

# Geometry, Part 1:

## Basic Shapes

(1.5 hours)

### Lesson at a Glance

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#### SUMMARY

For students with weak basic skills, tackling math can seem daunting and intimidating. This lesson takes a hands-on, experiential approach to geometry through the beautiful art form of origami. The springboard is a video segment about a Japanese-American artist who shows how basic shapes and angles come to the fore with every fold of the paper.

#### GOALS

- To know the basics about geometrical shapes
- To be familiar with origami, the Japanese art of paper-folding, and how it makes use of geometry

#### LEARNER OUTCOMES

Students will...

- Learn the basic vocabulary of geometry.
- Learn to identify various geometric shapes and their attributes.
- Learn about angles, symmetry, asymmetry, and parallel lines.
- Be able to make a piece of origami.

#### MATERIALS

##### VIDEO:

*Math Behind the Arts: Origami*

Episode 28: Length: 4:18, Start Time: 8:58

*Buzzword: Asymmetrical*

Episode 29: Length: 1:23, Start Time: 26:29

##### PRINT:

*Getting an Angle on Geometry*

Issue 28, p. 10–11

*Build Your Vocabulary*

Issue 28, p. 2

##### ADDITIONAL MATERIALS NEEDED:

- Colorful paper suitable for an origami project
- Scissors

#### ACTIVITIES

- View and discuss two **TV411** video segments.
- Read two *In Print* articles related to the video.
- Review nine vocabulary words or terms.
- Create an origami paper heart.

“Each piece of  
paper has a  
secret.”

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## Step by Step

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### 1. INTRODUCING THE CONTENT

#### Pre-Viewing Activities

##### Discuss

How many students in the class know the meaning of “geometry”?

[According to *Webster's New World Dictionary*, it is “the branch of mathematics that deals with points, lines, planes, and figures and examines their properties, measurement, and mutual relations in space.”]

What types of work draw on the principles of geometry?

[Answers will vary. Learners may mention carpentry, construction, drafting, engineering, and architecture among other professions that require knowledge of geometry.]

How many basic geometrical shapes do learners know?

[Square, rectangle, triangle, perhaps even hexagon, octagon, or pentagon—the five-sided shape for which the headquarters of the U.S. Department of Defense is named.]

How do these shapes differ from one another?

[Students may be aware of the varying number of sides and angles.]

Keep track of students' explanations on the board, but do not correct errors, if any.

##### Teacher Talk

Origami, the Japanese art of paper folding, relies a great deal on geometric ideas. This segment of **TV411** features an origami artist who shows how, through her art, you can learn the concepts of basic geometry and create beautiful paper objects as you do.

#### VOCABULARY REVIEW

- geometry
- pentagon
- hexagon
- square
- triangle
- isosceles triangle
- symmetry
- asymmetry
- asymmetrical
- parallel lines

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### Step by Step (cont.)

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#### 2. MODELING THE STRATEGY

View Video

*Math Behind the Arts: Origami*, Episode 28: Length: 4:18, Start Time: 8:58

Origami artist June Sakamoto explains why, when you're learning origami, you're really putting geometry into practice.

#### 3. MINING THE STRATEGY

Post-Viewing Activities

##### Discuss

- Why is geometry the basis of origami?  
[Because you're working with different shapes and angles, which are the basis of geometry.]
- What kinds of shapes did June Sakamoto demonstrate?  
[Square, rectangle, triangles, pentagon, hexagon.]
- What are angles?  
[The shape made by two straight lines that meet at a common point. Angles are measured in units called degrees.]

#### 4. EXTENDING AND PRACTICING THE STRATEGY

Workbook Activities

##### The Basics

Divide the class into small groups or pairs. Distribute copies of "Getting an Angle on Geometry," (*In Print* issue 28, p. 10–11) and ask participants to collaborate on the first half of the activity, on p. 10.

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### Step by Step (cont.)

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When learners have completed naming the shapes and describing their attributes, ask them to share their responses. You may wish to have them draw the shapes on the board and add up the angles.

#### Hands-On

Distribute the origami paper (and scissors, if necessary), and ask learners to make a paper heart, following the instructions on p. 11 of the *In Print* article.

If you prefer, you can ask a member of the class to guide the group through the activity by reading the instructions aloud.

### 5. EXTENDING THE LESSON

#### Discuss

You may wish to replay the video segment, focusing students' attention on the topics of discussion below.

- What is an isosceles triangle?  
[One that has at least two sides that are the same length, and possibly a third.]
- Is the triangle in the *In Print* lesson an isosceles triangle?  
[Yes.]
- What are parallel lines?  
[Lines that run side by side but never cross.]
- Can learners recall examples of parallel lines?  
[Railroad tracks, guitar strings, lines strung on telephone wires that run side by side.]

#### Optional

For the next question, you may want to play the short Buzzword segment.

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### Step by Step (cont.)

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#### View Video

**Buzzword:** *Asymmetrical*, Episode 29: Length: 1:23, Start Time: 26:29

- What is symmetry? Asymmetry?  
[Something that is symmetrical means that when it's divided down the middle, both halves are the same. An asymmetrical object is not the same on both sides when it's divided down the middle.]
- Ask learners to name or draw symmetrical and asymmetrical objects or to find examples of them in the room.

#### Workbook Activity

Distribute copies of "Build Your Vocabulary" (*In Print* issue 28, p.2). Ask learners to complete the activity, independently or in pairs.

### 6. PORTFOLIO

Students save their completed work pages in their portfolio.

### 7. WEB CONNECTION

There are many sites on the Web that feature free, downloadable instructions for origami creations. You may wish to print one out that is more challenging than the paper heart. It could be the basis of an extended lesson on geometric shapes, following directions, and artistic expression!