JUMPING FROGS

NUMBER

- Patterns
- Counting
- Multiples

Getting Ready

What You'll Need

Cuisenaire Rods, 1 set per pair

Lily Pad Strips worksheets, 1 per pair, page 93

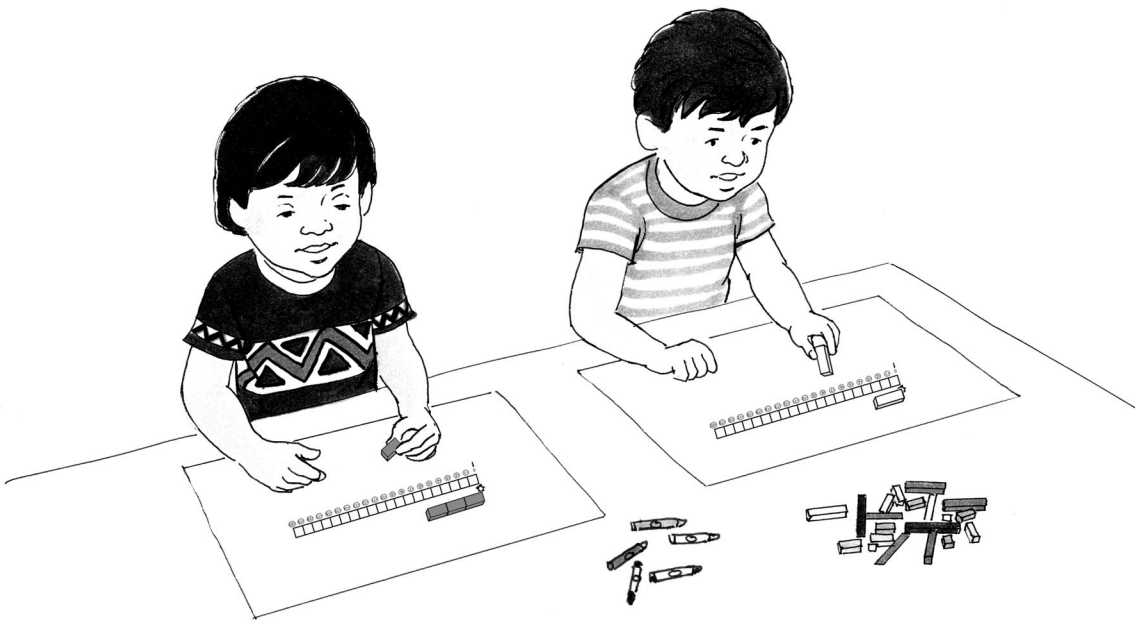
Crayons

Overhead Cuisenaire Rods and/or *Lily Pad Strips* transparencies (optional)

Overview

Pretending that a Cuisenaire Rod of a chosen color is a jumping frog, children move the rod along a number line. They then compare the "jumps" taken by several "frogs." In this activity, children have the opportunity to:

- investigate the factors of numbers up to and including 20
- recognize multiples of the numbers from one to ten
- describe patterns



The Activity

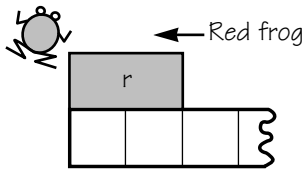
Introducing

- Display the *Lily Pad Strips* worksheet.
- Hold up a purple rodTell children to pretend that the purple rod is a frog. Put the rod on a lily pad strip starting at the zero point. Lead the class in counting the lily pads that the rod covers to determine that the rod is four units long and that it ends at the fourth lily pad.
- Demonstrate how to move the rod across the strip to show the frog's jumps, stopping to color every fourth lily pad purple.
- Have children predict how many jumps the frog will need to take to go all the way across the strip.

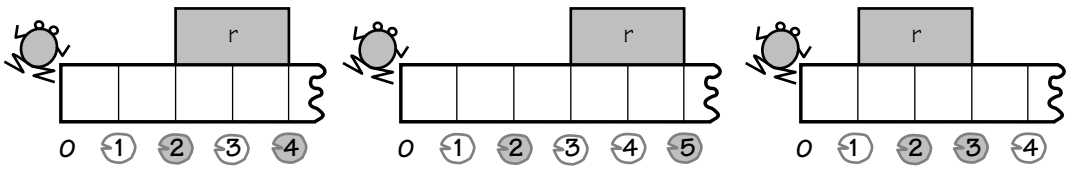
On Their Own

Make a Cuisenaire Rod "frog" jump! Which lily pads will the frog land on?

- With a partner, choose a rod of any color. Pretend that your rod is a frog that jumps its own length.
- Color the picture of the frog on a lily pad strip the same color as your rod.
- Get your frog ready to jump. Make it jump onto the lily pad strip starting at 0. Color the lily pad at the end of the jump the same color as your frog. Here's an example.



- Jump again! Start this jump where the first jump ended. Color the lily pad at the end of each jump. Here's an example:



Okay

Not Okay
(Second jump doesn't begin where first jump ended.)

- Make your frog jump all the way across the strip, coloring the lily pads at the end of each jump.
- Now choose a rod of a different color. Make this "frog" jump its own length along a new lily pad strip. Color to show the jumps. Do the same for different colored rods.
- Cut your lily pad strips apart. Compare them. Look for patterns.
- Be ready to talk about what you find out.

The Bigger Picture

Thinking and Sharing

Write the colors, from *white* to *orange,* as column headings across the chalkboard. Call on pairs to post their lily pad strips in the appropriate columns.

Use prompts such as these to promote class discussion:

- What do you notice about the posted lily pad strips?
- How are the strips the same? How are they different?
- Which frogs' jumps could you predict? Why?
- At which lily pads did the _____(name a color) frog land?

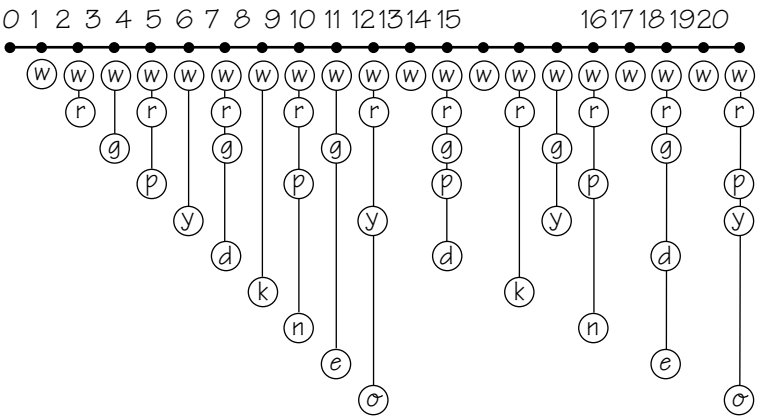
Extending the Activity

1. Have children do the activity again, this time using a longer strip made by taping two or more strips of centimeter grid paper end to end.

Teacher Talk

Where's the Mathematics?

Jumping Frogs provides a playful setting for exploring the concepts of factors and multiples as readiness for the formal study of multiplication and division. As the frogs jump from zero to twenty, the notion of multiplication as repeated addition is established. Between studying their individual lily pad strips and assembling the data on a completed chart such as the one shown below, children will be able to identify a variety of patterns.



The first pattern many children note is the link between the lily pads and the ordinal numbers. They will point out that the light green frogs stopped on every third lily pad, the purple frogs on every fourth pad, the yellow frogs on every fifth, and so forth. This occurs, of course, because the frogs are repeatedly making jumps of the same length. Children may also point out the inverse relationship that the longer the jump, the fewer it took to get across the lily pad strip or, conversely, the shorter the jump, the more it took to get across. Some of the frogs, namely the light green, dark green, black, brown, and blue ones, never reach 20 in an exact number of jumps.

2. Have children write addition and subtraction number sentences for each of the jumps shown on their lily pad strips.

Children will also note certain color patterns, such as that every lily pad the purple frogs stopped on was visited by the red frogs, too. Some will take this a step further and note that the purple frogs stopped on every other lily pad that the red frogs visited. Children who study the chart closely will see that if both the red and light green frogs stop on a lily pad, then they can predict that a dark green frog will land there, too. These observations are preparing children to recognize common multiples, important in the addition and the subtraction of fractions with unlike denominators. For example, the first step in adding $^1/_2$ and $^1/_3$ is to find that the common denominator is 6 which is similar to recognizing that whenever a red and light green frog stop on a lily pad, dark green frog will stop there as well.

Some children will note that certain lily pads are very popular stopping places indeed! Lily pads #12 and #20, for instance, are each visited by 5 different frogs, while lily pads #8 and #16 have 4 visitors apiece. Other lily pads, such as 1, 11, 13, 17, and 19 are visited only by the white frogs that stopped on every lily pad. The notion that some numbers, such as 8, 12, 16, and 20, are very rich in factors while other numbers have very few factors will be revisited for the purposes of dividing whole numbers and simplifying fractions. Fractions that have these factor-rich numerators and denominators are more likely to be fractions that can be simplified while fractions composed of 11, 13, or 17 in the numerator or denominator probably cannot be further simplified.
