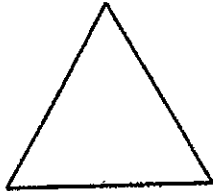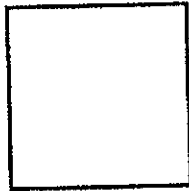MATH 230 ACTIVITIES

SYMMETRY

Each of the following polygons has two or more lines of symmetry. Determine these lines for each figure.
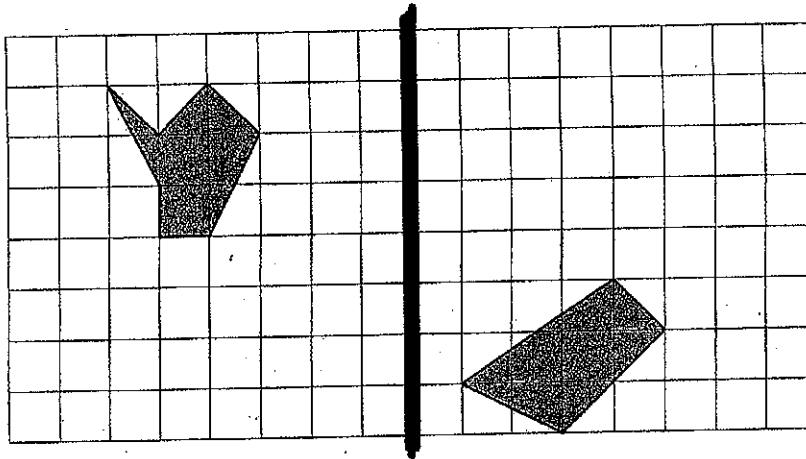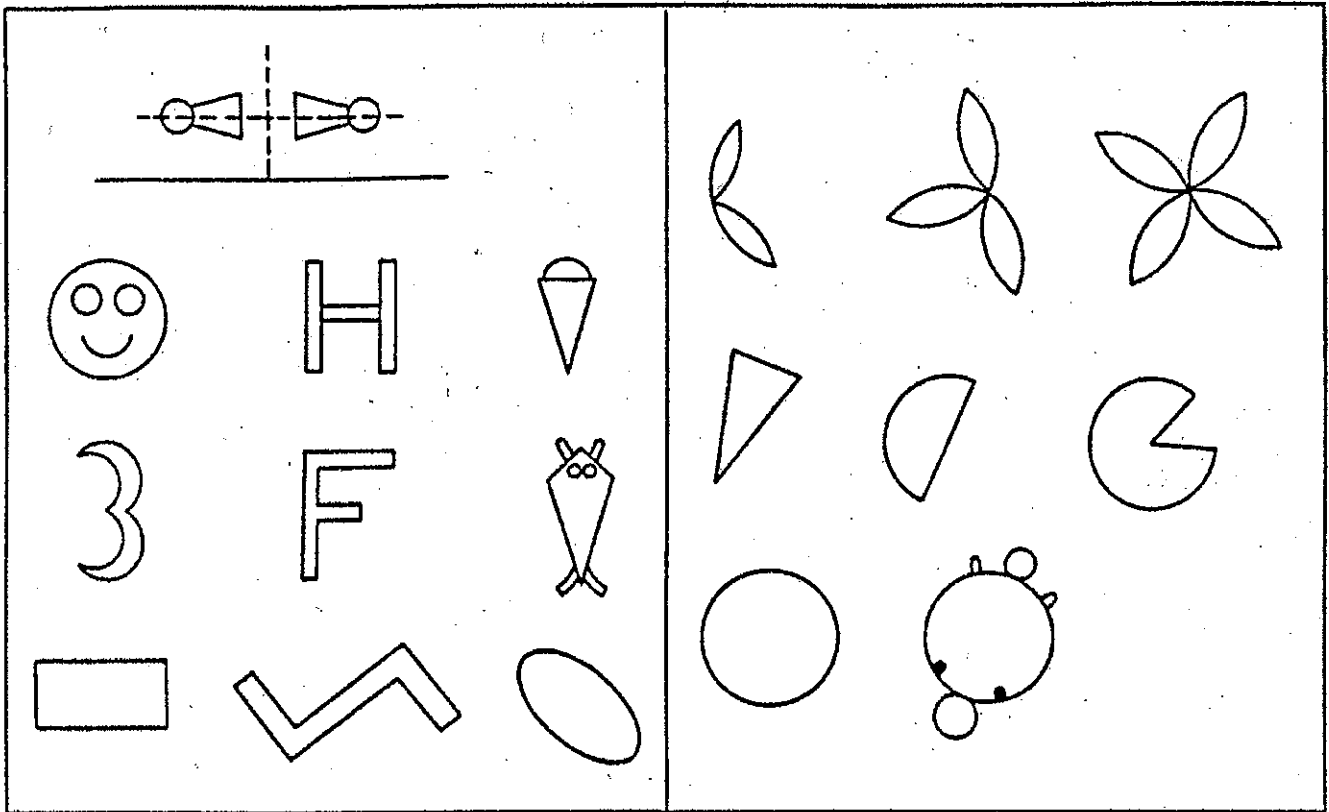
1.   2.   3.

VALIDATE YOUR ANSWERS USING A MIRROR.

4. Draw the result of reflecting the shaded shapes in the next figure across the heavy line. Explain how you know where to draw your reflected shapes.
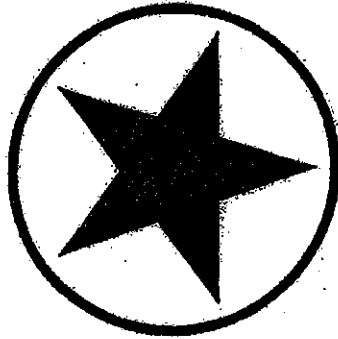
VALIDATE YOUR ANSWERS USING A MIRROR

Draw a line on each figure, indicating where you could put a mirror and still see the whole figure. There may be no place, one place, or more than one place.

6. THE FIGURE BELOW HAS ROTATIONAL SYMMETRY.
IF WE ACHOR THE FIGURE WITH A PIN AT POINT
X AND TURN THE FIGURE ABOUT X THROUGH
ONE-THIRD OF A COMPLETE ROTATION, WE HAVE
MOVED THE FIGURE SO IT COINCIDES WITH ITS
ORIGINAL OUTLINE. THROUGH HOW MANY DEGREES
SHOULD WE TURN THE FIGURE SO
THAT IT WILL REST INSIDE
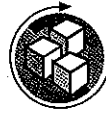THE ORIGINAL OUTLINE?
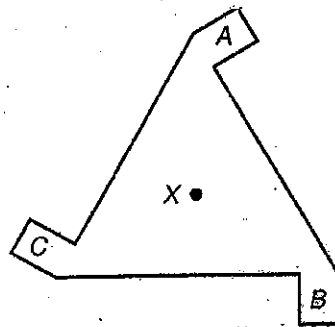
7. Discuss any lines of symmetry and any rotational symmetries possessed by the figure below.

MATH ACTIVITY 9.4

SYMMETRIES OF PATTERN BLOCK FIGURES

Materials: Pattern block pieces in the Manipulative Kit.

Teachers should guide students to recognize, describe, and informally prove the symmetric characteristics of designs through the materials they supply and the questions they ask. Students can use pattern blocks to create designs with line and rotational symmetry or use paper cutouts, paper folding, and mirrors to investigate lines of symmetry.

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1. The first pattern block figure shown below has three **lines of symmetry** (dotted lines), because when the figure is folded about any of these lines, it will coincide with itself. The second figure has no lines of symmetry, as can be shown by tracing pattern blocks and paper folding the resulting figure.

Construct pattern block figures which have exactly one, two, three, and four lines of symmetry. Record your figures and lines of symmetry.
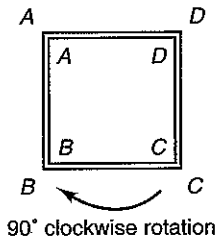
*2. A frame has been traced about the square pattern block at the left, and each corner of the frame and the corresponding corner of the square have the same letter. If the square is rotated 90° clockwise, it will fit back into the frame with *A* moving to corner *D* of the frame, and *D*, *C*, and *B* moving to corners *C*, *B*, and *A*, respectively, of the frame. The square is said to have 90° **rotation symmetry**. It also has 180°, 270°, and 360° rotation symmetries.

90° clockwise rotation

Determine all the rotation symmetries less than or equal to 360° for each of the following pattern block figures and the number of degrees for each rotation. (*Suggestion:* Trace each figure to form its frame.)

a.   b.   c.   d.
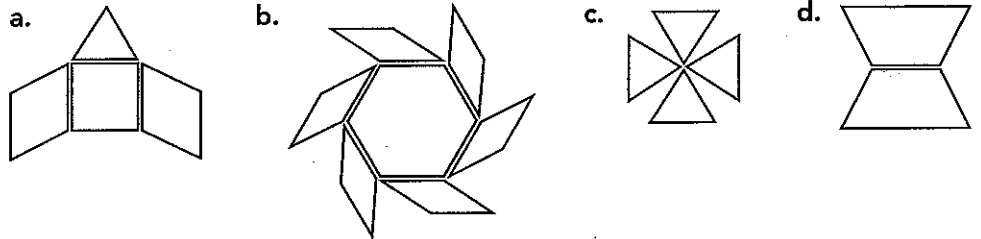
3. Build figures with two or more pattern blocks to satisfy each of the following conditions.
   a. Two lines of symmetry, two rotation symmetries
   b. Three rotation symmetries, no lines of symmetry
   c. Six lines of symmetry, six rotation symmetries

4. A trapezoid has been attached to a hexagon in the figure at the left.
   a. In how many different ways can another trapezoid be attached to this figure to form a figure that has a line of symmetry? Show sketches and lines of symmetry.
   b. In how many different ways can one or more trapezoids be attached to this figure to form a figure that has more than one rotation symmetry?