

Introduction to Abstraction and Pattern Recognition

Ordering octopi (15–20 minutes)

This activity will introduce students to two big ideas in computational thinking (CT): abstraction and pattern recognition.

Directions

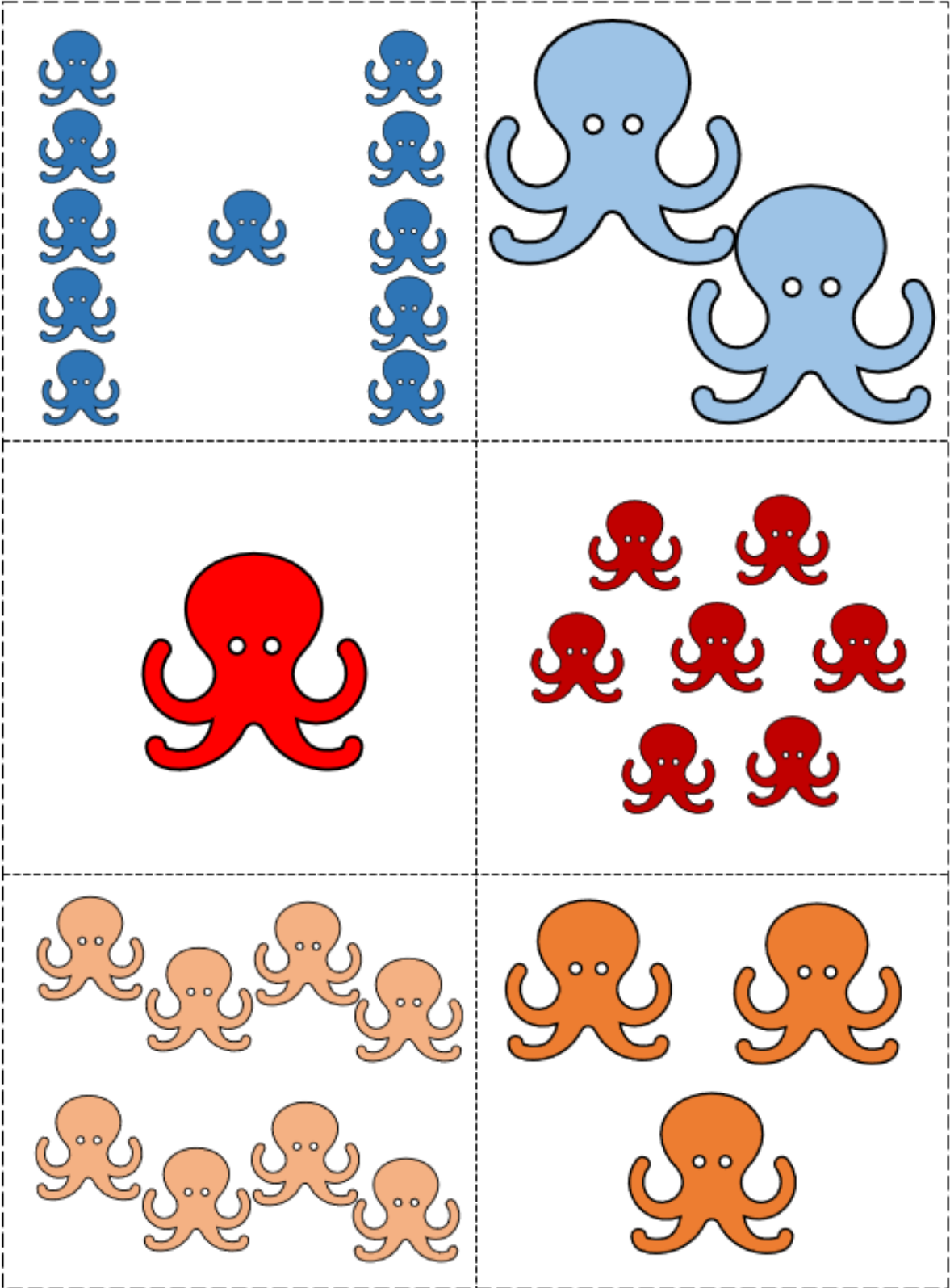
1. Distribute one set of cards to each pair of students. If you have not already cut the cards out, have students cut them out.
2. Tell students that their task is to work with a partner to put the cards in order. Part of their job will be to decide what it means for the cards to be in order.
3. Give partnerships time to work on the task. As they decide how to order the cards, have them practice explaining how they decided on the order of the cards. Circulate and observe as students work. Possible criteria for ordering the cards might be:
 - a. The number of octopi on the card (most to least or least to most).
 - b. The size of the octopi on the card (biggest to smallest or smallest to biggest).
 - c. The color of the octopi on the card (lightest to darkest, darkest to lightest, or rainbow order).
4. When partnerships have decided on their orderings, ask several partnerships to share their thinking. Choose partnerships that used different criteria for ordering. If all partnerships ordered the cards in the same way (such as by the number of octopi), then encourage students to think of other ways they could be ordered and work as a class to order a set of cards in different ways.
5. Ask students to share what they noticed about the cards when they first looked at them. As students share what they noticed about the cards, ask follow-up questions to help them restate their thinking in terms of patterns. For example:
 - a. If a student says that they noticed there were different numbers of octopi on the cards, ask: What did you notice about the numbers? Were they random numbers? Did some cards have the same number or were they all different?

Materials: One set of octopus cards for each pair of students (shown after the directions). You may wish to print them on cardstock and cut them out ahead of time. Otherwise, students will need scissors.

It will be helpful to print the octopus cards in color. If this is not possible, students can still complete the activity. Color will not be available as a criterion for ordering, but students could still order the cards by the number or size of the octopi.

- b. If a student says that they noticed there were different colors on the cards, ask: Can you say more about the colors? What did you notice about light and dark colors? What colors were there?
6. Explain that as students looked at the cards, they noticed **patterns**, or things that were similar or changing across the cards. Explain that patterns are useful in mathematics because they can provide clues for how to solve a problem. This year, students will use a CT strategy called **pattern recognition** to help them solve math problems. Point out that they already have had some practice recognizing patterns in the octopus' cards, and they will practice getting better at this skill during the school year.
 7. Next, ask students to share how they decided how to order the cards. Ask: If you decided to use the number of octopi to order the cards, did you have to pay attention to the size of the octopi as you put them in order? Why or why not? Explain that when they chose how to order the cards, students identified an important piece of information they wanted to focus on. They didn't have to pay attention to all the features of the cards after this. They could just focus on the size, color, or number of the octopi. Ask: How did focusing on just one kind of information on the cards make the task of putting them in order easier?
 8. Explain that when students identified what information was most important to focus on, they were doing a CT strategy called **abstraction**. Skilled problem solvers use this skill a lot to help them simplify problems. Students will have lots of practice this year identifying important information and representing that information in ways that are easy to see and explain.

Octopus cards, page 1



Octopus cards, page 2

