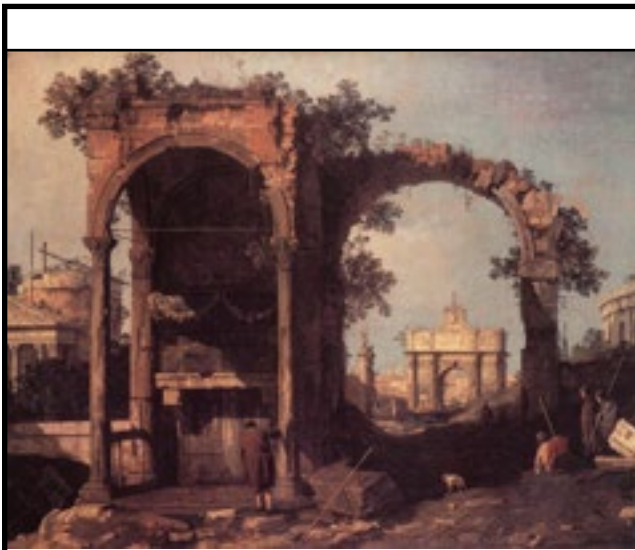




“Showing Curves with Lines”

*Lesson plan designed for DVI by
Camilla S. Haneberg*



Capriccio: Ruins and Classic Buildings, 1730, Canaletto

SUMMARY

This lesson plan delves into the concept of how artists represent accurate curves in 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 recreates them in steps, the resulting curves represent the subject matter proportionately and realistically.

OBJECTIVES

- Observe the use of overlapping straight lines used to find an accurate curve in an art work (see attached PowerPoints).
- Create curves using only a ruler, pencil and paper.
- Demonstrate where points belong on a pre-existing curve that divide it into almost straight line segments, kind of like a reverse dot-to-dot.
- Draw a curved object using a series of straight lines that lead to curved lines to accurately represent the object in a drawing.

STANDARDS

National Art Content Standards:

- VA:CR1.1.6a
- VA:CR1.1.7a
- VA:CR1.1.8a
- VA:CR1.1.1a
- VA:CR1.1.11a
- VA:CR1.1.111a

VA:Cr1.2.6a
 VA:Cr1.2.7a
 VA:Cr1.2.8a
 VA:Cr1.2.1a
 VA:Cr1.2.11a
 VA:Cr1.2.11a

Common Core Math Standards:
 CCSS.MATH.CONTENT.6.EE.B.7
 CCSS.MATH.CONTENT.7.EE.B.4
 (2 variable equations)

CCSS.MATH.CONTENT.HSG.GPE.A.2
 (parabola equation)

CCSS.MATH.CONTENT.HSG.C.A.4
 (tangent and secant line)

CCSS.MATH.CONTENT.HSG.MG.A.1
 (modeling with geometry)

MATERIALS

- rulers
- pencils
- erasers
- white paper
- curved objects for a still life, for example: hard boiled eggs, any sphere, bottles.



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. Straight lines lead to accurate curves that represent the contour and important interior landmarks of the subject. This lesson plan addresses the concept of using only straight lines as a beginning stage of a drawing.

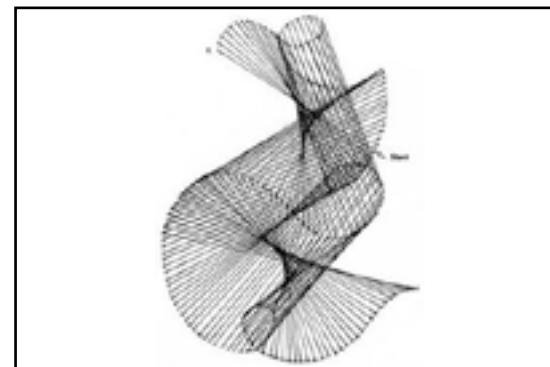
ACTIVITY 1

Watch and discuss the attached Power-Point, “Showing Curves with Line PP”

ACTIVITY 2

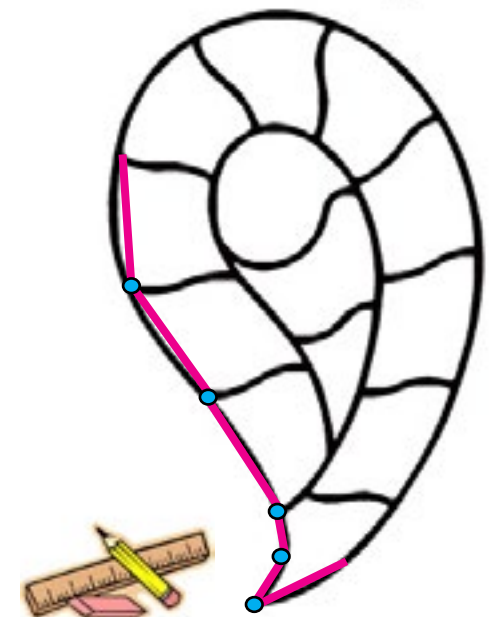
EXPERIENTIAL ACTIVITY:

Provide each student with a clean white piece of paper, a ruler and a sharp pencil. Challenge each student to create a curved design using only the materials provided, and only using straight lines.



ACTIVITY 3

Using the attached “Reverse Dot-to-dot Handout”, instruct students on how to find where the points go that divide the design into straight line segments. A ruler or straight edge will be necessary for this process. See the example in the next column and the Activity 3 Rubric for student assessment.



ACTIVITY 4

Watch and discuss the “Drawing a Bottle with Many Curves PP, A Cross-curricular Art/Math Lesson.” See if the students recognize any overlap between art and math.


ACTIVITY 5

The culmination of these activities comes together in a drawing that starts with straight horizontal and vertical lines, and then moves to angled lines that then lead to curved contours. Determine what to start with by where your student skill level is. You could set up more than one still life and let the students decide which one they are comfortable with, nudging those who are purposefully choosing the easier one when they have the skill for the more complicated one. See Activity 5 Rubric for student assessment.

“SHOWING CURVES WITH LINES”

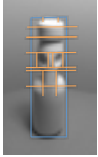
6-12 / Curves with Line

ACTIVITY 5 STEPS



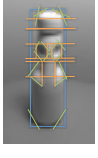
The envelope contains the object using vertical and horizontal straight lines.

Envelope



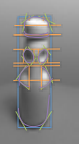
More subdivision specifies the vertical, as well as the horizontal edges.

Subdividing Lines




Next, add the angles of the curved edges of the shadow and forms.

Angled Lines



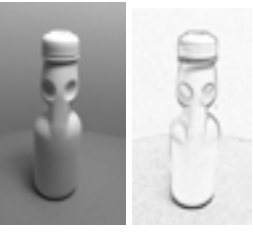
Now the curves can easily fit into the structure of angles you have set up with careful observation.

Accurate Curves



The contour of the bottle is now apparent.

Accurate Curves



Finished Drawing

“SHOWING CURVES WITH LINES”

6-12 / Curves with Line

ACTIVITY 5 RUBRIC

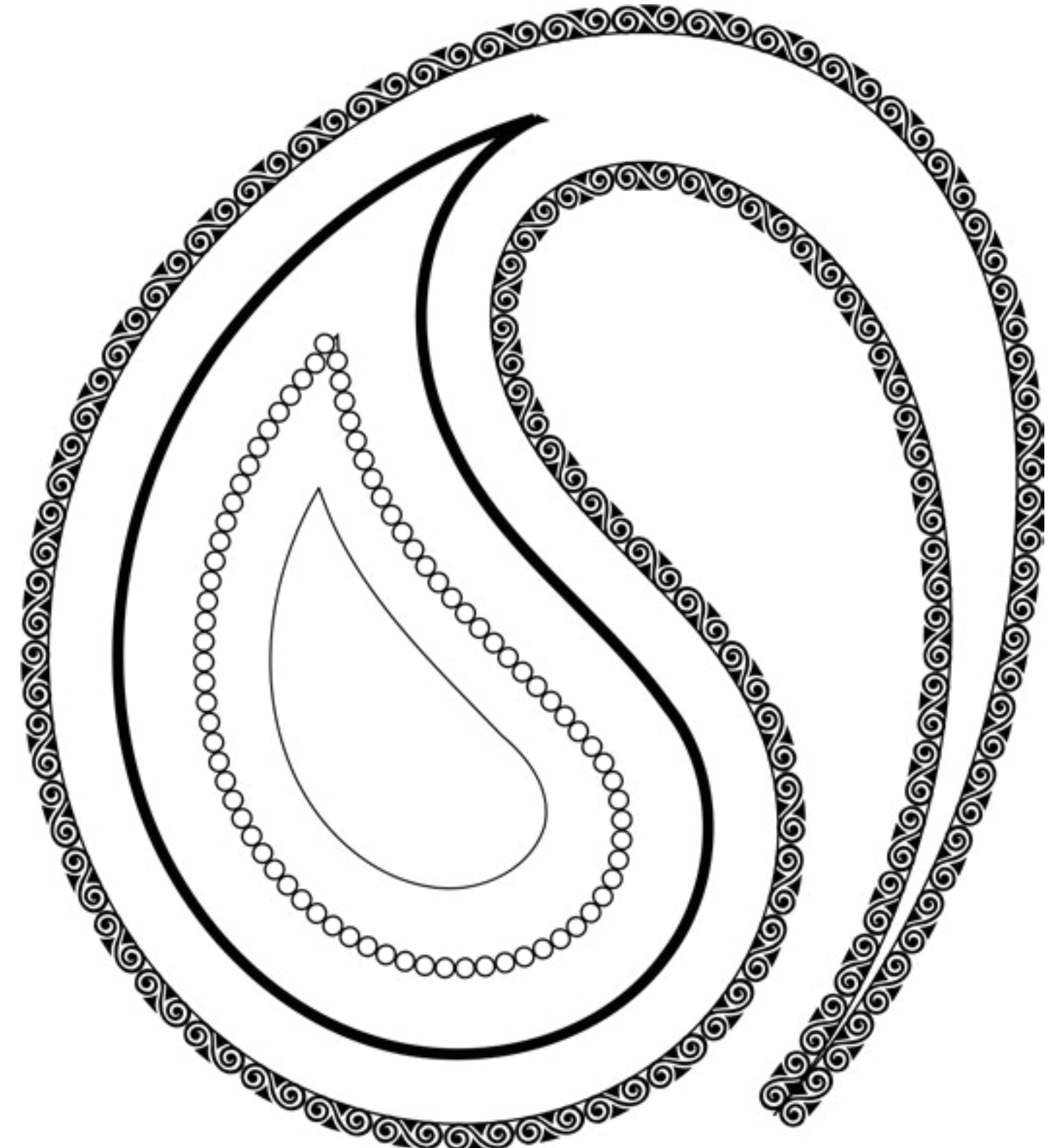
OBJECTIVE: Draw a curved object using a series of straight lines that lead to curved lines to accurately represent the object in a drawing.	3 pts	4 pts	5 pts
Envelope	Student struggles with demonstrating an envelope for still life object touching outermost point on each side of the object.	Student demonstrates an envelope for still life object close to touching outermost point on each side of the object.	Student demonstrates an accurate envelope for still life object touching outermost point on each side of the object.
Subdividing Lines	Student is unable to subdivide envelope into horizontal and vertical sections that indicate edges of inner and outer forms.	Student inaccurately subdivides envelope into horizontal and vertical sections that indicate some but not all edges of inner and outer forms.	Student subdivides envelope into horizontal and vertical sections that indicate edges of inner and outer forms.
Angled Lines	Student's angled lines are not close to defining edges of inner and outer forms of still life object.	Student's angled lines need adjustment to define edges of inner and outer forms of subject.	Student's angled lines further define edges of inner and outer forms of still life object.
Accurate Curves	Student's line structure has led to a few or no accurate curves representing a contour of the object.	Student's line structure has led to some accurate curves representing a contour of the object.	Student's line structure has led to accurate curves representing a contour of the object.
Finished Drawing Craftsmanship	Finished drawing does not show care, is not free of smudges, bent corners, and generally does not have a clean appearance.	Finished drawing shows some care, is mostly free of smudges, bent corners, and generally has a clean appearance.	Finished drawing shows care, is free of smudges, bent corners, and generally has a clean appearance.

ACTIVITY 3 RUBRIC

Objective	3 pts	4 pts	5 pts
Observe the use of overlapping straight lines used to find an accurate curve in an art work.	Student was present for the PowerPoint presentations and chose not to be engaged.	Student was present for the PowerPoint presentations and observed without verbal engagement.	Student was present for the PowerPoint presentations and was actively engaged with comments and questions.
Create curves using only a ruler, pencil and paper.	Student demonstrates limited understanding of a curve made from short straight line segments.	Student demonstrates some understanding of a curve made from short straight line segments.	Student demonstrates accurate understanding of a curve made from short straight line segments.
Demonstrate where points belong on a pre-existing curve that divide it into straight line segments.	Student's placements of the points where line segments connect, create an awkward representation of the curved object.	Student's placements of the points where line segments connect, create an accurate representation of the curved object.	Student's placements of the points where line segments connect, create a smooth and accurate representation of the curved object.

Student Name _____ Period _____

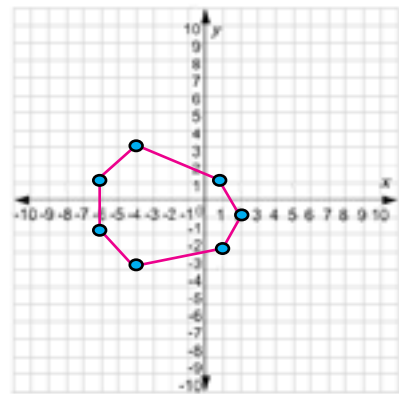
On the curvy design below, decipher and place where the points go to divide the curves into straight line segments. Think of it as a reverse dot-to-dot.



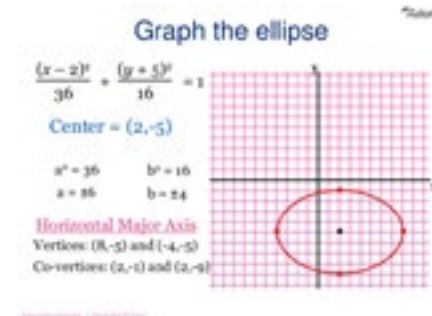
ADDITIONAL CROSS-CURRICULAR MATH ACTIVITIES

ACTIVITY ONE:

Using the website, www.desmos.com, or a sheet of graph paper, students can create math imagery using the x/y axis and the corresponding coordinates.



This is the same idea as the dot-to-dot connection of line segments that make curves. (Its an egg.) There are equations that create shapes by plugging in numbers and plotting the coordinates.



Materials:

- graph paper, one per student
- pencils
- erasers
- rulers

ACTIVITY TWO:

Origami Magic Circles, using the youtube video called “How to Make an origami Magic circle” (this is how the title appears on youtube) @ <https://www.youtube.com/watch?v=c-b0ICsjk114>.

This is a 4 minute and 20 second long “how to” video showing how a curved circle can be made from square paper folded in straight lines only. The finished product looks like this:



Materials:

- colored or white paper cut into 9X9 cm. squares, 8 per student
- youtube instructional video

ACTIVITY THREE:

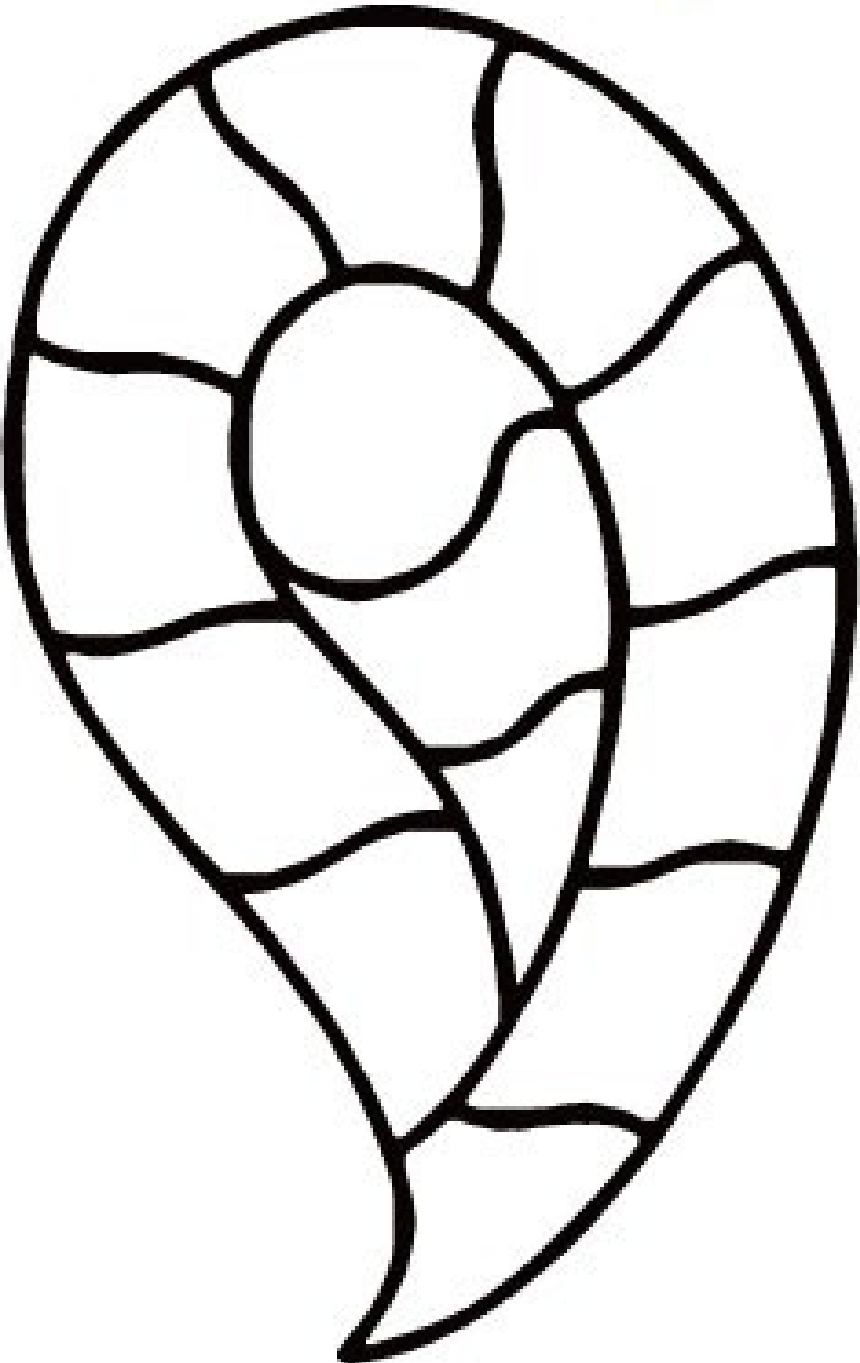
This is a very ambitious choice. Make string art with your students by following the tutorial for an Icosihenagon @ <http://www.mathcats.com/crafts/icosihenagon.html> The instructions include all you need to know. Here is the finished product:



REVERSE DOT-TO-DOT HANDOUT

Student Name _____ Period _____

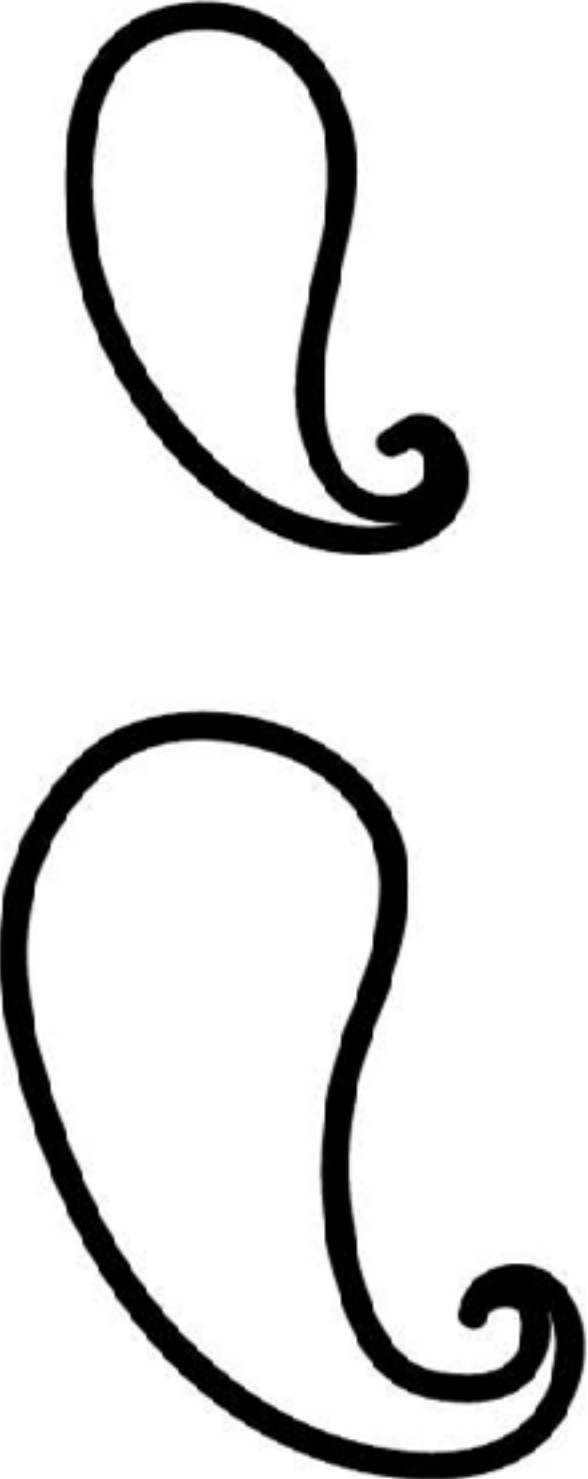
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