Facilitation Guide



10-15 Min Small Group

Digital Guide

ARTS EVERY DAY IN BALTIMORE CITY PUBLIC SCHOOLS

Drawing Algebraic Curves





Explore Brain Science

ARTFUL REPETITION

ROUTINE OVERVIEW

In this two-part series of differentiated small-group activities, students will practice drawing smooth curves using techniques demonstrated by line artists. They will then incorporate intervals of exponential curves into original 2D and 3D designs.

Want to see these objects in person? Book a free field trip to the Walters Art Museum! Visit the Walters website to learn more about field trips and bus reimbursements or contact tours@thewalters.org directly.

Maryland Standards

MARYLAND STATE MATH STANDARDS

- Algebra I: **F.IF.C.7** - Graph functions expressed symbolically and show key features of the graph
- Integrated Algebra I: **IA1.AT.D.14** - Represent functions using tables and graphs

MARYLAND ARTS STANDARDS

- **VA.AS1.I:9-12:1** - Act on creative ideas within the context of a given or chosen art problem.



Not in MD? View National Standards in the Digital Guide

Getting Ready

⭐ **REVEAL MATH: Algebra I: 9-1, 9-2**

ARTS INTEGRATED LEARNING OBJECTIVE: SWBAT incorporate exponential curves into 2-dimensional and 3-dimensional designs in order to more confidently draw smooth curves.

MATH DOMAINS:

Functions (HS)	Interpreting Functions	Graphing exponential functions
Algebraic Thinking (Integrated Algebra I)	Model with Functions	Graphing exponential functions

WHAT'S BEFORE: Graphing linear functions

WHAT'S NEXT: Transformations of exponential functions

MATH SKILL: Graphing exponential functions

ART SKILL: Drawing, creative thinking with pre-existing lines, idea generation, real world application

MATERIALS

- Slides
- Graph paper
- Pencils and other drawing implements
- Access to technology (for watching the video - linked in slides)
- Exponential Growth Worksheet 1 & 2
- Exponential Decay Worksheet 1 & 2

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TEACH

Facilitation Steps

Small group session 1

1. Watch the video (Slide 2)
   a. Students watch the video independently or in groups and take notes on key ideas. It will give them tips on improving the smoothness and accuracy of their curves in tattoo design, ink drawing, and sign/banner painting.
2. Graph an exponential (growth) function
   a. Students choose an exponential function and graph it, showing their work as necessary. For growth functions, this should be in the bottom-right quadrant of the page so that the curve fits well into an outline. For decay functions, this should be in the bottom-left quadrant, but if that doesn't happen, it just requires a little bit of extra creativity on the part of the student!
3. Incorporate part of the curve into a design
   a. Students use an interval of the curve in their graph and use it as part of a tattoo/drawing/sign design.
4. Repeat steps 2-3 (if time)

Small group session 2

1. Explore the Walters Art Museum collection on slide 3.
   a. Students look closely at 3-dimensional art that uses curves, either independently or as a group, taking notes on important connections to curves. This will give them ideas of how to incorporate curves in the context of pottery and sculpture.

Learn more about these featured pieces in the Walters collection!

- *Stemmed Kylix with Cuttlefish*
  - Mycenaean (Artist), 14th century BCE
  - Ceramics
  - Acquired by Henry Walters, 1924, 48.211
- *Pair of Mulberry Earrings*
  - Syrian (Artist), 11th–10th century BCE
  - Gold
  - Acquired by Henry Walters, VO.70.
- *Wak'a del Agua*
  - Kukli Velarde (Peruvian), 2022-2023
  - Clay, underglaze, casein and enamel paint
  - Museum purchase, 2024, 48.2903
  - © Kukuli Velarde

2. Graph an exponential (decay) function
   a. Students choose an exponential function and graph it, showing their work as necessary. For growth functions, this should be in the bottom-right quadrant of the page so that the curve fits well into an outline. For decay functions, this should be in the bottom-left quadrant, but if that doesn't happen, it just requires a little bit of extra creativity on the part of the student!
3. Incorporate part of the curve into a design
   a. Students use an interval of the curve in their graph and use it as part of a sculpture/pottery design.
4. Repeat steps 2-3 (if time)



SLIDES



MATERIALS
GOOGLE FOLDER

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Assessment & Reflection

Teachers will check for understanding based on the accuracy and smoothness of the curves, as well as their logical and creative incorporation into a larger design.

Differentiation

This can also be used for quadratic functions, as well as other curved graphs in higher-level math.

For students with fine motor difficulties, it might be easier for them to use modeling clay or something similar to “draw” the graph with. This will allow them to make easy adjustments without sacrificing the ability to feel the curve.

Calculators are a helpful support for all students.

Students who are able to independently plot points when provided with a visual model or other accommodations (like color coding, flow charts, provided tables, etc.) during the lesson should also be provided with the same supports when completing this activity independently.