Problems for the Web

P4W6: Paper Punching

Curriculum Areas: Spatial Sense, Symmetry, Problem Solving

Introduction:

These activities will help develop students' spatial abilities. The ability to visualize is a useful one in problem solving as well as in geometry.

For the Teacher:

Students should check each prediction, and use the results to refine (if necessary) their predictions for the next problem.

Anything that will make a hole in paper will do -- a paper punch, the point of a pair of compasses, a straight pin, even a ball point pen. Of course, the duller the point, the harder it will be to punch holes in multiple layers, so students may need to punch through one layer at a time.

Because the folds become lines of symmetry, the completed design should always have symmetry. More importantly, the fold lines will be lines of symmetry for the design. Thus, diagram D of **P4W6 (a)** is not possible. Students should use this idea of symmetry to predict results for **P4W6 (b)** and **(c)**.

For the Students:

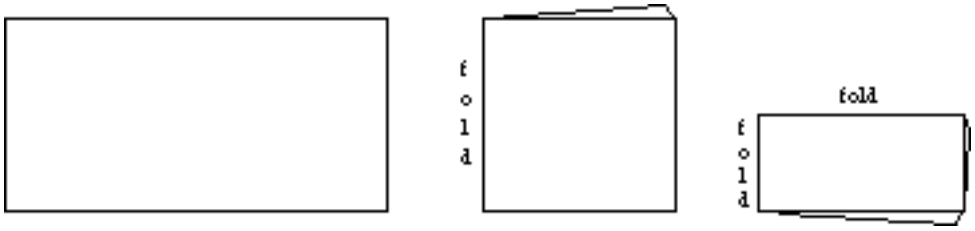
P4W6: Paper Punching

For these activities, you will need scrap paper and something to use for punching a hole in the paper.

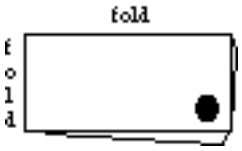
Try to picture in your mind what each design will look like before unfolding the paper.

P4W6 a): Holes in Rectangles

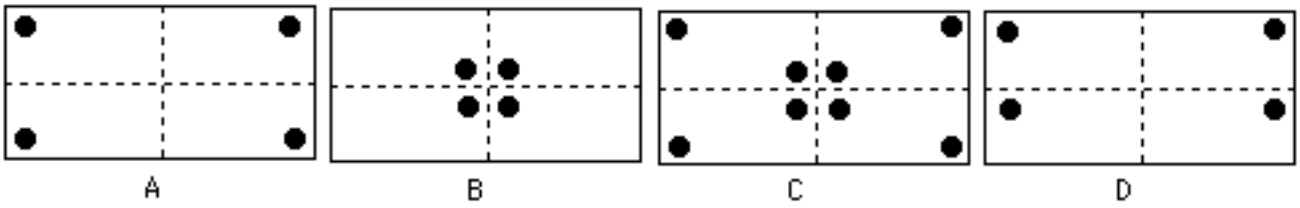
Fold a piece of paper in quarters as shown.



Now punch a hole through all the layers in one corner:

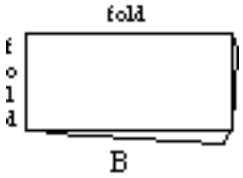


Before you unfold the paper, try to decide if it will look like one of the following diagrams.



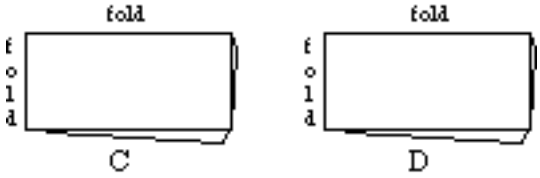
NNow unfold the paper and check.

Fold another piece of paper the same way. Try to punch holes so that when the paper is unfolded it will look like diagram B. Mark where you punched the holes:



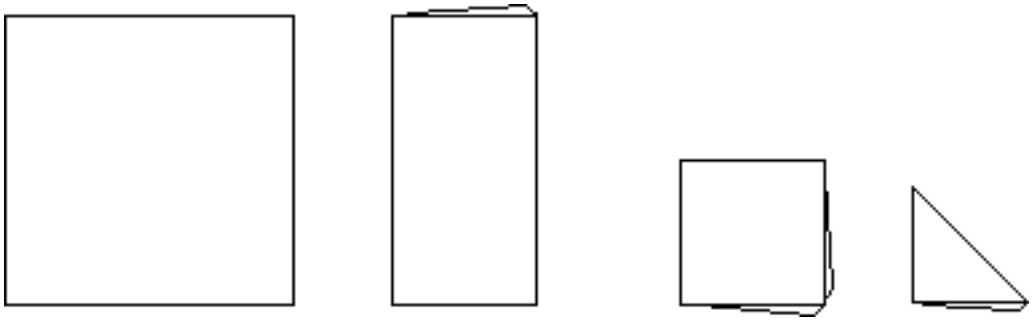
Now try to decide where to punch holes to get C and D. Are they possible? Why or why not?

If they are possible, mark where you punched the holes.

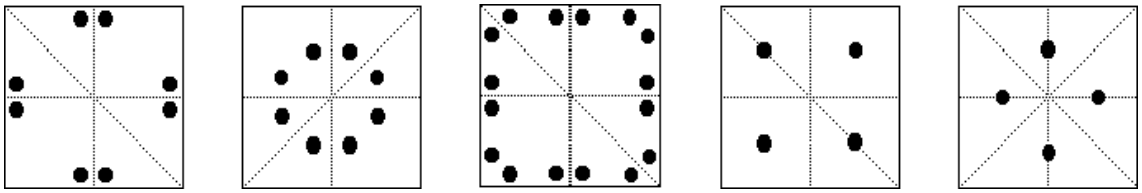


P4W6 b): Holes in Squares

This time, start with a square of paper and fold three times as shown.



Where would you punch holes to get each of the following patterns?

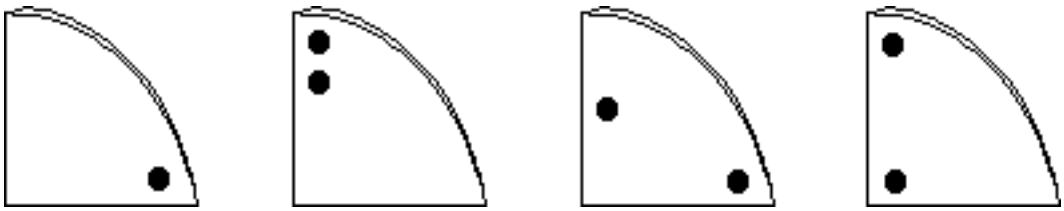


Record your answers here.

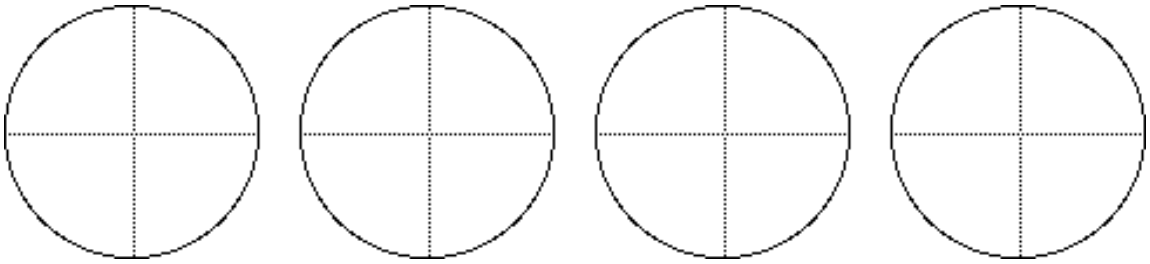
Now punch the holes, and unfold the squares to see if you were correct.

P4W6 c): Holes in Circles

A circle has been folded in quarters and holes have been punched through all layers.



Draw what you think each design will look like when it is unfolded.



Now try it! Were you right?