

Practice Task: Decoding ABC Symmetry

STANDARDS FOR MATHEMATICAL CONTENT

MCC.4.G.3_ Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students should have previous experiences with symmetry and finding lines of symmetry prior to this task. This task focuses on finding lines of symmetry on the letters of the alphabet and using these to create a secret code for others to decipher.

ESSENTIAL QUESTIONS

- Which letters of the alphabet are symmetrical?

MATERIALS

- “ABC Symmetry” letters for each student
- “ABC Symmetry Chart” Sheet for each student
- Pencils
- Scissors
- Glue

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

Part I

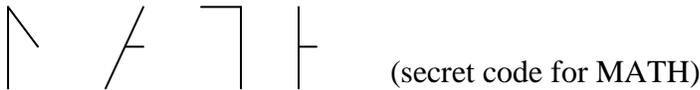
Distribute copies of “ABC Symmetry” and “ABC Symmetry Chart”. Tell students that today they will be detectives who write secret codes using symmetry as the key to the code breaking. Have student work through all the letters of the alphabet and sort them by letters with no symmetry, one line of symmetry, two lines of symmetry, or more than two lines of symmetry. They can cut out and fold the letters if needed. As they determined the number of lines of symmetry, they should label them on the cards and write the letters in the appropriate part of the “ABC Symmetry Chart.”

Once students have completed this portion of the task, facilitate discussion by using the following questions:

- Which letters have only one line of symmetry? (A, B, C, D, H, M, T, V, W, and Y)
 - Which letters have no lines of symmetry? Why? (E, F, G, J, K, L, N, P, Q, R, S, and Z)
 - Which letters have two lines of symmetry? (I, O, and X)
 - Which letters have more than two lines of symmetry? (none)
- If we used a different font or style to print these letters, would the symmetries stay the same? Why or why not?

PART 2

Tell students that the chart and letters can help them write a “secret” symmetry code. For the code, students only write one half of a letter that has symmetry and the person receiving the code must write in the other half of the letter to complete the code (letters with no lines of symmetry should be written as usual.) Model on the board how to write a few letters in “code”.



Have students practice writing one word codes at first and then give the word to a partner to “decode.” As students gain confidence, they can write longer messages on “code”

As students decipher each others’ codes, focus discussion on their strategies for filling in the rest of each letter and how they check their work.

FORMATIVE ASSESSMENT QUESTIONS

- How did you know which letters had symmetry?
- How did you know you found all the lines of symmetry for a letter?
- What strategies did you use for deciphering each other’s’ symmetry codes?
- Were students able to identify lines of symmetry?
- What strategies did students use for verifying their lines of symmetry?
- Were students able to explain their strategies for finding symmetry?
- Where students able to complete the drawing of the letters to make a symmetrical object?

DIFFERENTIATION

Extension

- Give students alphabets printed in other styles or fonts to complete and “ABC Symmetry Chart”. Have them investigate if any of the letters move places on the chart when written in a new font and then examine the font to see what changed. They can present their findings to the class.

Intervention

- Give students multiple copies of the letters to cut along the lines of symmetry to write their code. Their partner can give them the pieces that were cut off when the code was made to match up and complete the letter as they break the codes.

ABC Symmetry Cards

A	B	C
D	E	F
H	I	J
K	L	M
N	O	P
Q	R	S
T	U	V
W	X	Y
Z		

Name _____ Date _____

ABC Symmetry Chart

Write the letters of the alphabet in the proper column on the chart.

Letters with No Lines of Symmetry	Letters with 1 Line of Symmetry	Letters with 2 Lines of Symmetry	Letters with More than 2 Lines of Symmetry