



## “Showing Curves with Lines”

*Lesson plan designed for DVI by  
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### SUMMARY

This lesson plan delves into the concept of how artists represent accurate curves in a drawing. Curves are formed with a series of straight lines that overlap/cross one another. When an artist studies the angles of those lines carefully and then refines them in steps, the resulting curves represent the subject matter proportionally and realistically.

### OBJECTIVES

- Identify the difference between rectilinear and curvilinear lines
- Identify the difference between shapes made from rectilinear and curvilinear lines
- Recognize that curved lines are made from straight line segments
- Recognize that the curvier the line, the shorter the line segments
- Experimentation in various ways of forming and seeing straight line segments representing curved lines
- See how artists use straight lines in a progression to draw accurate curves in drawing
- Draw a simple curved still life object

### STANDARDS

MATH COMMON CORE:  
 CCSS.MATH.CONTENT.K.A.2  
 CCSS.MATH.CONTENT.1.GA.1  
 CCSS.MATH.CONTENT.2.GA.1  
 CCSS.MATH.CONTENT.3.GA.1  
 CCSS.MATH.CONTENT.4.GA.1

**NATIONAL ART STANDARDS:**

VA.Cr1.1.Ka  
 VA. Cr1.1.1a  
 VA.Cr1.1.2a  
 VA.Cr1.1.3a  
 VA.Cr1.1.4a  
 VA.Cr1.1.5a

VA.Cr1.2.Ka  
 VA.Cr1.2.1a  
 VA.Cr1.2.2a  
 VA.Cr1.2.3a  
 VA.Cr1.2.4a  
 VA.Cr1.2.5a

VA.Cr2.1.Ka  
 VA.Cr2.1.1a  
 VA.Cr2.1.2a  
 VA.Cr2.1.3a  
 VA.Cr2.1.4a  
 VA.Cr2.1.5a

**STILL LIFE MATERIALS**



**TIP FOR STILL LIFE MATERIALS**

Start saving jars and bottles that you use in your kitchen. Soak to remove labels (use “Goo Gone” for the really sticky ones). When you have a collection, spray them with “Kilz” spray primer in even coats. These become great studies for students to learn drawing concepts. Start looking at things in thrift shops and yard sales imagining them spray painted white and how interesting they can be for studies. Lots of times yard sale folks will give you things if you tell them you are an art teacher!



**BACKGROUND INFORMATION**

Drawing accurate representations is a process of close observation and recording your observations onto paper with your pencil. This starts with line. One of the techniques that artists use to make sure they are recording the subject matter accurately is through the use of a progressively more detailed framework of straight lines. These lead to accurate curves that represent the contour and important interior landmarks of the object for a drawing. The following activities address the use of line only as a beginning to a finished drawing.

The following activities range from grade K-5 and are loosely in that order. Treat them as a buffet of choices and choose the ones that will be meaningful to your students. The grade classification is a suggestion.

**ACTIVITY 1 (K-3)**

**SHAVING CREAM LINES:**

Before giving each student a daub of shaving cream on his/her table surface, talk about not spreading the cream farther than the space two hands with fingers spread wide take up.



Distribute shaving cream. Start with asking students to make:

- straight lines
- crooked lines
- curvy lines
- dotted lines
- thick lines
- long lines

Then demonstrate with your finger in space what a curvilinear line is. Students will organically follow.



Then demonstrate with your finger in space what a rectilinear line is. Again they will imitate.



Then ask students to make shapes:

- circle (curvilinear)
- triangle (rectilinear)
- square (rectilinear)
- oval (curvilinear)

And on.

With a sponge and warm water wipe down the tables and they will be very clean! Students can rinse hands in water.

**MATERIALS:**

- shaving cream (2 cans per class)
- sponge
- water
- bucket

**ACTIVITY 2 (K-4)**

**HUMAN LINE SEGMENTS:**

Clear back all the tables/desks for a large floor space, or go outside to a place where students can lie on the ground. Divide students into teams of 6-8.

Challenge them to form curvilinear and rectilinear lines, as well as curvilinear and rectilinear shapes by lying down on the ground. Take a cell phone pic to “critique” the actual shape that they assume and show them.

Start simple (circle) and become more complex (star) for fun! Join in if you are so inclined!

**ACTIVITY 3 (K-5)**

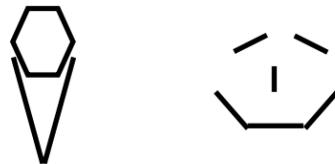
**PAPER LINE MANIPULATIVES:** This is another experiential activity - a kinesthetic way to approach the concept. For grades (K-1) you may want to pre-cut strips of white construction paper or poster board 1/4” wide and various lengths long,

**ACTIVITY 3 (continued)**

and for grades 2-5 use the attached hand-out, “PAPER LINE MANIPULATIVES A-3”.

The concept here is to challenge students to figure out how to form progressively more “curved” shapes from straight line segments, which in this case are paper strips. Work can be done individually or in pairs.

In grades K-1, distribute paper strips, grades 2-5 distribute handouts and scissors for students to cut out strips of paper. Start with rectilinear shapes and gradually change to more curvilinear shapes. For example: Triangle, square, rectangle, oval, circle, etc. Throw a surprise in there for fun: ice cream cone (could be both curvilinear and rectilinear), or a smily face!



Its okay if students want to cut the paper strips into smaller segments...this will create a curvier appearance to shapes.

**MATERIALS:**

- copies of PAPER LINE MANIPULATIVES A-3 handout, one per student or pair of students
- scissors, one pair per student

**ACTIVITY 4 (K-5)**

**DOT-TO-DOT/EXPERIMENT WITH CURVES:**

This activity further reinforces how curved shapes are made from line segment using the attached handouts. The curvier the shapes are, the shorter the line segments.

The handout, “DOT-TO-DOT”, is designed for grades K-2 and demonstrates how curves are made from line segments. Comparing the two shapes on that page demonstrates that shorter lines make a shape closer to a circle.

The handouts, “EXPERIMENTING WITH LINES”, are designed for grades 2-5. They are labeled in the following way:

- 1a and 2a are made for a classroom that has rulers to use
- 2a and 2b include a straight edge your students can cut out to use and it is recommended that you copy these on card stock for that reason.
- 3b includes a right angle your students can cut out to use and it is recommended that you copy these on card stock.
- 1c and 2c are designed for grade 4 and 5 and require rulers.
- See suggested solutions to these handouts following all material lists.

**MATERIAL LIST for 1a, 2a, 1c, 2c:**

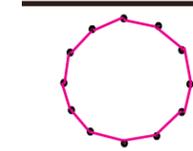
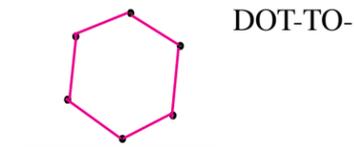
- copy of handout, one per student
- rulers or straight edges (posterboard cut into strips on a paper cutter work well)
- pencils

**MATERIAL LIST for 2a, 2b, 3b:**

- copy of handout on cardstock, one per student
- scissors
- pencils

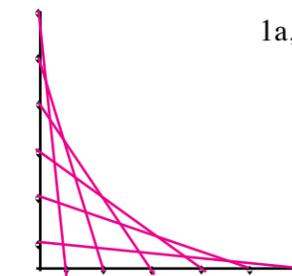
**MATERIAL LIST for 1c and 2c:**

- copy of handout, one per student
- rulers
- pencils

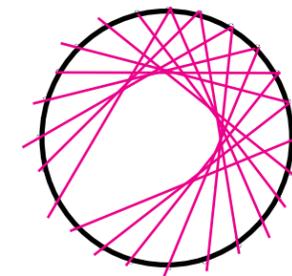


DOT-TO-

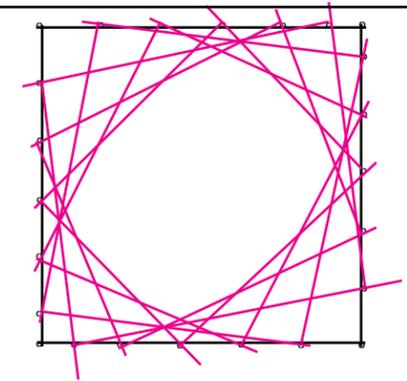
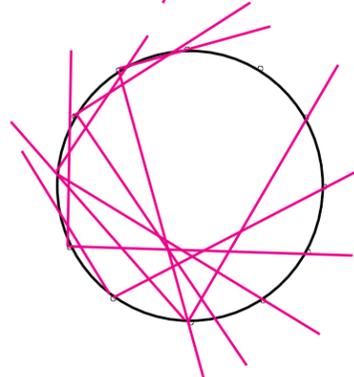
1a, 1b



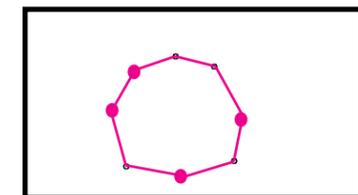
2a, 2b



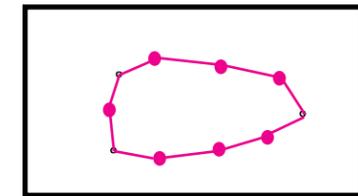
3b



1c



2c



**ACTIVITY 5 (K-5)**

**SPAGHETTI MANIPULATIVE**

This activity is appropriate for grades K-5. Using two pieces of dry spaghetti, challenge students to make shapes from broken pieces beginning with rectilinear lines, then rectilinear shapes to curvilinear lines, then curvilinear shapes.



“SHOWING CURVES WITH LINES”

K-5 / Curves with Line

“SHOWING CURVES WITH LINES”

K-5 / Curves with Line

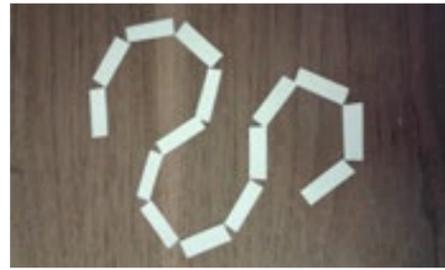
**ACTIVITY 6 (K-5)**

**STILL LIFE DRAWING:**

This activity sums up all the previous activities and challenges the students to use a straight line framework that is later used to draw accurate curves of a simple still life. (see STILL LIFE MATERIALS)

After looking at and discussing the DRAWING AN EGG K-5 PP, set up simple still lifes for students in various areas of the room. You can set students free to work, or guide them step by step through an envelope, angles lines then curves.

If you and students want to add some shading and the shadow to make the drawing three dimensional you can. However the rubric for Activity 6 is designed for the lines becoming curves.



Paper Line Manipulative

*“A curved line for beauty, a straight line for duty.”*  
- Violet Linton

**ACTIVITIES 1-5 RUBRIC**

Objective	3 pts	4 pts	5 pts
Identify the difference between rectilinear and curvilinear lines	Student is not able to point to and say which lines are rectilinear and which are curvilinear	Student is mostly able to point to and say which lines are rectilinear and which are curvilinear	Student is able to correctly point to and say which lines are rectilinear and which are curvilinear
Identify the difference between shapes made from rectilinear and curvilinear lines	Student is not able to point to and say which shapes are rectilinear and which are curvilinear	Student is mostly able to point to and say which shapes are rectilinear and which are curvilinear	Student is able to correctly point to and say which shapes are rectilinear and which are curvilinear
Recognize that curved lines are made from straight line segments	Student does not demonstrate understanding of the relationship between longer and tighter curves and the line segments that form them	Student sometimes mixes up manipulatives not understanding the relationship between longer and tighter curves and the line segments that form them	Student uses manipulatives to create long curves with long line segments and tighter curves with shorter line segments

**ACTIVITIES 1-5 RUBRIC (continued)**

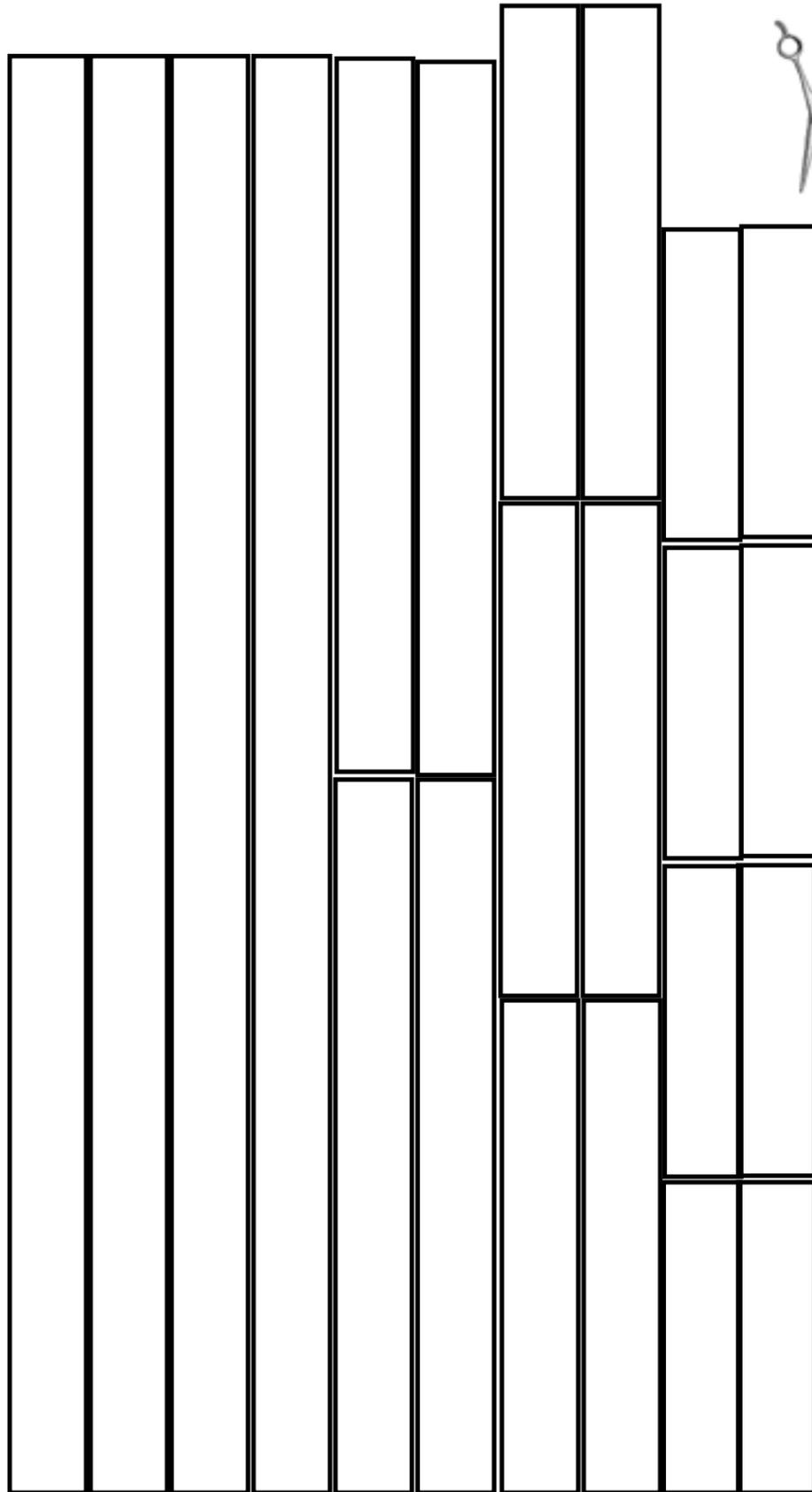
Objective	3 pts	4 pts	5 pts
Recognize that the curvier the line, the shorter the line segments	Student is unable to make tight curvy lines with short line segments, because they are using long line segments	Student makes some tight curvy lines with short line segments, but others are large because they are made with longer line segments	Student makes tight curvy lines with short line segments
Experimentation in various ways of forming and seeing straight line segments representing curved lines	Student refuses to participate and openly experiment with line segment manipulatives	Student resists participation and open experimentation with line segment manipulatives	Student actively participates and openly experiments with line segment manipulatives

**ACTIVITY 6 RUBRIC**

Objective	3 pts	4 pts	5 pts
Draw a simple curved still life using straight lines in a progression to accurate curves in drawingt			
Envelope	Student does not or makes an envelope or misses touching most of- the top, bottom and sides with horizontal and vertical lines	Student makes an envelope surrounding the still life object that misses touching each- the top, bottom and sides with horizontal and vertical lines	Student makes an envelope surrounding the still life object that touches the top, bottom and each side with horizontal and vertical lines
Angled lines	Student draws few angled lines that inaccurately indicate edges of the curved still life object	Student draws some angled lines that further indicate edges of the curved still life object	Student draws angled lines that further indicate edges of the curved still life object
Curves	Student does not add drawn curves or curves are not guided by the envelope and angled lines to complete a contour of curved still life object/s	Student adds some accurate, some inaccurate drawn curves guided by the envelope and angled lines to complete a contour of curved still life object/s	Student adds accurate drawn curves guided by the envelope and angled lines to complete a contour of curved still life object/s

# PAPER LINE MANIPULATIVES (A-3)

Student Name \_\_\_\_\_ Period \_\_\_\_\_

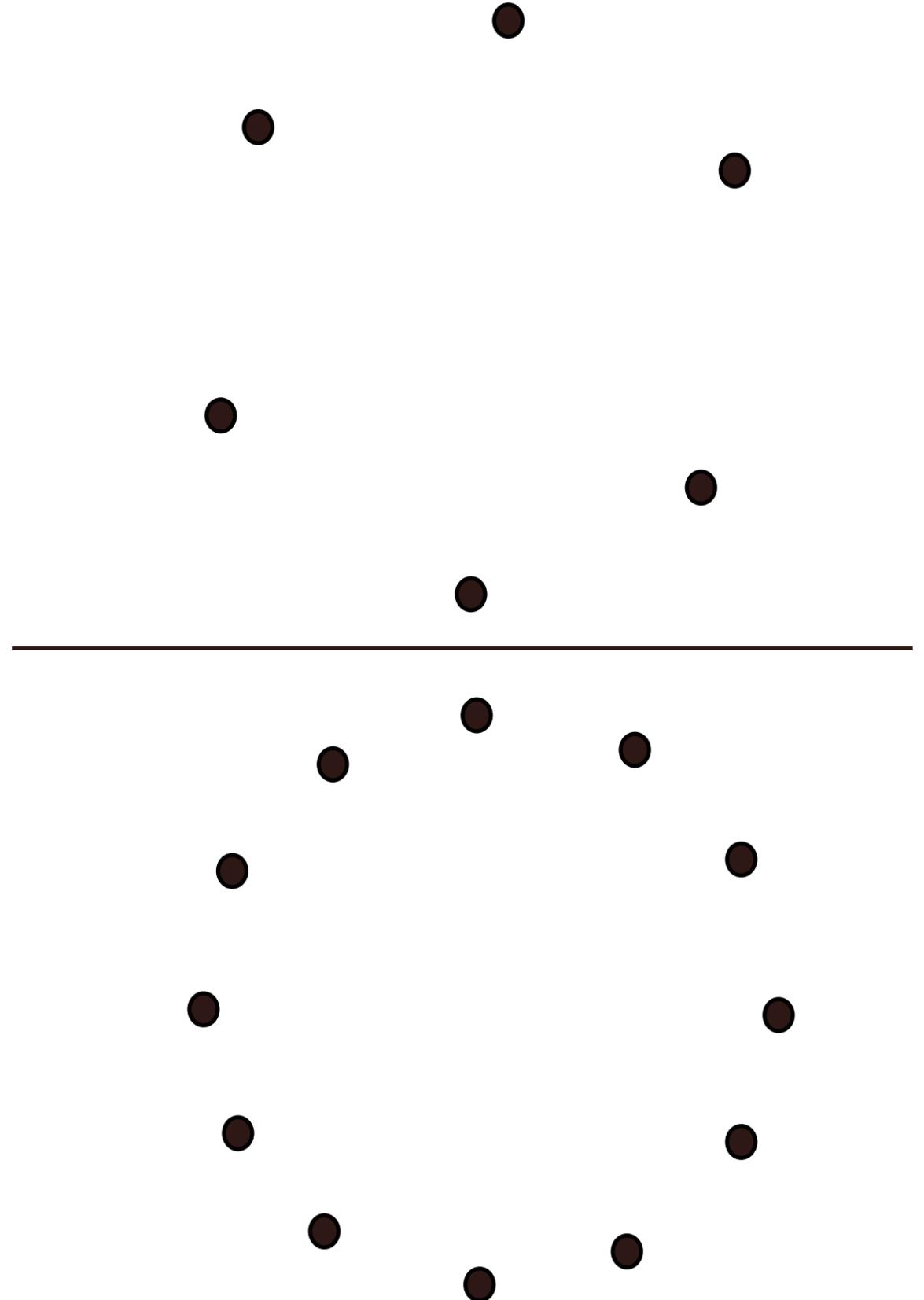


Cut out strips of paper to use as sides of shapes.

If needed, you can customize the length by trimming them.

# DOT-TO-DOT

Student Name \_\_\_\_\_ Period \_\_\_\_\_

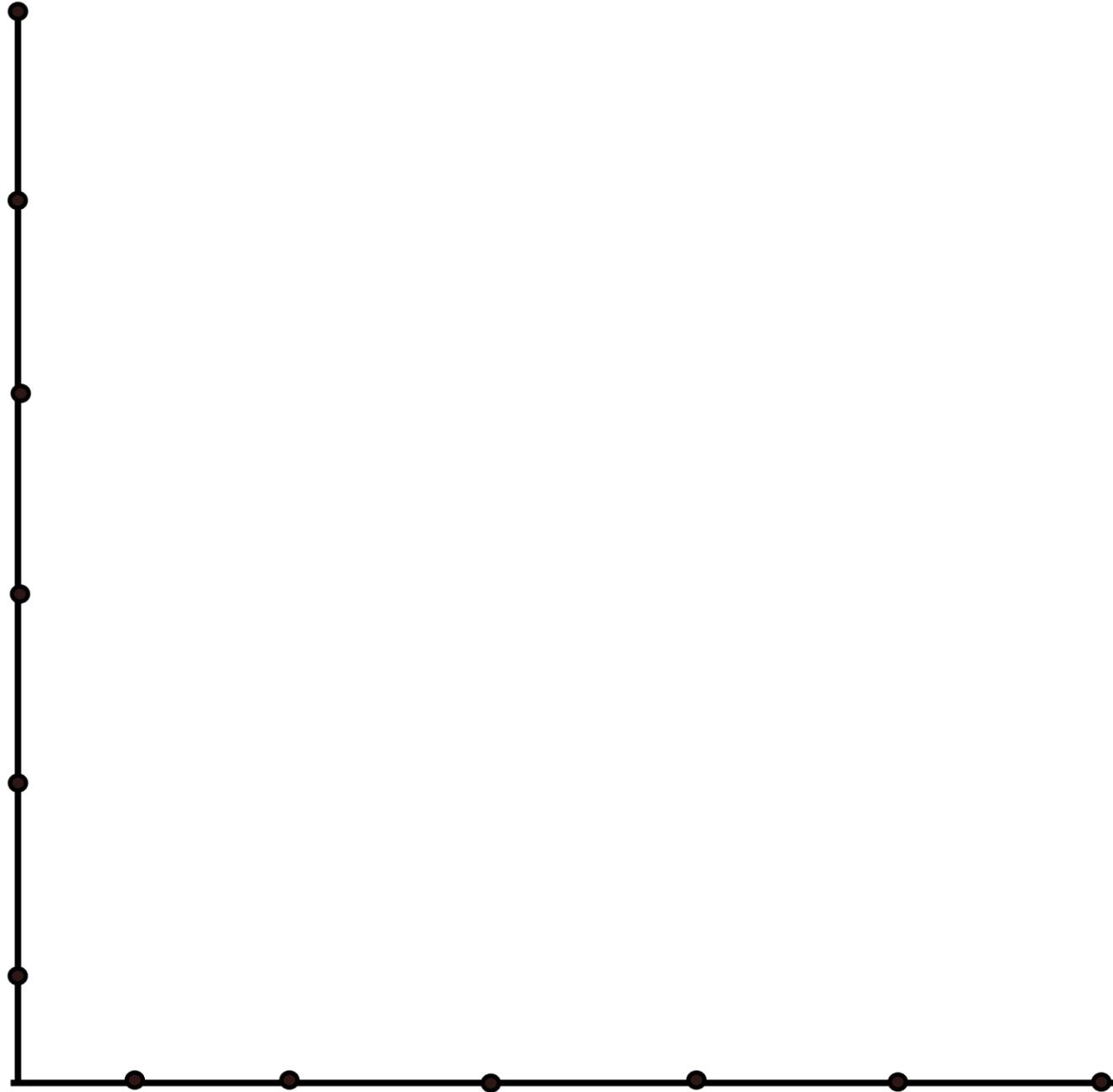


Which of these is more like a circle? Why?

# EXPERIMENT WITH CURVES 1a

Student Name \_\_\_\_\_ Period \_\_\_\_\_

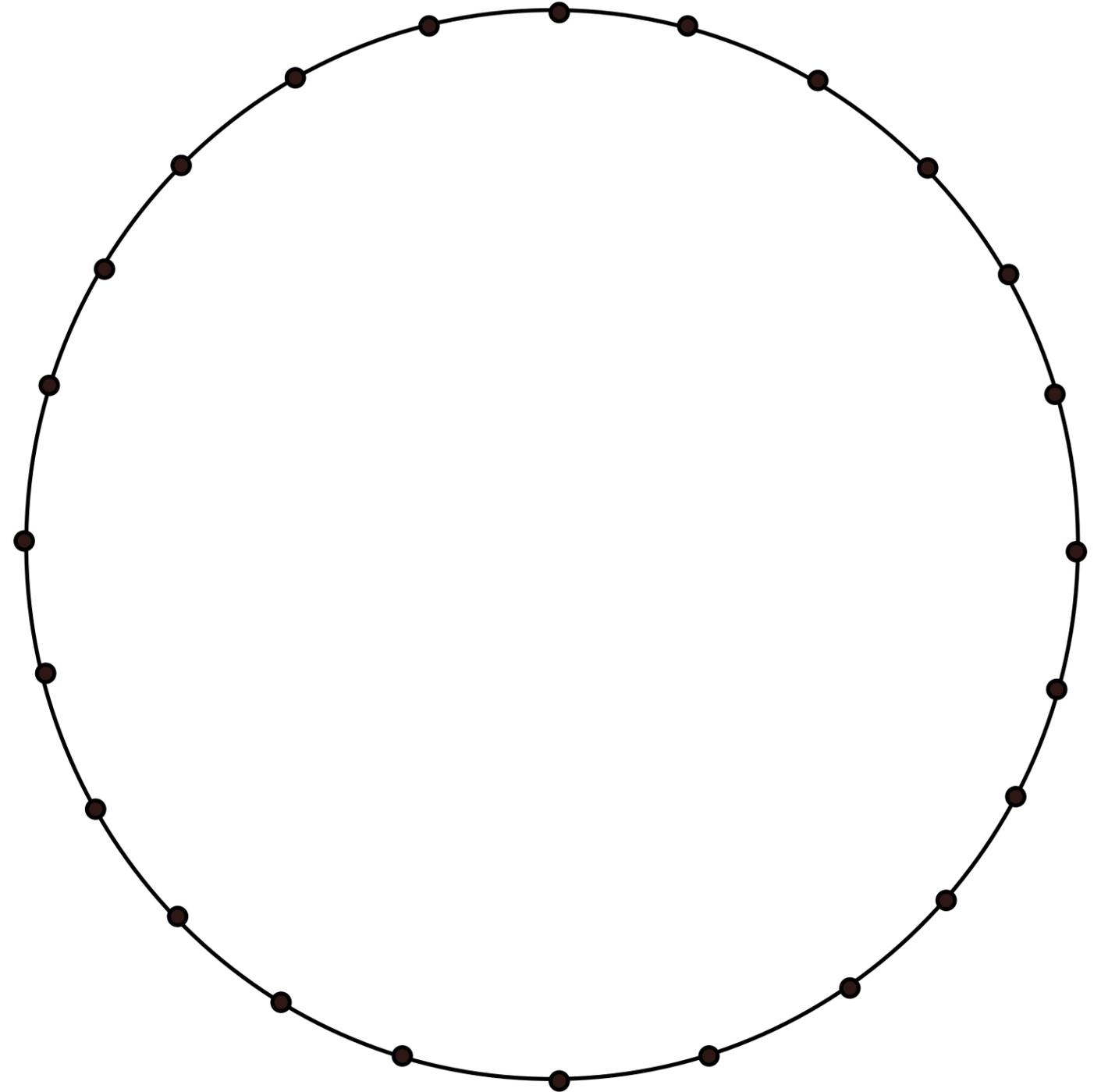
Use a ruler or straight edge to draw straight lines connecting various dots on the image below. Challenge yourself to make a curve using only straight lines.



# EXPERIMENT WITH CURVES 2a

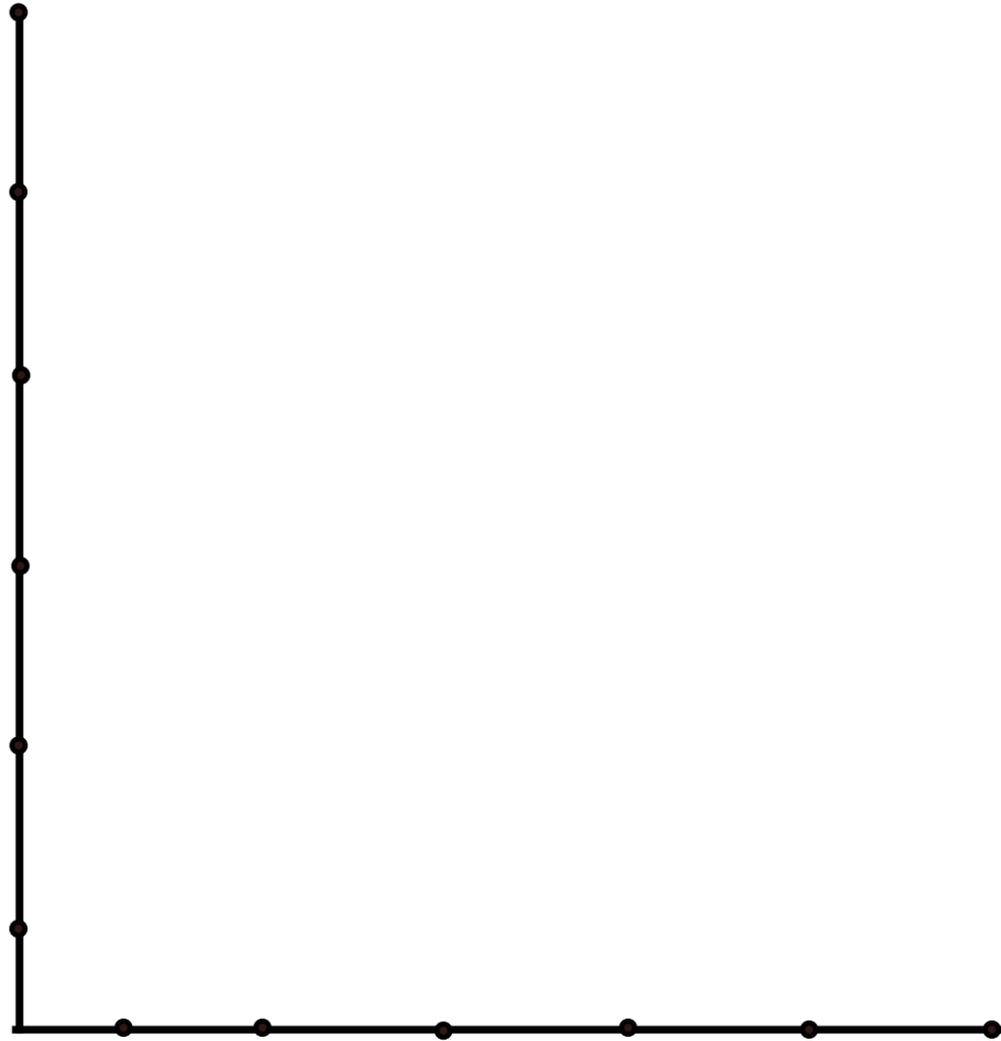
Student Name \_\_\_\_\_ Period \_\_\_\_\_

Use a ruler or straight edge to draw straight lines connecting various dots on the image below. Challenge yourself to make a curve inside the circle using only straight lines.

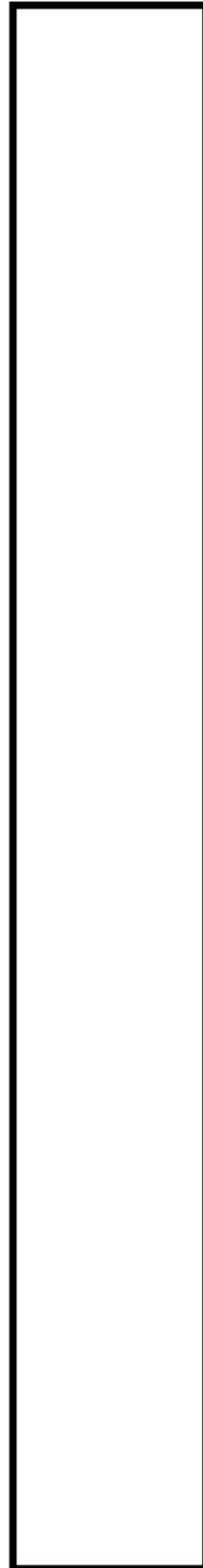


# EXPERIMENT WITH CURVES 1b

Student Name \_\_\_\_\_ Period \_\_\_\_\_

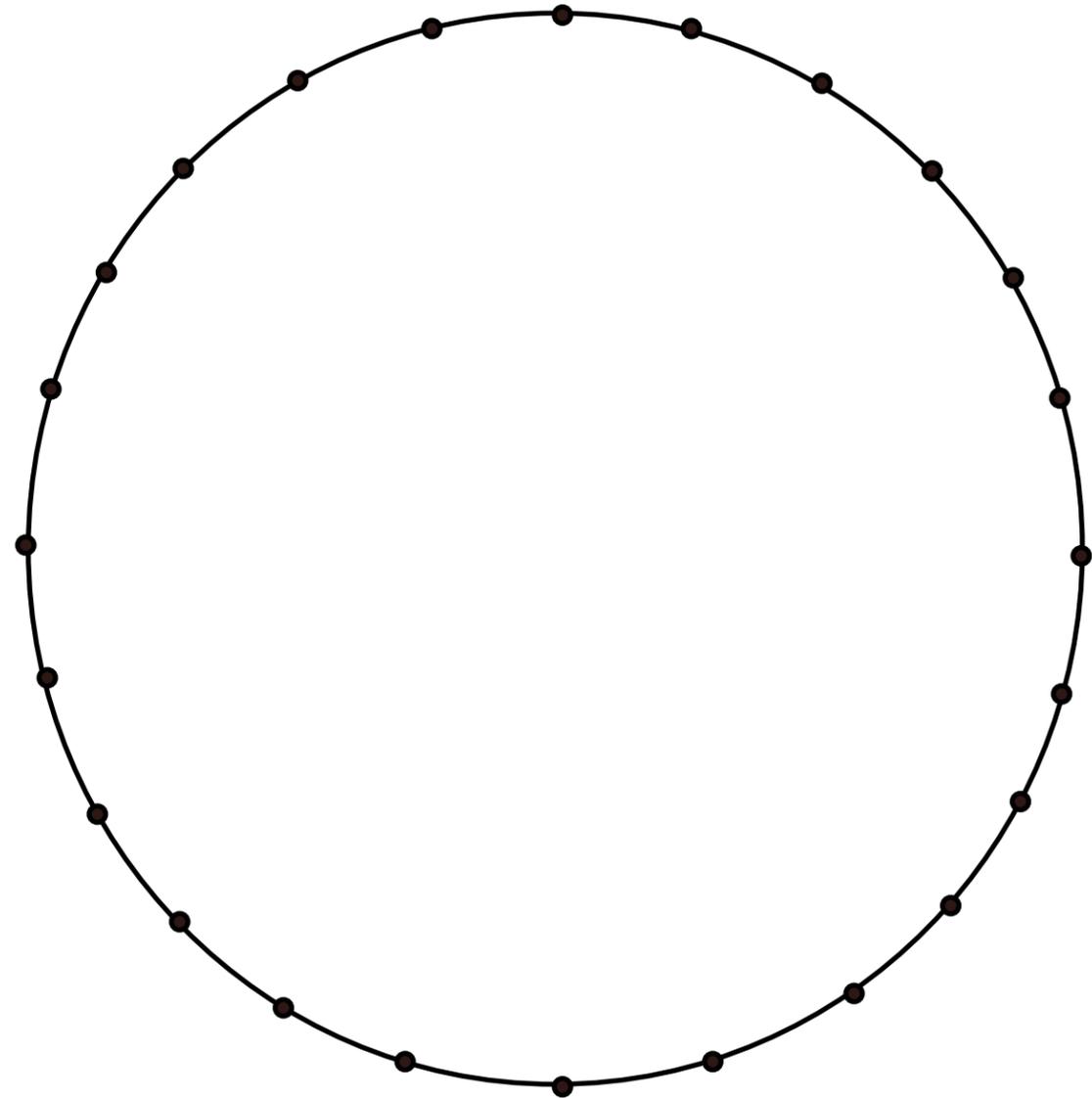


Cut out straight edge and use to draw straight lines connecting various dots on the image above. Challenge yourself to make a curve using only straight lines.

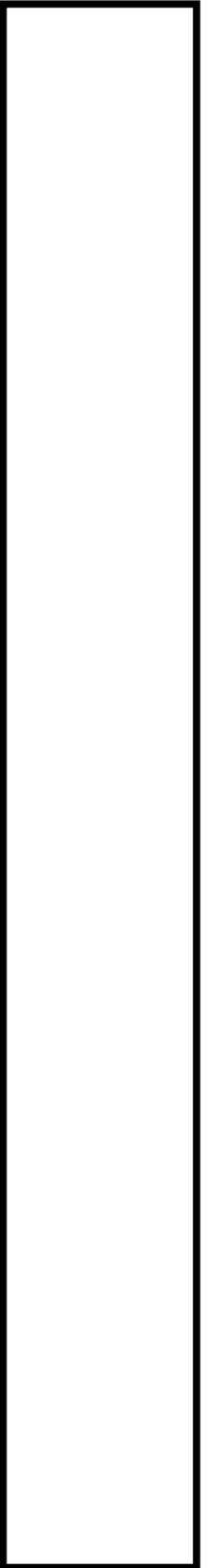


# EXPERIMENT WITH CURVES 2b

Student Name \_\_\_\_\_ Period \_\_\_\_\_

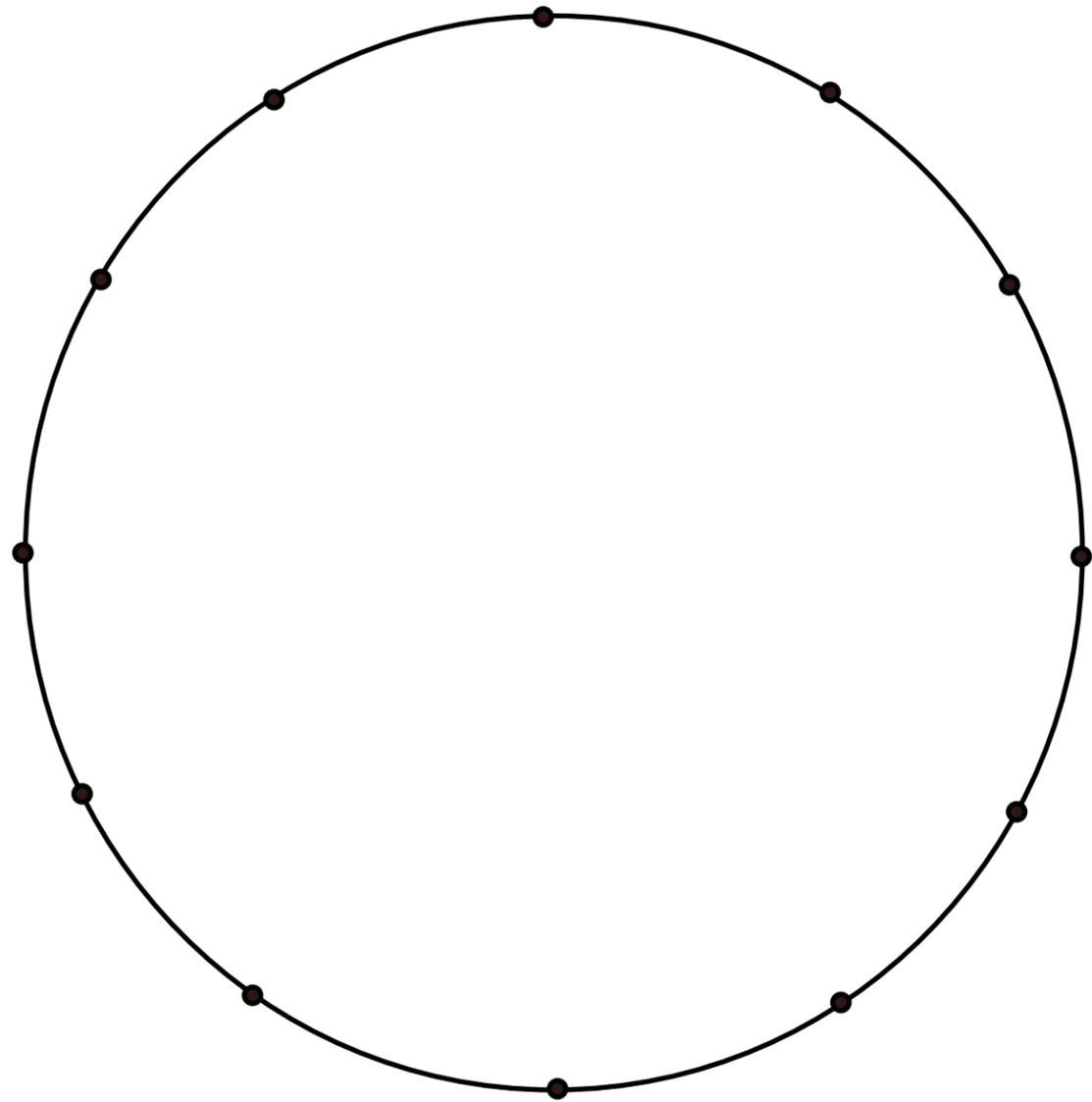


Cut out straight edge and use to draw straight lines connecting various dots on the image above. Challenge yourself to make a curve inside the circle using only straight lines.



# EXPERIMENT WITH CURVES 3b

Student Name \_\_\_\_\_ Period \_\_\_\_\_



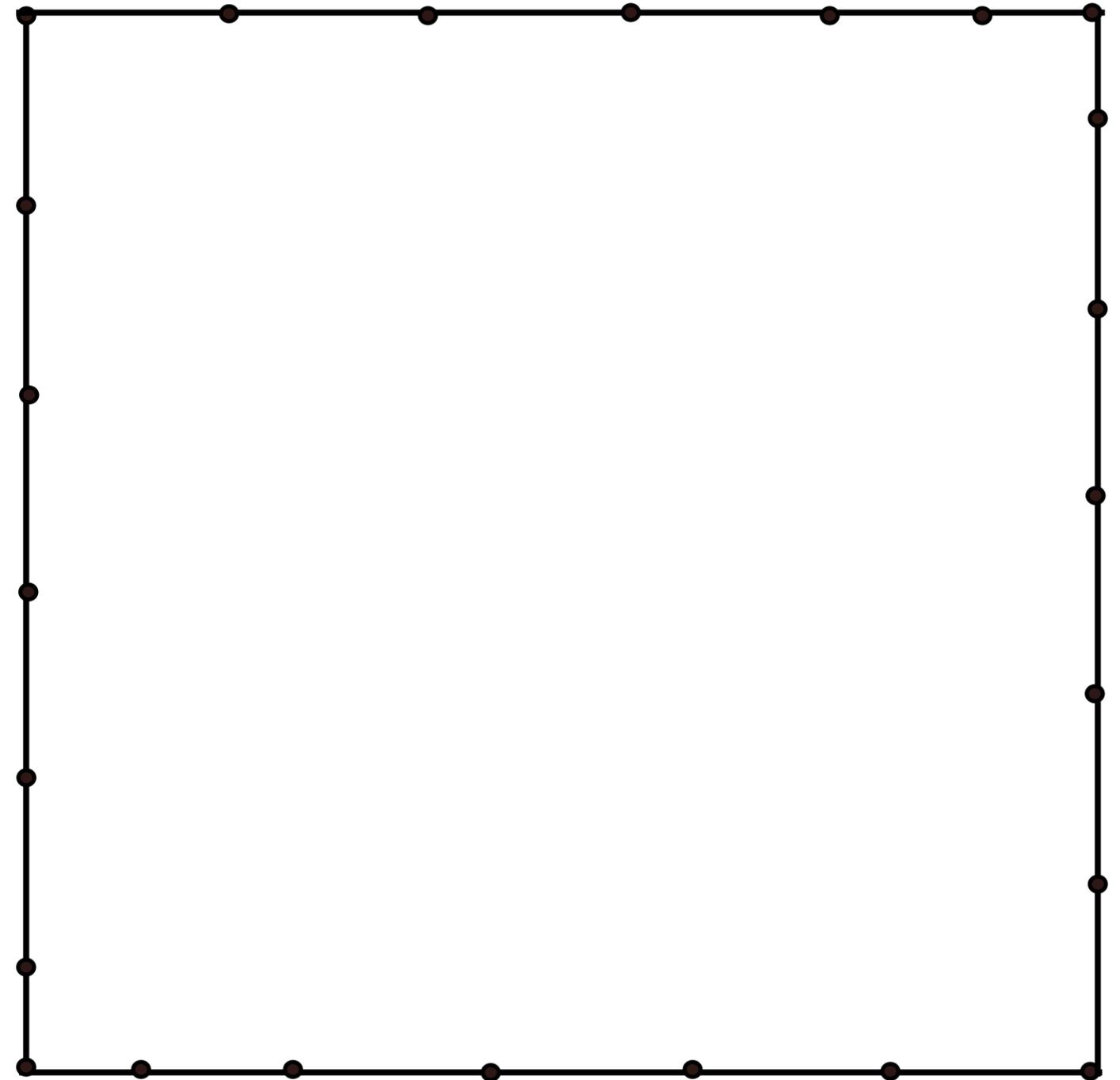
Cut out right angle tool and use to draw straight right angles connecting various dots on the circle above.  
Challenge yourself to make a curve inside the circle using only straight lines.



# EXPERIMENT WITH CURVES 1c

Student Name \_\_\_\_\_ Period \_\_\_\_\_

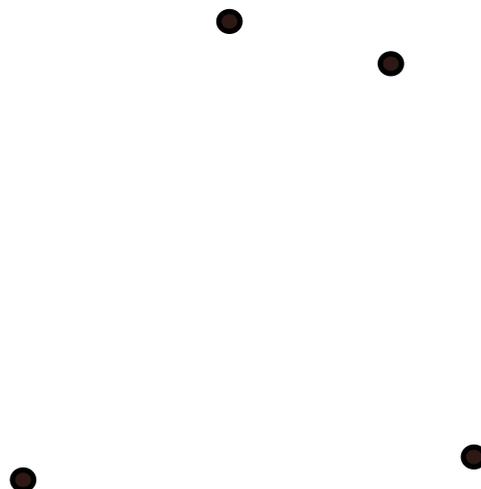
Use a ruler or straight edge to draw straight lines connecting various dots on the image below. Challenge yourself to make a curve using only straight lines.



# EXPERIMENT WITH CURVES 2c

Student Name \_\_\_\_\_ Period \_\_\_\_\_

Can you add points and line segments to form a circle?  
While working, plan how you will share out with the class the sequence of your problem solving.



Can you add points and line segments to make an egg shape, or ellipse?  
Again be prepared to share out your problem solving sequence.

