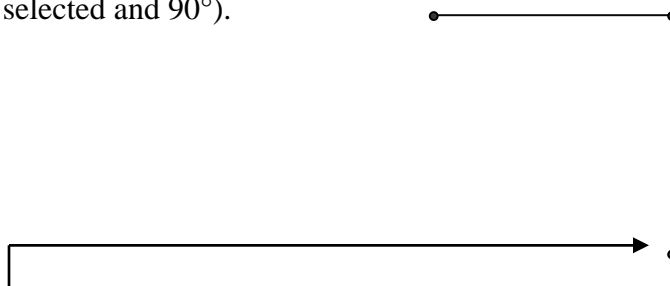
1. Construct a square.
Select the line segment tool  hold the shift key down to draw a straight line.



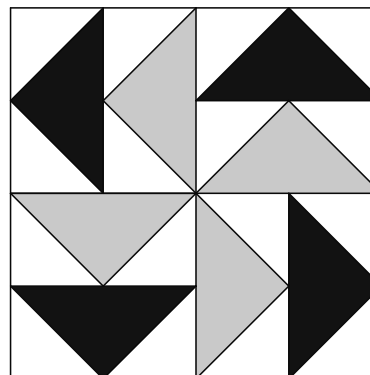
2. Using the Selection tool  select this point. You will be rotating the line 90°.



From the menu, Select **Transform>Mark Center**, the point will highlight, holding the shift key, click on the line and the other point. Select **Transform>Rotate**, (Fixed Angle should be selected and 90°).

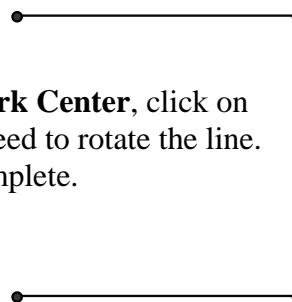


3. Select the bottom point, Select **Transform>Mark Center**, holding the shift key click on the line and the top point. Select **Transform>Rotate**

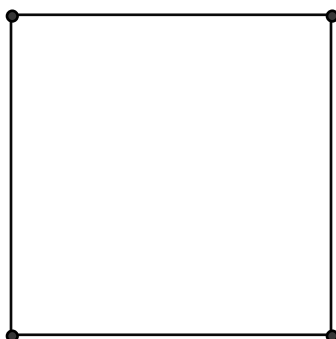


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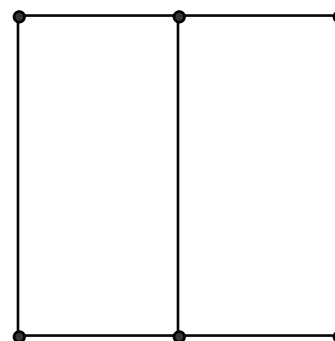
4. The third side of the square will appear.



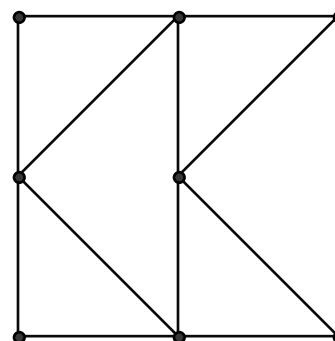
5. Select the bottom left point, Select **Transform>Mark Center**, click on the line, **do not** select the point, this time we only need to rotate the line. Select **Transform>Rotate**. Your square will be complete.



6. Now that the square is completed we will divide it in half to create the isosceles triangles.



Using the selection tool, select the top line, select **Construct>Midpoint**. Select the bottom line, select **Construct>Midpoint**. Holding the shift key down select both midpoints, select **Construct>Segment**, the two points will now be joined.

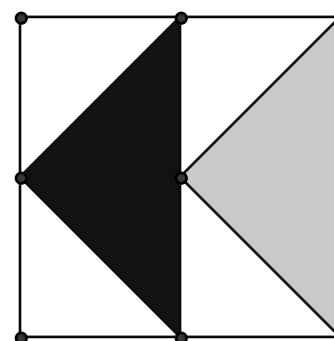


Using the selection tool, select the left vertical line of the square, from menu select **Construct>Midpoint**. Select the center line, from menu select **Construct>Midpoint**. Holding the shift key down, select two points, select **Construct>Segment**.

Finish constructing the lines for the remaining points.

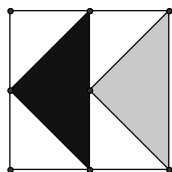
7. Colour in the triangle interiors.

Using the selection tool, holding the shift key down, select three points of the triangle. Select **Construct>Triangle Interior**. Do the same for the other triangle. To change the colour of triangle interior, (use the selection tool), click on the interior. Select **Display>Colour**, choose a



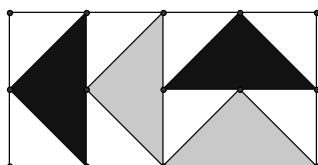
different colour.

8. We will now rotate the triangles and square to complete the quilt block.



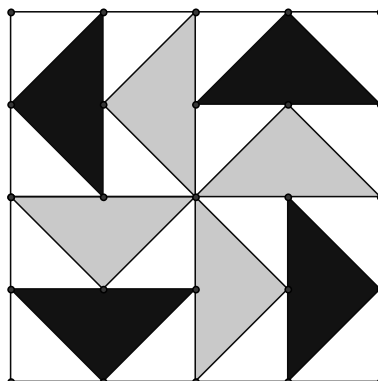
Using the selection tool, select the bottom right corner of the figure.

With the corner highlighted, select **Transform>Mark Center**. Select **Edit>Select All**, Select **Transform>Rotate** (choose fixed angle, and -90°), selecting -90° will rotate the figure in a clockwise direction.

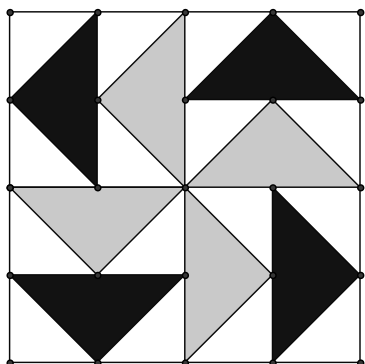


With everything still highlighted, Select **Transform>Rotate**, the third block will appear, Select **Transform>Rotate** again, the fourth block will fill in.

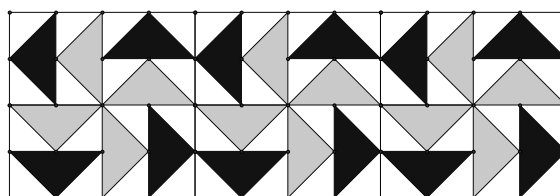
The completed Flying Geese Block



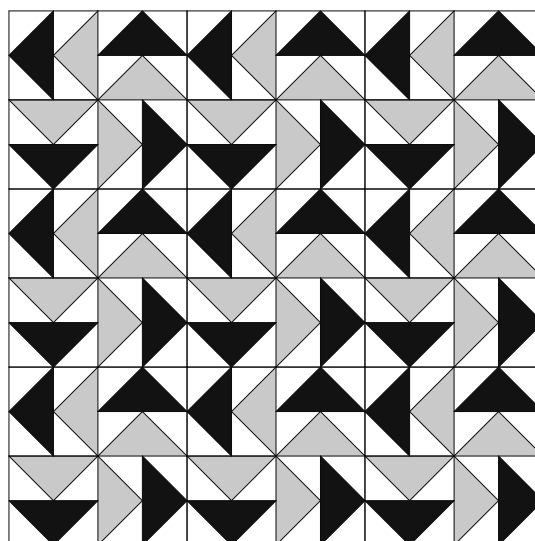
Continuing the Flying Geese Block Pattern



1. Using the selection tool, select the bottom left corner of the block, holding the shift key down, select the bottom right corner. Select **Transform>Mark Vector**. Select **Edit>Select All**. Select **Transform>Translate**, make sure Marked is selected, click **Translate**. While everything is highlighted, select **Transform>Translate** to repeat the process.
2. This pattern should appear.



3. We are going to continue translating the pattern down. Using the selection tool, select the top right corner of the pattern. Holding the shift key down select the bottom right corner. Select **Transform>Mark Vector**. Select **Edit>Select All**. Select **Transform>Translate**, make sure Marked is selected, click **Translate**. While everything is highlighted, select **Transform>Translate** to repeat the process.
4. Once the pattern is complete, Click on the Point tool, Select **Edit>Select All Points**, Select **Display>Hide Points**. Your Flying Geese Quilt is complete.



GEOMETER'S SKETCH PAD LESSON #2

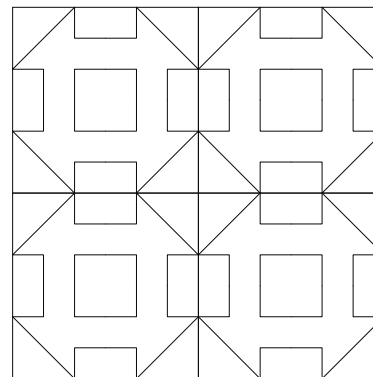
Monkey Wrench Quilt Block

Lesson Overview:

Using The Geometer's Sketchpad v4.03 students will create the various quilt patterns found on the Freedom Quilt. This lesson will walk them through creating the Monkey Wrench Quilt Block using transformational geometry.

Length of Lesson: 45 minutes

Notes: This lesson is particularly suitable for grades 5-8




Instructional Objectives:

Students need to have prior knowledge of using The Geometer's Sketchpad. Students will use transformational geometry to create patterns on the Freedom Quilt. This lesson uses rotations, reflections, and translations.


Supplies:

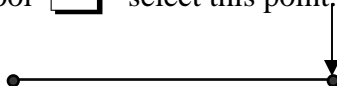
Computer, the Geometer's Sketchpad v4.03.

Instructional Plan:

1. Construct a square.
2. Select the line segment tool  hold the shift key down to draw a straight line.

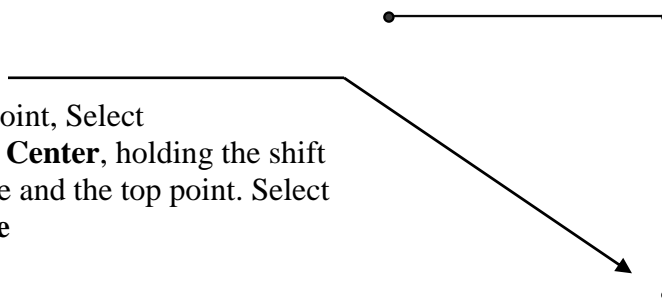


3. Using the Selection tool  select this point, You will be rotating the line 90°.

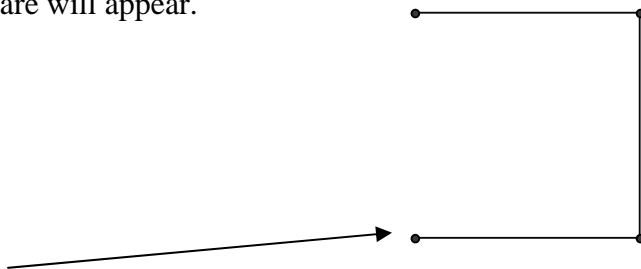


4. From the menu, Select **Transform>Mark Center**, the point will highlight, holding the shift key, click on the line and the other point. Select **Transform>Rotate**, (Fixed Angle should be selected and 90°).

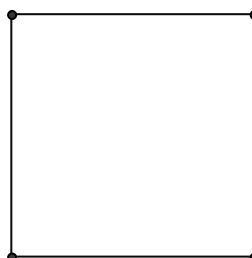
5. Select the bottom point, Select **Transform>Mark Center**, holding the shift key click on the line and the top point. Select **Transform>Rotate**



6. The third side of the square will appear.

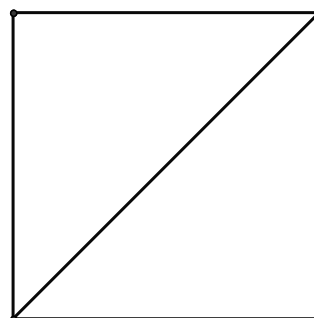


7. Select the bottom left point, Select **Transform>Mark Center**, click on the line, **do not** select the point, this time we only need to rotate the line. Select **Transform>Rotate**. Your square will be complete.

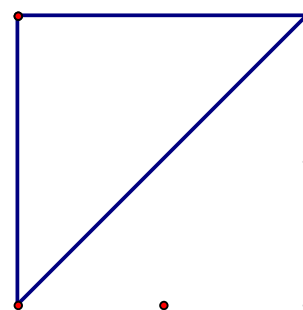


8. Now that the square is completed we will divide it in half by creating a diagonal.

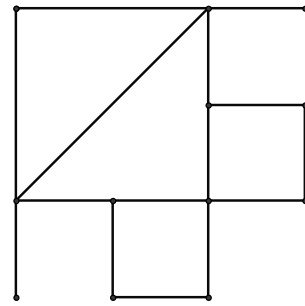
9. Using the selection tool, select the top right corner, holding the shift key down, select the bottom left corner, select **Construct>Segment**. The two points will now be joined.



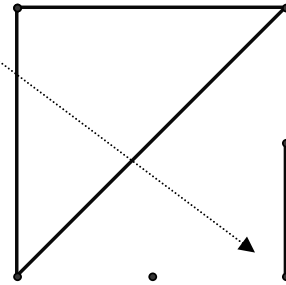
10. Using the selection tool, select the right vertical line of the square, from menu select **Construct>Midpoint**. Select the bottom line, from menu select **Construct>Midpoint**. Holding the shift key down, select the right vertical segment and the bottom segment, select **Display> Hide Segments**.



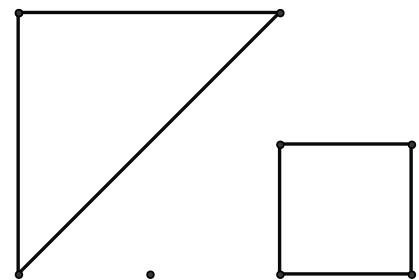
11. We will now create two small squares and two lines to complete one corner of the Monkey Wrench Block.



12. Using the selection tool, select the bottom right point, holding the shift key down, select the point that is above the bottom right point. Select **Construct>Segment**.



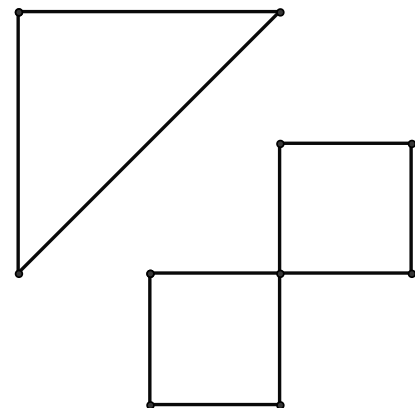
13. We will now create a square using the segment we created. Follow the same process we used in Steps 2-5.



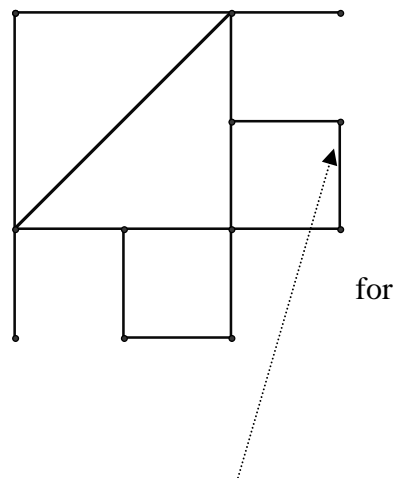
14. We will now create the other square in one of two ways. We can draw a line segment from the point to the corner of the square and follow Steps 2-5 as above, (note: to rotate an object in a clockwise direction put a negative sign “-“ in front of the degree of rotation, “-90°”).

or:

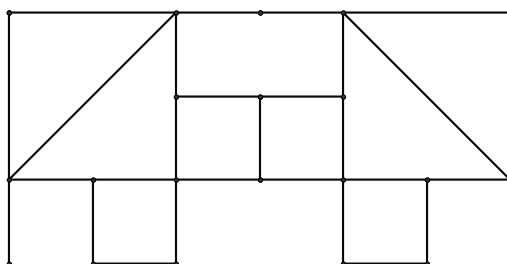
The other way to create the square is to rotate the existing square 180°. Using the selection tool select the bottom left corner of the square. Select **Transform>Mark Center**. Using the selection tool, holding the shift key down, select all the points and segments of the square. Once everything is selected, select **Transform>Rotate**, rotate 180°.



15. We will now create the two small lines from each corner of the triangle. Using the selection tool select the right vertex of the triangle, holding the shift key down select the vertex of the square directly below, select **Construct>Segment**. Again select the top right corner of the triangle, select **Transform>Mark Center**, holding the shift key down, select the segment we just created and the vertex of the square, select **Transform>Rotate 90°**. You must also create the lines the bottom left corner of the triangle using the same process, (hint, you will have to rotate -90°).

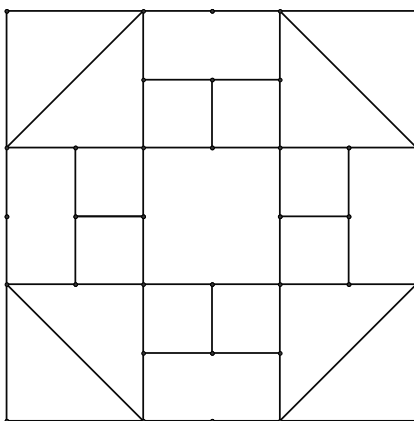


16. We will now reflect the image along the vertical line, select the right segment of the square, select **Transform>Mark Mirror**, the line will flash. Select **Edit>Select All**, everything will be selected, select **Transform>Reflect**. You should end up with this image.

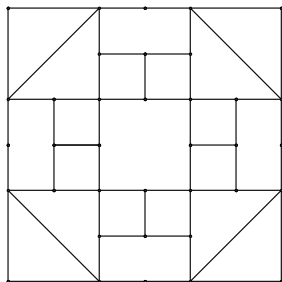


17. We will now reflect the image along a horizontal line, select a bottom segment of the square, select **Transform>Mark Mirror**, the line will flash. Select **Edit>Select All**, everything will be selected, select **Transform>Reflect**. You should end up with this image.

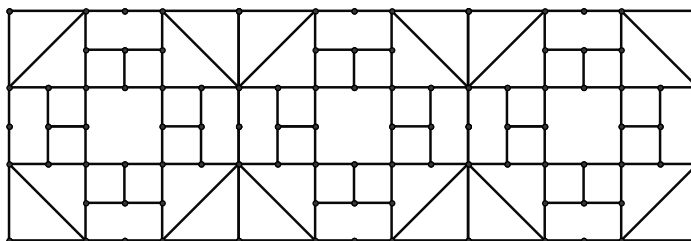
18. The completed Monkey Wrench Block



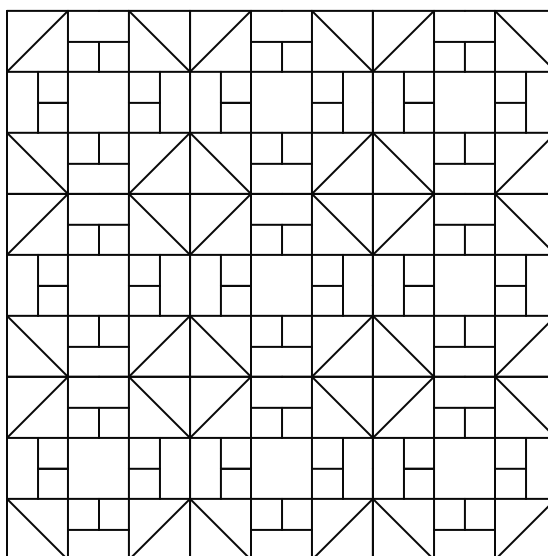
Continuing the Monkey Wrench Pattern



1. Using the selection tool, select the bottom left corner of the block, holding the shift key down, select the bottom right corner. Select **Transform>Mark Vector**. Select **Edit>Select All**. Select **Transform>Translate**, make sure Marked is selected, click **Translate**. While everything is still highlighted, select **Transform>Translate** to repeat the process.
2. This pattern should appear.



3. We are going to continue translating the pattern down. Using the selection tool, select the top right corner of the pattern. Holding the shift key down select the bottom right corner. Select **Transform>Mark Vector**. Select **Edit>Select All**. Select **Transform>Translate**, make sure Marked is selected, click **Translate**. While everything is highlighted, select **Transform>Translate** to repeat the process.
4. Once the pattern is complete, Click on the Point tool, Select **Edit>Select All Points**, Select **Display>Hide Points**. Your Monkey Wrench Quilt is complete.



GEOMETER'S SKETCH PAD LESSON #3

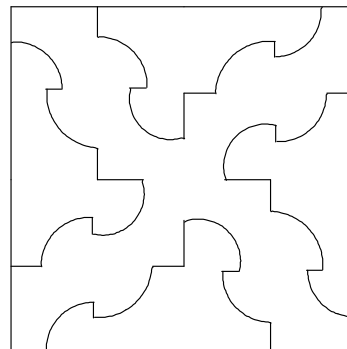
Freedom Quilt Block Pattern Extension

Lesson Overview:

Using The Geometer's Sketchpad v4.03 students will create the various quilt patterns found on the Freedom Quilt. Students will create another Quilt Block Pattern found on the Freedom Quilt.

Length of Lesson: Two or three **45 minute blocks.**

Notes: **This lesson is particularly suitable for grades 5-8**



Instructional Objectives:

Students need to have prior knowledge of using The Geometer's Sketchpad. Students should have completed the Flying Geese and Monkey Wrench Quilt Block Pattern. Using their prior knowledge from the Flying Geese and the Monkey Wrench Quilt Block Pattern students will use transformation geometry to create an additional Freedom Quilt Block Pattern. Student will keep a journal on the steps they used to create the additional block pattern.

Supplies:

Computer, the Geometer's Sketchpad v4.03, and a math journal.

Instructional Plan:

Students will choose a Freedom Quilt Block Pattern that they want to create using the Geometer's Sketchpad. They will use transformational geometry to create the new block pattern. Students will write a journal recording their steps they used to create the block pattern.

The steps the students create for the block pattern can be shared with others to attempt.