Arrange the class in two teams. Display a transparency so only one circle you have traced can be seen. In turn, players from each team can guess which size piece can be used to cover the fractional part of the circle. Then, try using the pieces to cover the shape. The team that covers and names a fractional part correctly scores a point. If an attempt is unsuccessful, the other team can try. When all circles have been covered and named, the team with most points wins.

**Adding and Subtracting Fractions**

On the overhead, arrange $\frac{1}{4}$ and $\frac{1}{2}$ on the whole circle. Ask students to, “Estimate what part of the whole circle these pieces cover.”

(*Answer: $\frac{3}{4}$ or $\frac{3}{8}$.*) How could we find out?

Explore the children’s suggestions.

You may want to lead children to try exchanging pieces so all parts are the same size and can be counted.

Continue adding fractional parts such as $\frac{1}{3}$ and $\frac{2}{6}$, $\frac{1}{2}$ and $\frac{1}{4}$, $\frac{1}{5}$ and $\frac{5}{10}$, $\frac{2}{6}$ and $\frac{3}{8}$ and $\frac{3}{6}$. Younger children can draw pictures to record their responses. Show older children how to compute the addition using the symbols.

Next, place $\frac{1}{2}$ on the overhead. Say, “I have $\frac{1}{2}$ of a circle. How could I give $\frac{1}{4}$ of this circle away?” Explore the children’s suggestions, and if necessary, lead them to exchange $\frac{1}{2}$ for $\frac{2}{4}$. Then $\frac{1}{4}$ can be removed with $\frac{1}{4}$ remaining. Continue with other subtraction situations including $\frac{1}{2} - \frac{1}{8}$, $1\frac{1}{2} - \frac{3}{8}$, and $\frac{2}{3} - \frac{1}{8}$. (Help students recognize that both the third pieces need to be traded for sixths, so the remaining pieces can be counted.)
Overhead Deluxe Fraction Circles (LER 0618) include nine translucent circles representing halves, thirds, fourths, fifths, sixths, eighths, tenths, twelfths, and one whole. This set can be used for demonstration on the overhead projector to provide students with a concrete model as they learn about fractional relationships. For hands-on explorations, use the student companion set, Deluxe Fraction Circles (LER 0617) or cut fraction circles from construction paper in corresponding colors.

Before you begin directed activities with fraction circles, give students time for independent exploration. Encourage them to describe any relationships they discover.

**Naming Fraction Circles**

Place the whole circle on the overhead, asking students to find and display the corresponding piece from their sets. Let them describe the circle, leading them to name it as one whole. Then place the halves on the overhead and arrange the pieces to form a circle. Ask, “What do you notice about these pieces?”

Lead students to recognize that the pieces fit together to form a whole circle, that both pieces are the same size (equal parts) and that each piece is \( \frac{1}{2} \). Encourage them to compare and describe the pieces they have named so far. (*Answer: 1 whole, 2 halves.*) Continue guiding and questioning students as they identify thirds, fourths, fifths, sixths, eighths, tenths, and twelfths.

**Using the Fraction Symbols**

Slip a transparency below two halves on the overhead, asking students to find the corresponding pieces in their sets. Ask, “What part of a circle is each piece?” (*Answer: \( \frac{1}{2} \).) Write \( \frac{1}{2} \) below each piece. Explain to students that these fractions tell about the sizes of the pieces.

Ask them to think about what each number in the fraction might represent, then help them understand that the denominator tells the number of parts in the whole, and the numerator tells the number of parts counted. Continue identifying thirds, fourths, fifths, sixths, eighths, tenths, and twelfths, as you write the fraction for each one. Write the fraction \( \frac{2}{3} \) on the transparency. Ask students to use what they know...
about fractions to show this amount with their pieces. Then have a volunteer model it on the overhead. Continue writing other fractions such as $\frac{2}{4}, \frac{3}{6}, \frac{5}{10}$, and $\frac{4}{12}$, as students use their pieces to show the amounts. Then make models on the overhead.

**Exploring Equivalent Fractions**

Display $\frac{1}{2}$ on the overhead. Ask pairs of students to identify the piece and to find the corresponding piece in their set. Ask, “Are there other pieces the same size as $\frac{1}{2}$? How could you find out?” Discuss ways of finding equivalent parts, including placing pieces on top of others to compare. Allow students time to find all the parts they can that are equivalent to $\frac{1}{2}$. (Answers: $\frac{2}{4}, \frac{3}{6}, \frac{4}{8}, \frac{5}{10}, \frac{6}{12}$.) Some students also may choose to show one half as $\frac{1}{3} + \frac{2}{6}, \frac{1}{4} + \frac{2}{8}, \frac{1}{5} + \frac{2}{10}$. To record their findings, students might write the fractions or cut and paste paper circles on paper. Then call the group together to share results on the overhead.

Ask students to find equivalent fractions for other amounts such as $\frac{6}{8}, \frac{5}{6}$ and $\frac{3}{4}$.

**Comparing and Ordering to Make a Number Line**

Write the following on the chalkboard:

\[
\frac{1}{2} \quad \frac{1}{3} \quad \frac{1}{4} \quad \frac{1}{5} \quad \frac{1}{6} \quad \frac{1}{8} \quad \frac{1}{10} \quad \frac{1}{12}
\]

Give pairs of students a set of fraction circles, and ask them to find the piece that represents each fraction written on the chalkboard, then arrange these pieces in order from largest to smallest. (Note: For older students, include other fractions such as $\frac{2}{3}, \frac{3}{4}, \frac{5}{6}$, and $\frac{4}{5}$.)

After students have arranged the pieces in order, form a fraction number line together. Ask volunteers to show their arrangements on the overhead, then describe their ordering. Discuss and reorder the sequence as necessary, until all students agree. Then give each student paper, and help them draw and complete a number line, ordering the fractions from smallest to largest. Discuss the number line when it is completed, inviting students to describe any patterns they notice.

**How Many Ways Can You Make One Whole?**

Place all the overhead fraction pieces next to the projector. Form two whole circles using the halves and fourths. Ask the students to describe what they see, helping them understand that each whole circle is formed with the same size pieces (equal parts). Volunteers can form fraction circles with equal parts on the overhead, using thirds, fifths, sixths, eighths, tenths and twelfths. Keep a list or draw a picture on chart paper to show each whole circle that students form.
Remove all circles from the overhead except the halves and fourths. Ask, “We have made whole circles when each circle is made up of equal parts. How might we make other whole circles?” Let students combine their fraction parts until they form a whole circle. Volunteers can model their circles on the overhead. Add each circle the students find to the list on the chart paper. Possibilities include:

Place a set of fraction circles and the class list in a math center. Here, students can continue to look for pieces to make whole circles until they are certain all the possibilities have been found.

**Fractions Greater Than One**
Ask a student to demonstrate the following on the overhead, as the class models at their seats. Use your fraction pieces. Show \( \frac{2}{5} \). Show \( \frac{3}{5} \). Show three, four and \( \frac{5}{5} \). Ask, “Is \( \frac{6}{5} \) more than a whole circle, the same as a whole circle or less than a whole circle?” (Answer: more.) “Can you think of a way that we could write six fifths?” (Answer: \( \frac{6}{5} \)) If students have not already done so, help them show a mixed form with the pieces.

“Can you think of another way we could write \( \frac{6}{5} \)?” (Answer: \( 1 \frac{1}{5} \)) Repeat with other mixed forms. Give students the opportunity to model, write and read these fractions.

**A Game of Fractions**
Use several transparencies to trace around fractional parts of circles as shown: