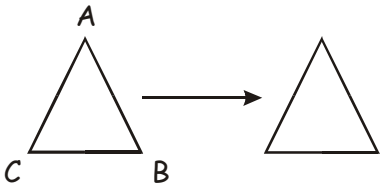
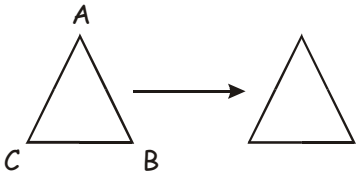
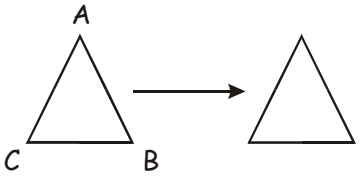
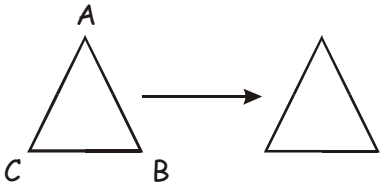
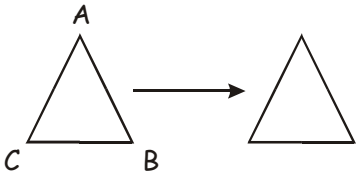
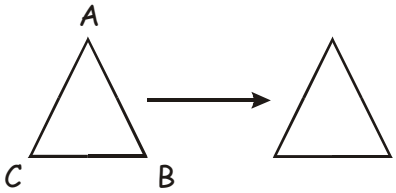
1. Let ***F*** stand for a flip across the vertical axis and ***R*** stand for a 120º clockwise rotation.

2. For each of your six, symmetries, find a combination of ***F***'s and ***R***'s that is equivalent. Then fill out the following table expressing each of the six symmetries in terms of the symbols ***F*** and ***R***.

Symmetries: Original Symbols	Symmetries: In terms of ***F*** and ***R***.

3. Argument about notation:

4. Fill out the table below for the new symbols so that you have a nice record of what each symmetry does to the triangle.

Symmetry Symbol	Diagram of what the symmetry does
	
	
	
	
	
	

5. Last time, we decided that any combination of two symmetries had to be equivalent to one of our six symmetries. Your task: For each combination of two symmetries, figure out which of our six it is equivalent to.

6. Did you figure all of them out by moving the triangle around or did you figure out some shortcuts?

7. Now, go back and fill out the table again, this time using rules (rather than moving the triangle) for to fill in each entry. Make a list of the rules that you use.

Here are some of the rules you came up with:

Rule 1. *The associative property*: If A, B, and C are symmetries then $A(BC) = (AB)C = ABC$.

Rule 2. *The identity property*: Any symmetry combined with I is that symmetry. In symbols, if X is a symmetry then $IX = X$.

Rule 3. $R^3 = I$ *and* $F^2 = I$

Rule 4. $RF = FR^2$

Rule 5. $FR = R^2F$

Rule 6. $RFR = F$

Rule 7. $FRFR = I$

Are all of these rules needed?

No, you say? Pick out one rule that you think we can do without. Try to show that this rule can be gotten using the other rules.

We will show that we only really need one of the last 4 rules.