

Activity 7: Adding and Subtracting Fractions

PURPOSE Develop algorithms for adding and subtracting fractions.

MATERIALS Pattern Blocks (pages A-7 to A-11) and Fraction Strips (page A-23)

GROUPING Work individually.

If the yellow hexagon = 1, then the red trapezoid = $\frac{1}{2}$, the blue rhombus = $\frac{1}{3}$, and the green triangle = $\frac{1}{6}$. Use pattern blocks to solve the following:

$$\begin{array}{rclclclclcl}
 1. & 1 \text{ red} + 3 \text{ green} & = & 1 \text{ red} + 1 \text{ red} & = & 3 \text{ green} + 3 \text{ green} & = & \\
 & \frac{1}{2} + \frac{3}{6} & = & \frac{1}{2} + \frac{1}{2} & = & \frac{3}{6} + \frac{3}{6} & = & \underline{\hspace{2cm}}
 \end{array}$$

$$\begin{array}{rclclclclcl}
 2. & 1 \text{ red} + 1 \text{ blue} & = & \underline{\hspace{1cm}} \text{ green} + \underline{\hspace{1cm}} \text{ green} & = & \underline{\hspace{2cm}} \\
 & \frac{1}{2} + \frac{1}{3} & = & \underline{\hspace{1cm}} + \underline{\hspace{1cm}} & = & \underline{\hspace{2cm}}
 \end{array}$$

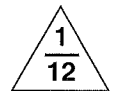
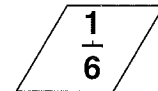
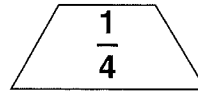
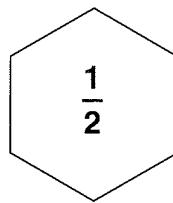
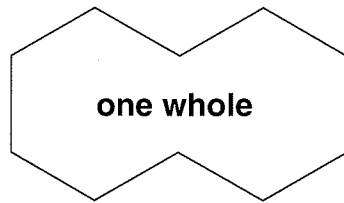
$$\begin{array}{rclclclclcl}
 3. & 1 \text{ blue} + 1 \text{ green} & = & \underline{\hspace{1cm}} + \underline{\hspace{1cm}} & = & \underline{\hspace{2cm}} \\
 & \frac{1}{3} + \frac{1}{6} & = & \underline{\hspace{1cm}} + \underline{\hspace{1cm}} & = & \underline{\hspace{2cm}} & = & \underline{\hspace{2cm}}
 \end{array}$$

$$\begin{array}{rclclclclcl}
 4. & 1 \text{ red} - 1 \text{ blue} & = & \underline{\hspace{1cm}} - \underline{\hspace{1cm}} & = & \underline{\hspace{2cm}} \\
 & \frac{1}{2} - \frac{1}{3} & = & \underline{\hspace{1cm}} - \underline{\hspace{1cm}} & = & \underline{\hspace{2cm}}
 \end{array}$$

$$\begin{array}{rclclclclcl}
 5. & 1 \text{ red} - 1 \text{ green} & = & \underline{\hspace{1cm}} - \underline{\hspace{1cm}} & = & \underline{\hspace{2cm}} \\
 & \frac{1}{2} - \frac{1}{6} & = & \underline{\hspace{1cm}} - \underline{\hspace{1cm}} & = & \underline{\hspace{2cm}} & = & \underline{\hspace{2cm}}
 \end{array}$$

Use pattern blocks to solve the following problems. Write your answers in simplest form, that is, the number represented by the least number of blocks of the same color.

Let
w



1. $\frac{1}{2} + \frac{3}{12} =$

2. $\frac{3}{4} + \frac{1}{2} + \frac{1}{6} =$

3. $\frac{3}{4} - \frac{2}{3} =$

4. $\frac{5}{6} - \frac{3}{4} =$

5. $\frac{2}{3} + \frac{1}{2} =$

6. $\frac{3}{4} + \frac{2}{3} + \frac{1}{6} =$

7. $1\frac{1}{2} + \frac{2}{3} =$

8. $1\frac{5}{12} - \frac{5}{6} =$

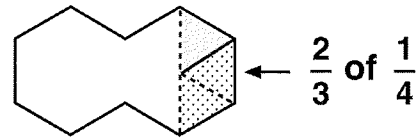
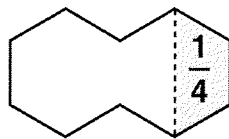
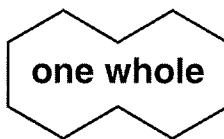
Activity 8: Multiplying Fractions

PURPOSE Develop an algorithm for multiplying fractions.

MATERIALS Pattern Blocks (pages A-7 to A-11) and paper for folding

GROUPING Work individually.

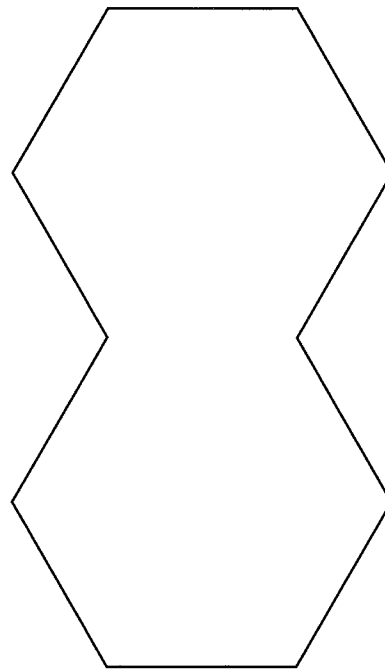
Example: $\frac{2}{3}$ of $\frac{1}{4}$ means two of three equal parts of $\frac{1}{4}$.



$$\frac{2}{3} \times \frac{1}{4} = \frac{2}{12} = \frac{1}{6}$$

Place pattern blocks on Figure A to solve the following. Record your solution both pictorially and numerically.

Figure A



1. $\frac{1}{2} \times \frac{1}{3} =$

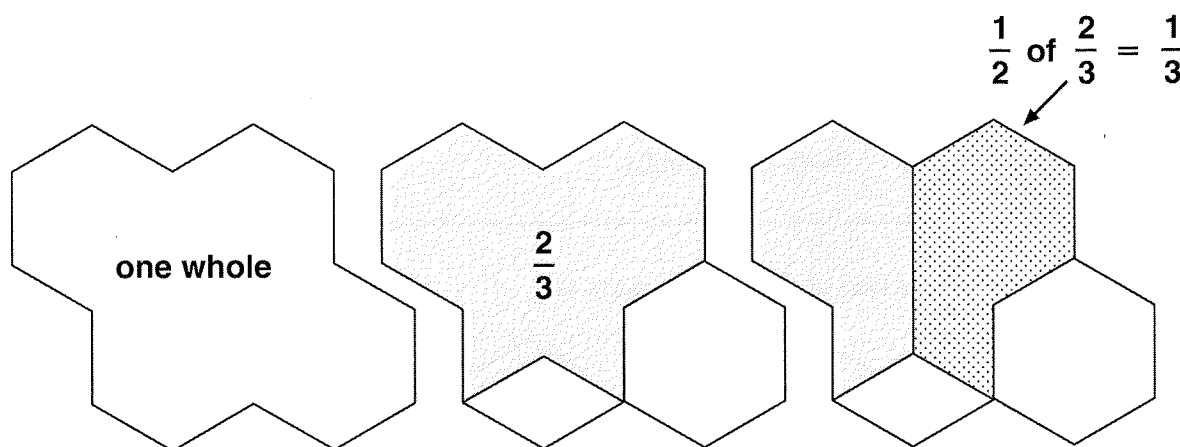
2. $\frac{3}{4} \times \frac{1}{3} =$

3. $\frac{1}{4} \times \frac{1}{3} =$

4. $\frac{3}{4} \times \frac{2}{3} =$

5. $\frac{5}{6} \times \frac{1}{2} =$

Example: $\frac{1}{2}$ of $\frac{2}{3}$ means one of the two equal parts of two thirds.



Use four hexagons to construct a figure similar to the one shown above, and solve the following. Record each step of your solutions both pictorially and numerically.

1. $\frac{3}{4} \times \frac{1}{6} =$

2. $\frac{3}{8} \times \frac{2}{3} =$

3. $\frac{7}{12} \times \frac{1}{2} =$

4. $\frac{5}{8} \times \frac{1}{3} =$

Activity 9: Dividing Fractions

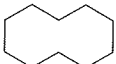
PURPOSE Develop understanding of division of fractions.

MATERIALS Pattern Blocks (pages A-7 to A-11)

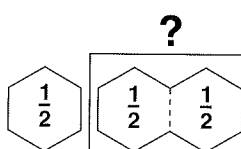
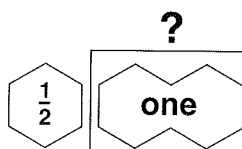
GROUPING Work individually.

GETTING STARTED Recall the use of the multiplication and division frame for the division of whole numbers.

Example: $3 \overline{)6}$ can mean how many groups of 3 are there in 6? $3 \overline{)2}$

In the following example  represents 1.

Example: $1 \div \frac{1}{2}$ means: How many groups of $\frac{1}{2}$ are there in 1?



$$1 \div \frac{1}{2} = 2$$

Complete each sentence and use your pattern blocks to solve the following problems.

1. $\frac{1}{3} \div \frac{1}{6}$ means _____
 $\frac{1}{3} \div \frac{1}{6} =$

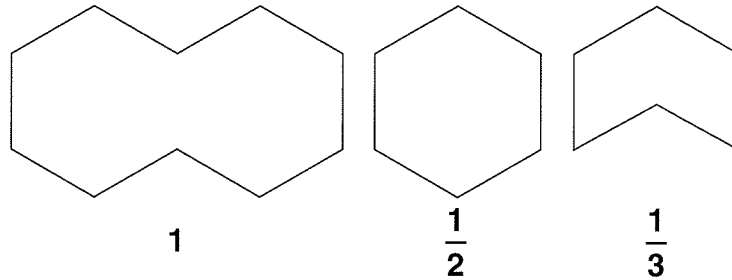
2. $\frac{1}{2} \div \frac{1}{4}$ means _____
 $\frac{1}{2} \div \frac{1}{4} =$

3. $\frac{5}{6} \div \frac{5}{12}$ means _____
 $\frac{5}{6} \div \frac{5}{12} =$

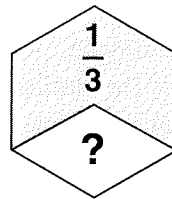
4. $\frac{3}{4} \div \frac{1}{4}$ means _____
 $\frac{3}{4} \div \frac{1}{4} =$

5. $\frac{3}{2} \div \frac{3}{4}$ means _____
 $\frac{3}{2} \div \frac{3}{4} =$

To model the problem $\frac{1}{2} \div \frac{1}{3}$, let



How many sets of $\frac{1}{3}$ (two blue rhombuses) are there in $\frac{1}{2}$ (one hexagon)?



There is one group of $\frac{1}{3}$ (two blue rhombuses), plus a remainder.

The remainder is equal to one blue rhombus, which is $\frac{1}{2}$ of $\frac{1}{3}$.

Therefore $\frac{1}{2} \div \frac{1}{3} =$ one set of two blue rhombuses + one half set of two blue rhombuses

$$= 1 + \frac{1}{2}$$

$$= 1\frac{1}{2}$$

Use your pattern blocks to solve the following:

1. $\frac{5}{6} \div \frac{1}{3} =$

2. $\frac{3}{4} \div \frac{1}{2} =$

3. $\frac{2}{3} \div \frac{1}{2} =$

4. $1\frac{1}{3} \div \frac{1}{2} =$

EXTENSIONS

1. Describe how you would use fraction strips to solve the previous problems. Draw at least one illustration of your method.
2. From what you have observed in this activity, write a rule for division of fractions.