Lesson: Fraction Penguin

GRADE LEVEL	K-3rd; California Content Standards for 1st, 2nd and 3rd
SUBJECTS	Mathematics, Visual and Performing Arts
DURATION	Preparation: 10 minutes Activity: 30 minutes
SETTING	Classroom

Objectives

In this craft activity, students will:

1. recognize, name, and compare the fractions 1/2, 1/4, and 1/8, as related to a whole circle.
2. construct a penguin out of portions of paper circles.

Materials

recipe for a Fraction Penguin
white construction paper
black construction paper
spare compact discs
pencils
scissors
glue
black markers

Vocabulary

- countershading: protective coloration of an animal characterized by darker coloring on the upper surface and lighter coloring on the underside
- flipper: the wing of a penguin, used for swimming rather than flying
- fraction: a part of a whole; a portion or section

Background

Penguins are known for their tuxedo suit, but many do not realize that this coloration is an adaptation to evade predation by orcas and seals while swimming in the ocean. A black back blends in with the dark depths of the sea, so a predator has trouble spotting the bird from above. Likewise, a white belly makes the penguin less visible from below, when its form is cast against the surface made bright by the sun. This camouflage resulting when an animal's back is darker than its underside is known as countershading. Birds, squirrels, dolphins, and fish all exhibit countershading, for they live and move in mediums that allow others to view them from above and below.

There are 17 species of penguin in the world, with all living on or south of the equator. Species can be distinguished by size, color variations, decorative feathers, and distinctive markings on their face and chest. The Fraction Penguin craft is based on the black-footed penguins featured in African Hall. Found in the wild off the coastal islands of southern Africa, black-footed penguins can be identified by their black beak, black feet, black horseshoe-shape band spreading across the chest, and white markings on the face.

Activity

Preparation (5 min)

1. Trace the outline of a compact disc onto white construction paper, and cut out several of the resulting circles. Fold the circles in half consecutively until you have a 'pie' with 8 slices. Cut along the folds, and then snip each piece in half again, to create two 1/16 sized slices for each student (eye masks for penguins).
2. If you are concerned about the dexterity level of your students, use the compact disc to prepare 4 black circles and 1 white circle for each student.
3. Make a complete Fraction Penguin as a sample, and write the Recipe for a Fraction Penguin on the board.

Introduction

Tell students that today they will be making a penguin out of paper, but that this penguin is extra special, because it is made out of fractions of a circle. To teach the fraction concept, ask if students have ever eaten a whole cake. Or, did they just eat a fraction of it? Fractions are parts of a whole. Mention that fractions are often used in recipes. If students have helped their parents bake a cake, they might remember having to measure ingredients out in parts. Students will learn how to divide circles into smaller parts to be able to read the penguin recipe.

Procedure

1. Distribute – or have students trace and cut out – 4 black circles per student.
2. Show students how to fold 3 of the black circles into halves, fourths, and eighths, respectively. Have students cut out the pie slices, and lay the pieces down on their desks to re-form three whole circles. Review the fraction sizes using the concrete slices. Assess student understanding with simple exercises, counting the number of parts that add up to a whole for the respective circles. Have students choose a slice and show it to a partner, who has to use its size to guess what fraction it represents.
3. Distribute one white circle per student, saying that this represents the penguin's belly. Explain countershading. Show students the back of your penguin and note that the recipe calls for 4 black feathers, size 1/4. Have students glue on the protective feathers to reform one whole black circle to cover up the white paper.
4. Have students turn the circle over so the white belly is facing up.
5. Have students read the recipe, refer to your example penguin, and then construct their own by attaching the appropriately-sized head, wings, feet, and beak.
6. Pass out the 1/16 sized eye patches. Can they guess how you made them? After gluing on the eye mask and drawing eyes on their own penguin, tell students to draw a broad black band across the penguin's chest. This mark characterizes the bird as a black-footed penguin!

Wrap-up

Have students fold the beak, wings, and feet to their liking, which adds some dimensionality and character. Students can bring home their creation to challenge their parents to figure out what is special about their penguin!

Extensions

- Give students freedom to design the form of a penguin using any classic shapes, such as squares, rectangles, triangles, circles, ovals, diamonds, or wavy lines. Have the class make a colony of a certain species of penguin, or allow students to choose a favorite.

- Bake a black and white cake to share, fraction-style!

Resources

- Visit our *Science Heroes* webpage to watch videos, listen to podcasts, or read more about how Academy scientists care for our penguins: http://www.calacademy.org/academy/heroes/pschaller/

Correlated California Content Standards

Grade One
Visual and Performing Arts: Visual Arts
2.3 Demonstrate beginning skill in the manipulation and use of sculptural materials (clay, paper, and paper maché) to create form and texture in works of art.

Grade Two
Mathematics: Number Sense
4.1 Recognize, name, and compare unit fractions from 1/12 to 1/2.
4.2 Recognize fractions of a whole and parts of a group (e.g., one-fourth of a pie, two-thirds of 15 balls).
4.3 Know that when all fractional parts are included, such as four-fourths, the result is equal to the whole and to one.

Grade Three
Mathematics: Number Sense
3.1 Compare fractions represented by drawings or concrete materials to show equivalency and to add and subtract simple fractions in context (e.g., 1/2 of a pizza is the same amount as 2/4 of another pizza that is the same size; show that 3/8 is larger than 1/4).