

# Teaching Suggestions

## Science and Mathematics Lab

(Course 1, Lesson 13-6; Course 3, Lesson 6-5)

### *Sea Stars: Size, Shape, and Symmetry*

#### OVERVIEW

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In this activity, students will determine the symmetry of a sea star. They will also measure arm length and the angles between the arms of a sea star, and record this information. Finally, they will use this information to draw similar and congruent sea stars.

#### RECOMMENDED TIME

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1 class period

#### MATERIALS

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- sea star, dried
- protractor
- ruler

#### PREPARATION

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Obtain dried sea star specimens before the class period. They may be available in the school biology laboratory, or they can be purchased from a biological supply company.

#### TEACHING THE LAB

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1. Have students work in pairs.
2. Review the steps for measuring angles with a protractor and finding lines of symmetry.

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(Course 1, Lesson 13-6; Course 3, Lesson 6-5)

### ***Sea Stars: Size, Shape, and Symmetry (continued)***

#### ***Answers and Conclusions***

1. Drawings will vary.
2. Drawings will vary. The angles formed by the ridges of adjacent arms of the sea stars should be the same as those in the first drawing, but the arms should be half as long.
3. Sample answer: The measurements of the angles between the arms were the same. The measurements of arm length and size are different.
4. Sea stars have five lines of symmetry (pentameral symmetry). One drawing should show these five lines of symmetry.

#### **EXTENSION**

The measurements of the angles of all specimens may be close but not necessarily the same. The sum of the five angles is always  $360^\circ$ , because the angles form a full circle when they are put together.

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## Sea Stars: Size, Shape, and Symmetry

### INTRODUCTION

Sea stars (or starfish) are in the phylum *Echinodermata* (echinos = spiny; derm = skin). They can be found in shallow tidal pools along the Pacific coast of North America. They are often brightly colored, and they move slowly. Most species have five arms. If an arm is cut off, the animal simply grows another one.

### OBJECTIVES

In this lab, you will:

- measure the angles formed by the arms of the sea star.
- measure the length of the arms of the sea star.
- describe the symmetry of a sea star.
- draw two sea stars, one similar to and one congruent to your specimen.

### MATERIALS

- sea star, dried
- protractor
- ruler

### PROCEDURE

1. Place your sea star flat on a piece of paper with its under side facing up. You should see a ridge running down the middle of each arm.
2. On the piece of paper, number the arms from 1–5.
3. Measure the angle formed by the ridges of adjacent arms using your protractor. Record this information in the Data Table.
4. Repeat Step 3 until you have found the angle measurements for all five arms.
5. Measure the length of each arm. Record this information in the Data Table.

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**Sea Stars: Size, Shape, and Symmetry (continued)****DATA AND OBSERVATIONS**

Between Arms	Angle Measure		Arm Length
1 and 2		1	
2 and 3		2	
3 and 4		3	
4 and 5		4	
5 and 1		5	

**Questions and Conclusions**

- Using only the measurements in the Data Table, draw a sea star congruent to your specimen. Show all your work. When you are finished, check your work by laying the specimen on your drawing. Use another piece of paper if you need more space to draw.
- Draw a sea star similar to your specimen, but about 50% smaller.
- What measurements in your two drawings are the same?  
What measurements are different?
- How many lines of symmetry does a sea star have? Sketch the lines of symmetry on one drawing.

**EXTENSION**

Are the measurements of the angles formed by the arms of your specimen the same as specimens of other groups in your class? Find the sum of the five angles. Is the sum of the angles the same as that of other groups? If so, why?