

Glyph Gallery

Focus

Reasoning about data relationships

Summary

Students interpret and create glyphs—pictorial representations of data.

Goals

- Interpret displays
- Make and justify conjectures

Mathematical Connections

Data Analysis

- Organizing and displaying data

Geometry

- Recognizing attributes of shapes

Prior Knowledge

- Identifying basic shapes
- Drawing basic shapes

Materials

- An overhead-transparency copy of the blackline master “Joe, Anne, and Fred” or an enlarged copy of “Joe, Anne, and Fred” drawn on chart paper
- A copy of the blackline master “A Data Source” for each student
- Paper, pencils, and crayons for each student

Investigation

Engage

Display or project the copy of the blackline master “Joe, Anne, and Fred.” Arrange the students in a semicircle to examine the faces at the top of the display. Call on students to name the people and tell how they are alike and how they are different (e.g., both Anne and Fred have four hairs on their heads, but Joe has five hairs; both Joe and Anne have square eyes, but Fred’s eyes are triangles). Have the students describe what they see below each face (candles on a cake, pizzas, and houses).

Explain that the pictures below the faces give us clues to what the different features on the faces, or “glyphs,” mean.

Explore

Have the students look at the faces and the drawings below the faces. Analyze the glyphs with them by posing the following questions:

- “Which picture—the birthday cake, the pizza, or the house—tells you how old Joe is?” (the birthday cake—it has five candles)



Make and investigate mathematical conjectures



Develop . . . mathematical arguments



pp. 38, 39

Copyright © 2009 by the National Council of Teachers of Mathematics, Inc. www.nctm.org. All rights reserved. This material may not be copied or distributed electronically or in other formats without written permission from NCTM.

- “Which part of Joe’s face do you think tells how old he is?” (The hairs on his head—there are five hairs.)
- “How old is Joe?” (five)
- “How did looking at Fred’s and Anne’s faces help you decide?” (The number of hairs on their heads also matches the number of candles on their cakes.)
- “What part of the faces tells whether the person is a girl or a boy?” (The shape of the face. Anne’s face is oval, and the boys’ faces are round.)
- “How do you know that a long mouth means that a person likes pizza?” (Joe’s is the only face with a long mouth, and there is a pizza below his glyph. The other two have short mouths, and the pizzas below their glyphs have been crossed out. So mouth length and pizza go together.)
- “Look at Fred’s and Anne’s faces. How do you know that the shape of their eyes tells about the color of their houses?” (Both have four hairs and four candles on their birthday cakes, so both must be four years old. Both have short mouths and both have the picture of the pizza crossed out, so neither likes pizza. Besides the shape of their faces, the only thing different is the shape of their eyes and the color of their houses, so the eyes must tell about the house color. Triangular eyes must represent a white house, and square eyes must represent an orange house.)

Display the glyphs of Kit and Sam. Tell the students that these glyphs follow the same rules that the glyphs of Joe, Anne, and Fred did. Start with the glyph of Kit, and ask questions like the following:

- “Is Kit a boy or a girl?” (a boy) “How do you know?” (His face is round.)
- “How is Kit’s picture like Joe’s?” (They both have long mouths.)
- “How is Kit’s picture different from Joe’s picture?” (The pictures differ in number of hairs and the shape of the eyes.)
- “How old is Kit?” (three)
- “Does Kit like pizza?” (yes)
- “What color is Kit’s house?” (white)

Ask the same questions about Sam. (Sam is a girl. She is six years old, and she does not like pizza. She lives in an orange house.)

Discuss with the students how they would draw pictures of a six-year-old girl who likes pizza and lives in a white house. (Her glyph would have six hairs, an oval face, a long mouth, and triangular eyes.) Do the same for a seven-year-old girl who likes pizza and lives in an orange house. (Her glyph would have seven hairs, an oval face, a long mouth, and square eyes.)

With the students, create a legend for the features on the glyphs for Joe, Anne, and Fred. Show the symbol for each attribute, and describe what it represents (see fig. 2).

Talk about other facial features that could represent information about people on glyphs—for example:

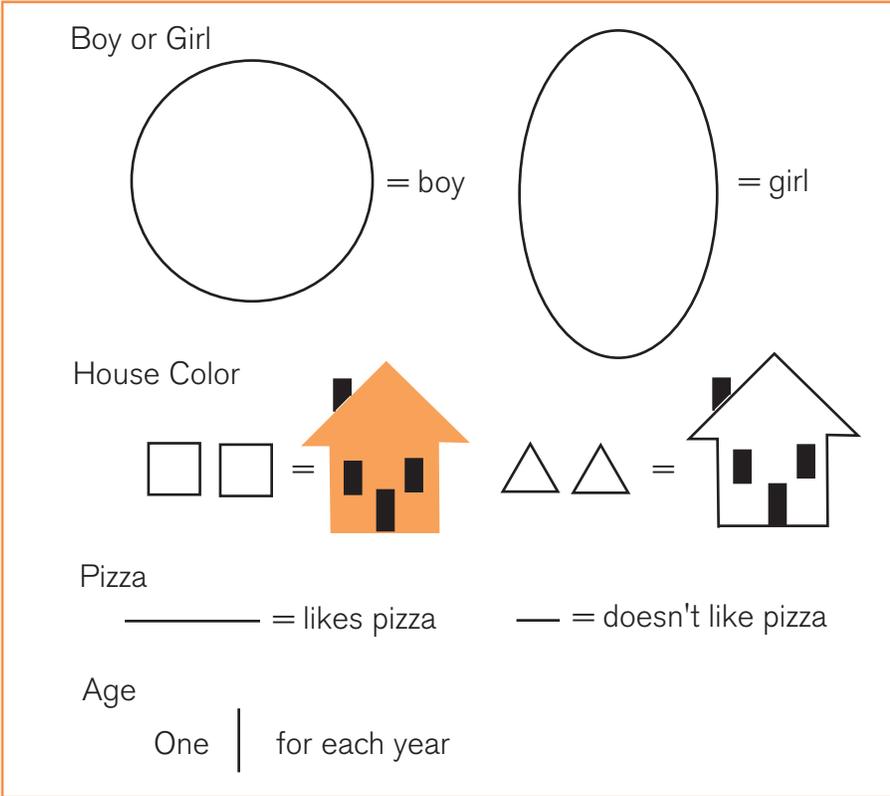


Fig. 2.
A glyph legend

- Ears, noses, and eyebrows of different shapes
- Eyes of different colors
- Curly or straight hair

Show, for example, what a glyph of Joe might look like if the face color represented the house color, the shape of the nose indicated whether the person is a girl or a boy, the shape of the ears indicated the age, and the shape of the mouth indicated whether the child likes pizza. Figure 3 shows new glyphs of Joe, Anne, and Fred, in which the color of the face matches the house color; a square nose represents a boy, and a round nose represents a girl; round ears indicate a four-year-old, and rectangular ears represent a five-year-old; and a straight mouth indicates a preference for pizza, and a curved mouth means a dislike of pizza.

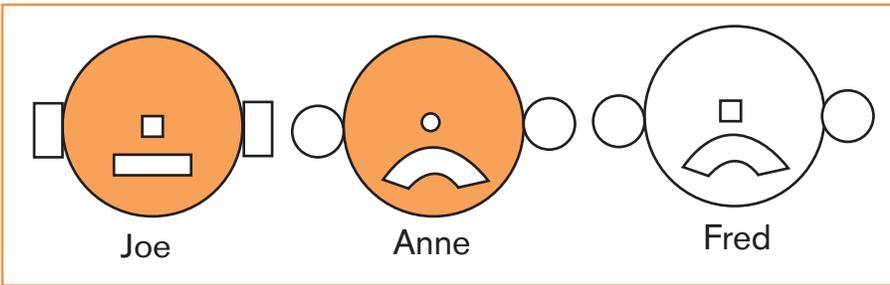


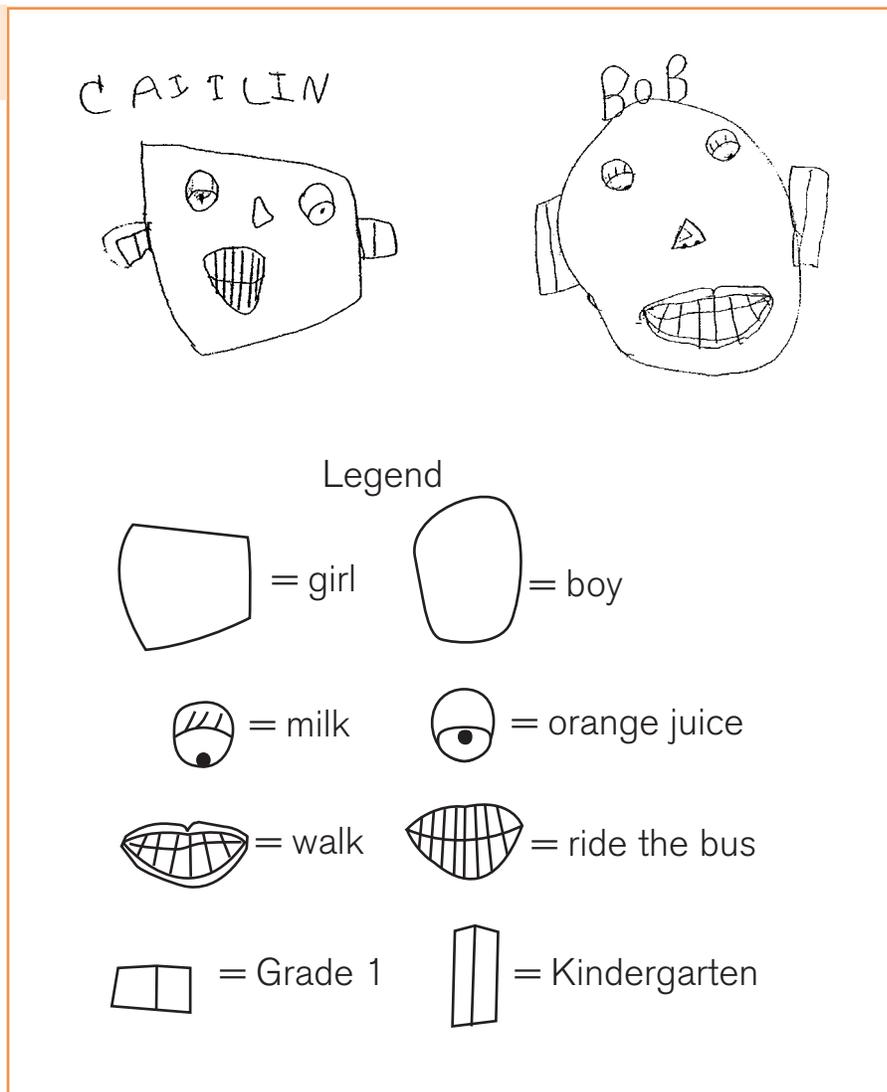
Fig. 3.
New glyphs of Joe, Anne, and Fred

Extend

As a follow-up, you might either (1) distribute “A Data Source” to each student and ask the students to create glyphs to represent the data shown (see the student-created glyphs in fig. 4) or (2) have the students

collect data and create glyphs to represent them. Suggest that the students work in pairs on the extension.

Fig. 4.
Student-created glyphs



Discussion

Glyphs are an interesting tool for organizing and displaying data. Deciding the number of categories to use and which feature will represent each category demands high-level reasoning. To interpret glyphs, students must compare them and identify similarities and differences. They must compare the “facts” (e.g., the person’s name, whether he or she likes pizza or not, the number of candles on the birthday cake, and the color of the house) and deduce how the features on the glyphs are related to the facts.