Activity 2: PICTURE PATTERNS
(Pictorial Action)

Materials: Fraction Worksheet PRF-7.2
Red pencils
Regular pencils

Management: Partners (50 minutes)

Directions:

1. Give each student a copy of Worksheet PRF-7.2 and a red pencil. Tell the students that each rectangle represents a whole unit and that they will be showing different fractional parts of these whole units.

2. Do not assume that students know how to subdivide rectangles pictorially. Many will not. As a readiness activity show them how to subdivide a rectangle drawn on the chalkboard. An effective way is to use tick marks on the upper edge of the rectangle to show where the new subdivision segments might be located. This allows students to look at their spacing to decide if the new parts will be *about equal;* if not, the tick marks can be erased and redrawn. Once students are satisfied with the positions of the tick marks, they can draw in the subdivision segments. Specifically students need to be shown such skills as:

- finding fourths by placing a tick mark at the midpoint, then one tick halfway between the left end and the midpoint and another tick halfway between the midpoint and right end

- finding sixths by marking the midpoint, then spacing two tick marks equally between the left end and midpoint and two more tick marks equally between the midpoint and right end
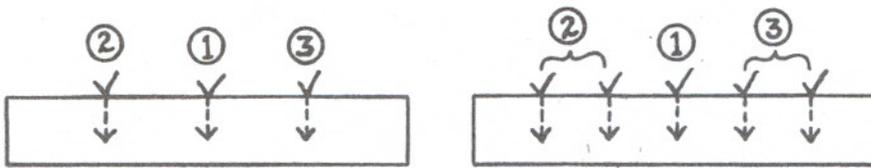
WORKSHEET PRF-7.1
Building Mat for Who Gets To Trade?

(to be used with FRACTION BAR set; see pattern in PATTERNS/GRIDS section)
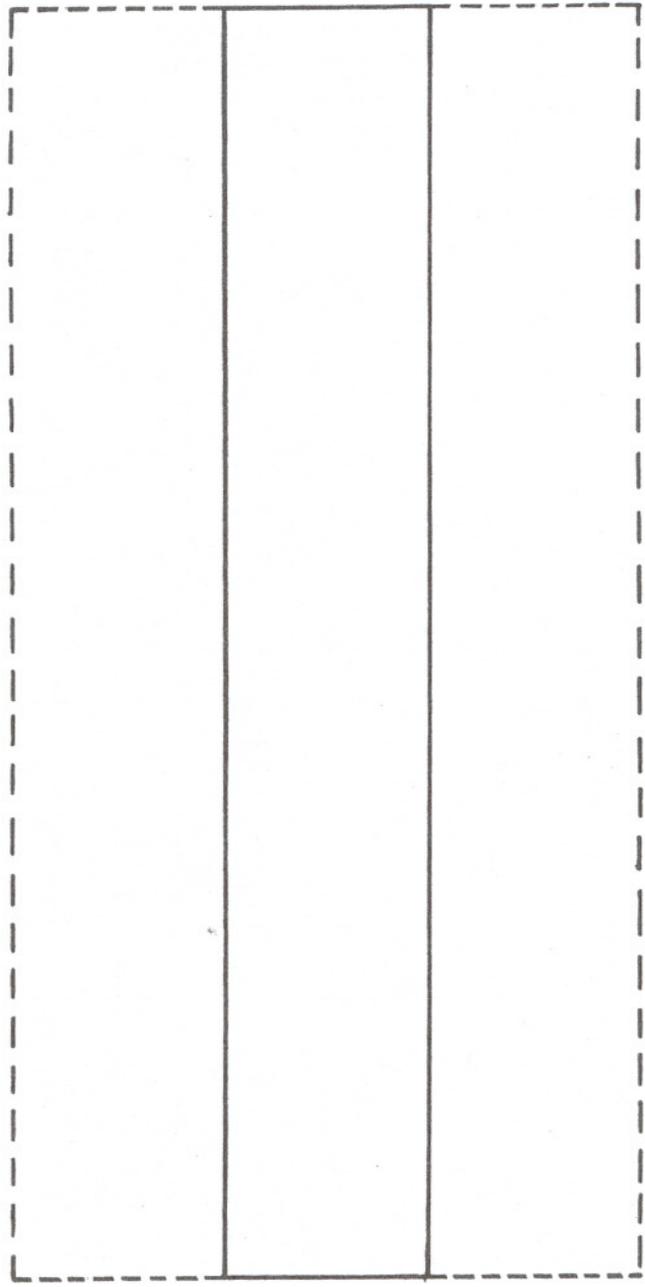
ONE WHOLE UNIT

3. Have the students *cut* the first blank rectangle on the worksheet into two *equal* parts by drawing a segment down the middle of the bar (no need to measure; just agree that the two parts *look about equal* to the untrained eye). Ask them to shade one of the two halves they now have for the whole unit bar. To *shade*, have them draw diagonal segments. Full shading takes too long and is difficult to erase when a change is needed.

4. Ask the students to show a 2-for-1 trade by cutting each half of the whole unit into two equal parts. Tick marks should be used first, then the final subdivision segments should be drawn in red pencil. Extend the new *cuts* beyond the rectangle itself. This helps to distinguish the new parts from the original ones on the drawing.
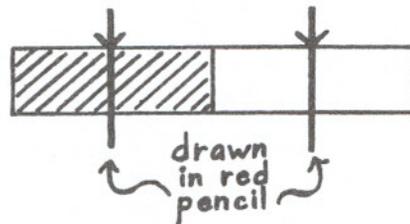
5. Discuss how many new parts are in the whole unit now and what each part should be called. (four; fourths) Discuss how many new parts are now shaded. (two) In the space below the rectangle, have students record *1-half of whole = 2-fourths of whole*.

6. Next, ask: *How many old parts were shaded?* (one of the halves) *How many new parts were traded for 1 old shaded part?* (2 new for 1 old) Write this as *1 × 2 new = 2 new shaded* on the board. Emphasize the language: *1 set of 2 new parts makes 2 new parts shaded in all.*

7. Then ask: *How many old parts were in the whole unit?* (2 of the halves) *How many new parts were traded for each old part in the whole unit?* (2 new for each old) Write this as *2 × 2 new = 4 new total* on the board. Again emphasize the language: *2 sets of 2 new parts each have 4 new parts altogether.*

8. Next, have students record this information under their rectangle as follows: (Continually emphasize that 1/2 or one-half means 1 out of 2 parts, etc.)

$$\frac{1}{2} = \frac{1 \times 2 \text{ new}}{2 \times 2 \text{ new}} = \frac{2 \text{ new shaded}}{4 \text{ new total}} = \frac{2}{4} \text{ of whole unit}$$

9. Repeat steps 3–8, showing 2-fourths and a 3-for-1 trade on the second whole rectangle on the worksheet. Shade the two fourths by drawing diagonals in opposite directions; this makes it easier to *see* the separate parts on the rectangle.

10. Since each shaded fourth will trade for 3 new parts, there will be *2 sets of 3 new parts each* or 6 new shaded parts formed. Since each fourth on the whole unit bar trades for 3 new parts, there will be *4 sets of 3 new parts each* or 12 new parts total for the whole rectangle. Students should have the following shown on their worksheets:
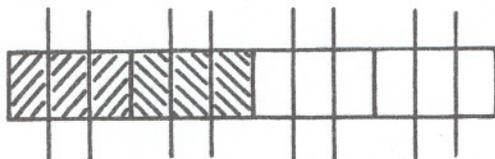
$$\frac{2}{4} = \frac{2 \times 3 \text{ new}}{4 \times 3 \text{ new}} = \frac{6 \text{ new shaded}}{12 \text{ new total}} = \frac{6}{12} \text{ of whole unit}$$

11. Have students draw several other examples. Do not use denominators that are greater than 15 after the trade; the parts become too small to count easily. Here are some possible problems to use:

- 2-thirds—3-for-1 trade to get 6-ninths of the unit (similarly for 1-third)

- 1-fifth—2-for-1 trade to get 2-tenths of the unit (similarly for 2-fifths, etc.)

- 1-half—4-for-1 trade to get 4-eighths of the unit (similarly for 2-halves)

- 3-fifths—3-for-1 trade to get 9-fifteenths of the unit (similarly for 4-fifths, etc.)

- 5-sevenths—2-for-1 trade to get 10-fourteenths of the unit (similarly for 2-sevenths, etc.)

12. Have students share their results; encourage the use of the *set language* (e.g., 2 sets of 3 new parts each makes 6 new parts total) to reinforce the role of multiplication in the trading process.
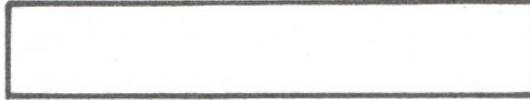
13. Discuss what happens in the numerator and the denominator when a fraction of a whole unit is renamed through trading. Ask partners to write two or three sentences to describe the change in their own words. Have several students read their paragraphs to the entire class so that they can hear different ways of expressing the same ideas. (The main idea should be that, since both the numerator and the denominator must undergo the same type of trade, the number sentence will show the two original amounts multiplied by the same factor, which is the size of the trade used.)
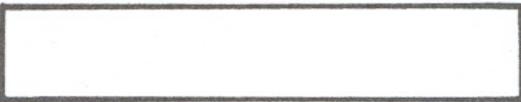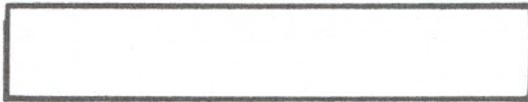
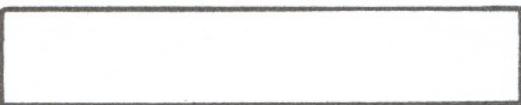# FRACTION WORKSHEET PRF-7.2
Picture Patterns

Each bar below is a whole unit. Your teacher will tell you how to change each bar.

1.
2.

3.
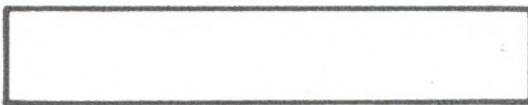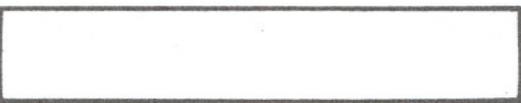4.

5.
6.

7.
8.