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PENTOMINOS  
Geometry

Purpose: To place all pieces on the grid

Skill: Spatial awareness

Players: 2 (or play alone)

Direction:

Players alternately place a chosen pentomino on the grid (one dimension only). Play continues until one player is unable to make a move.

Alternate Ideas:

- a) place pieces on the board to build desired shapes
- b) design three dimensional shapes with pentomino pieces

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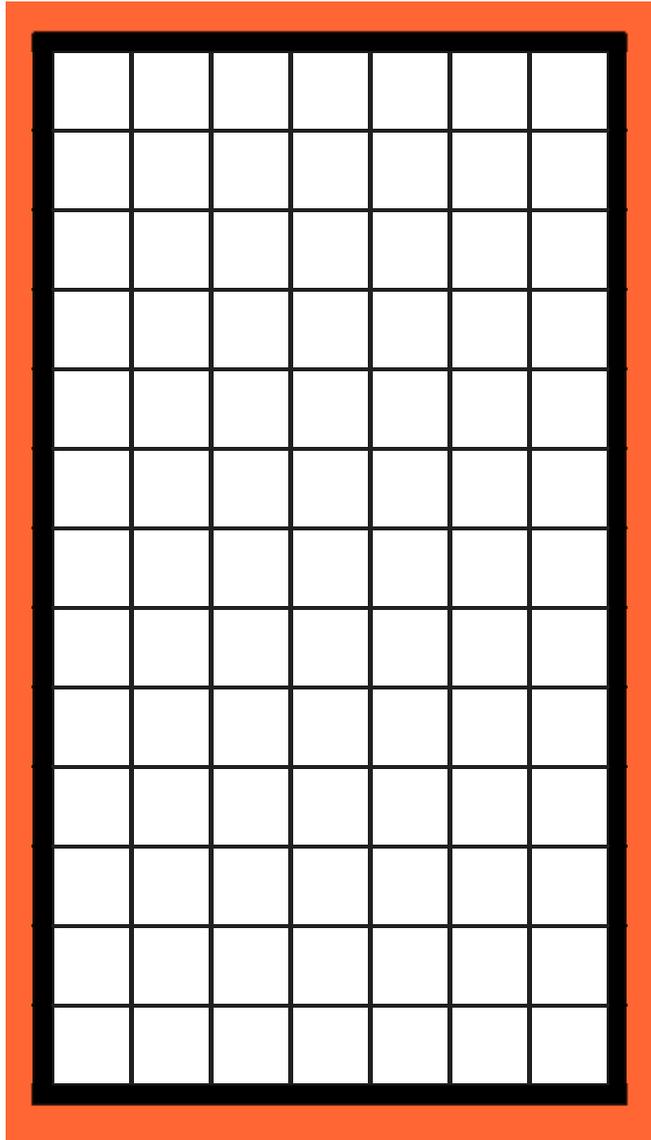
Can you build the figures shown on the following pages?

HINTS:

- a) The first figure is actual size - place pieces directly on the page.
- b) To build the figures on the pages with grids, use the shapes as indicated on the top of each section.

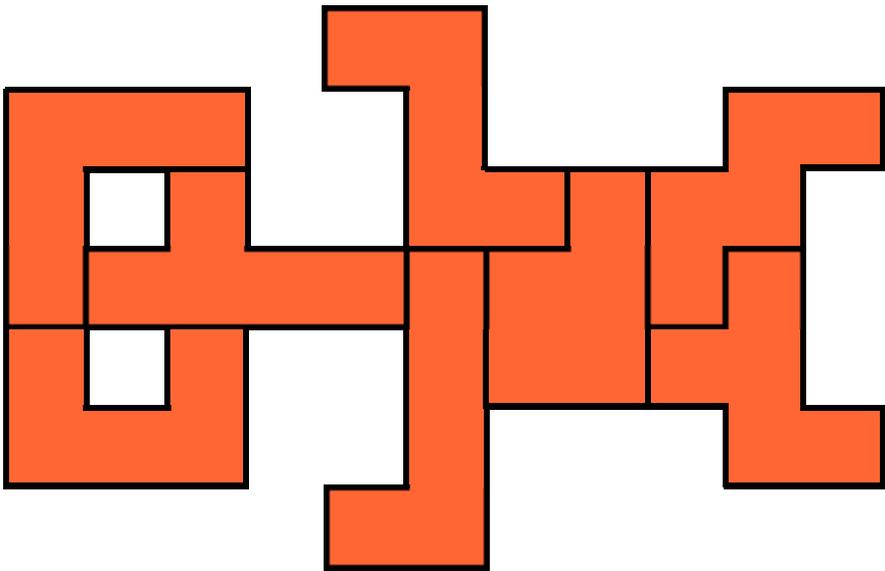
Good Luck!

# Pentominos Game Board

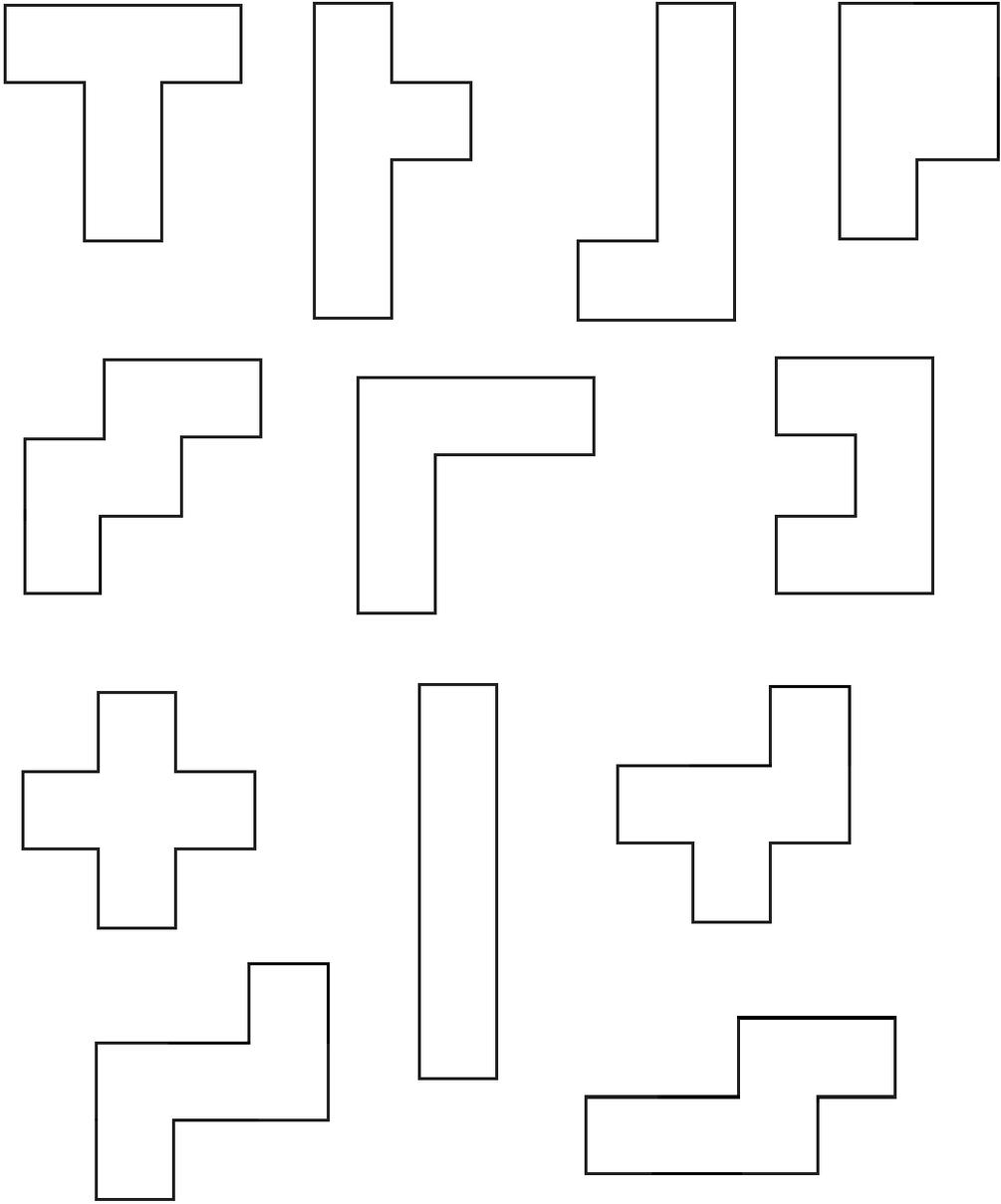




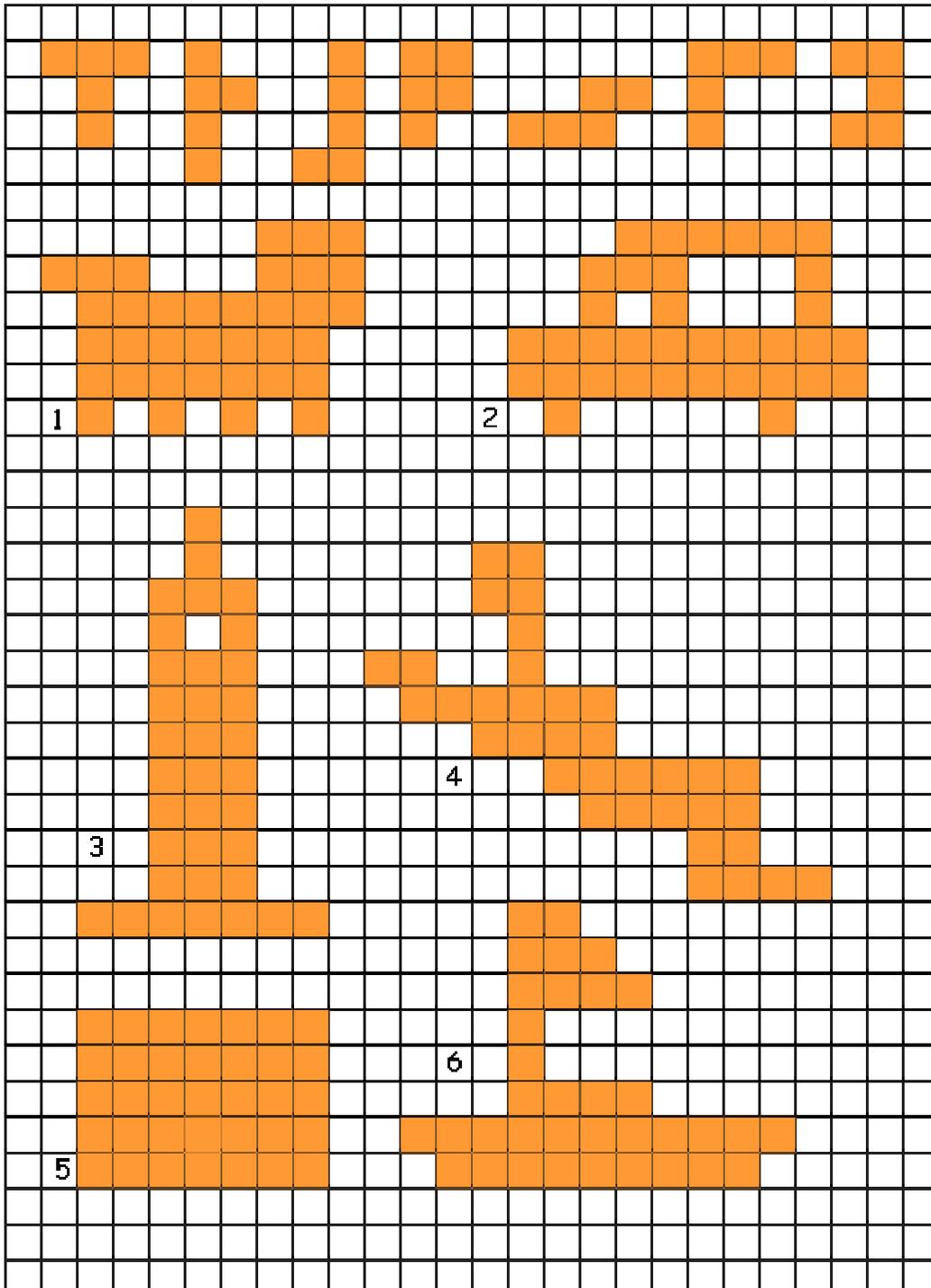
One possible solution:



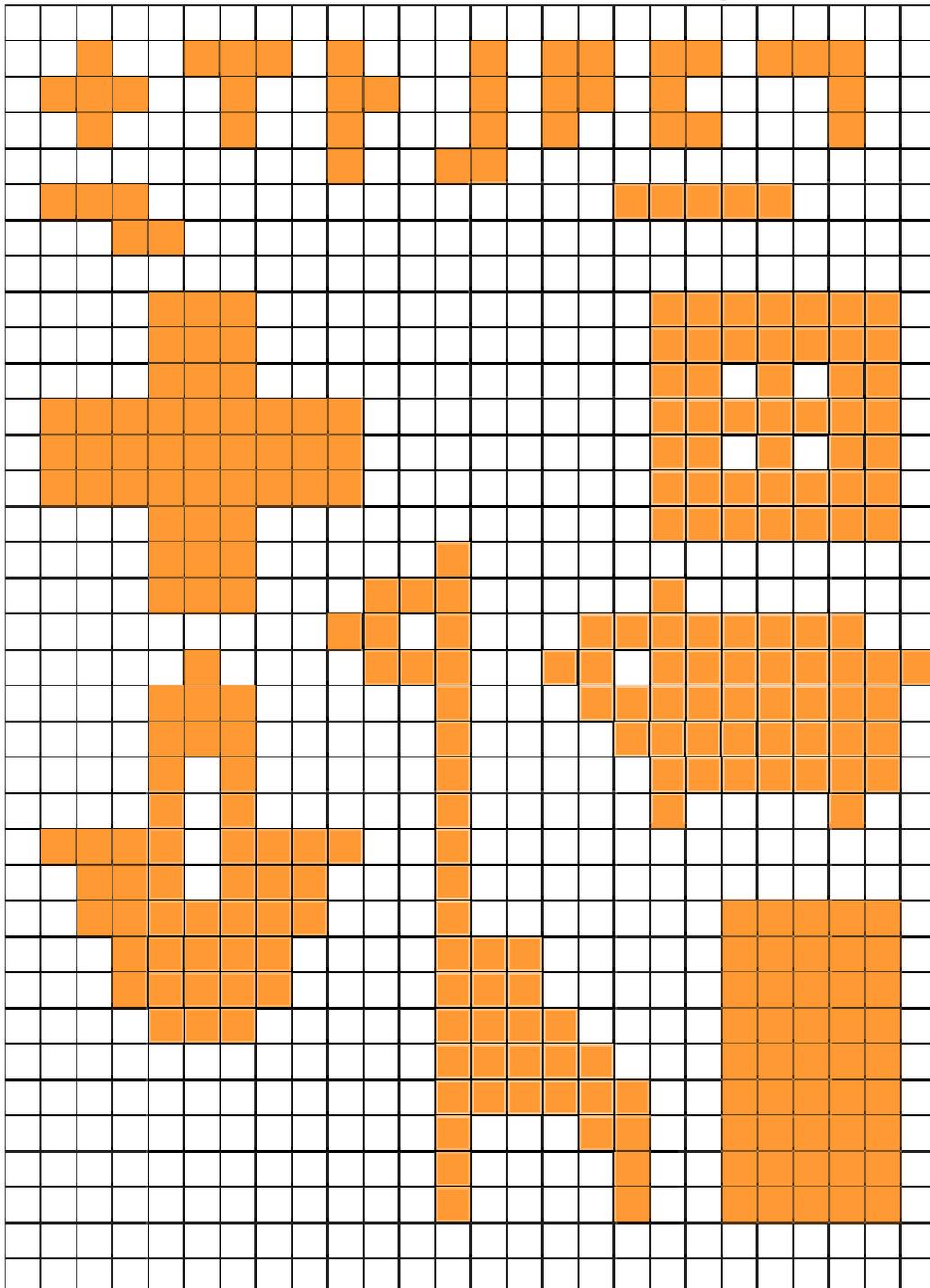
Use the following patterns to make your own pentominos:



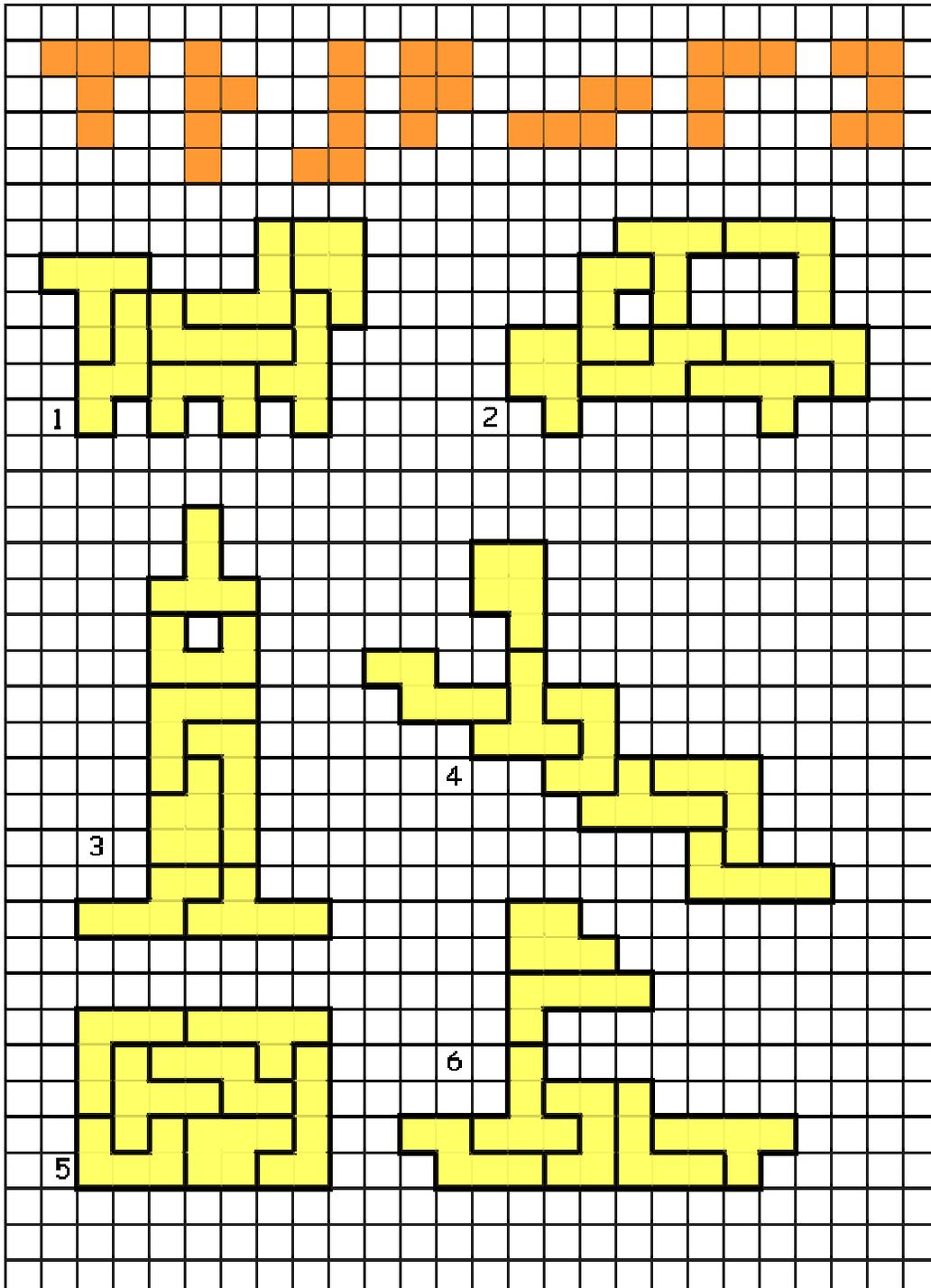
Try making the following figures using the shapes shown at the top of the page:



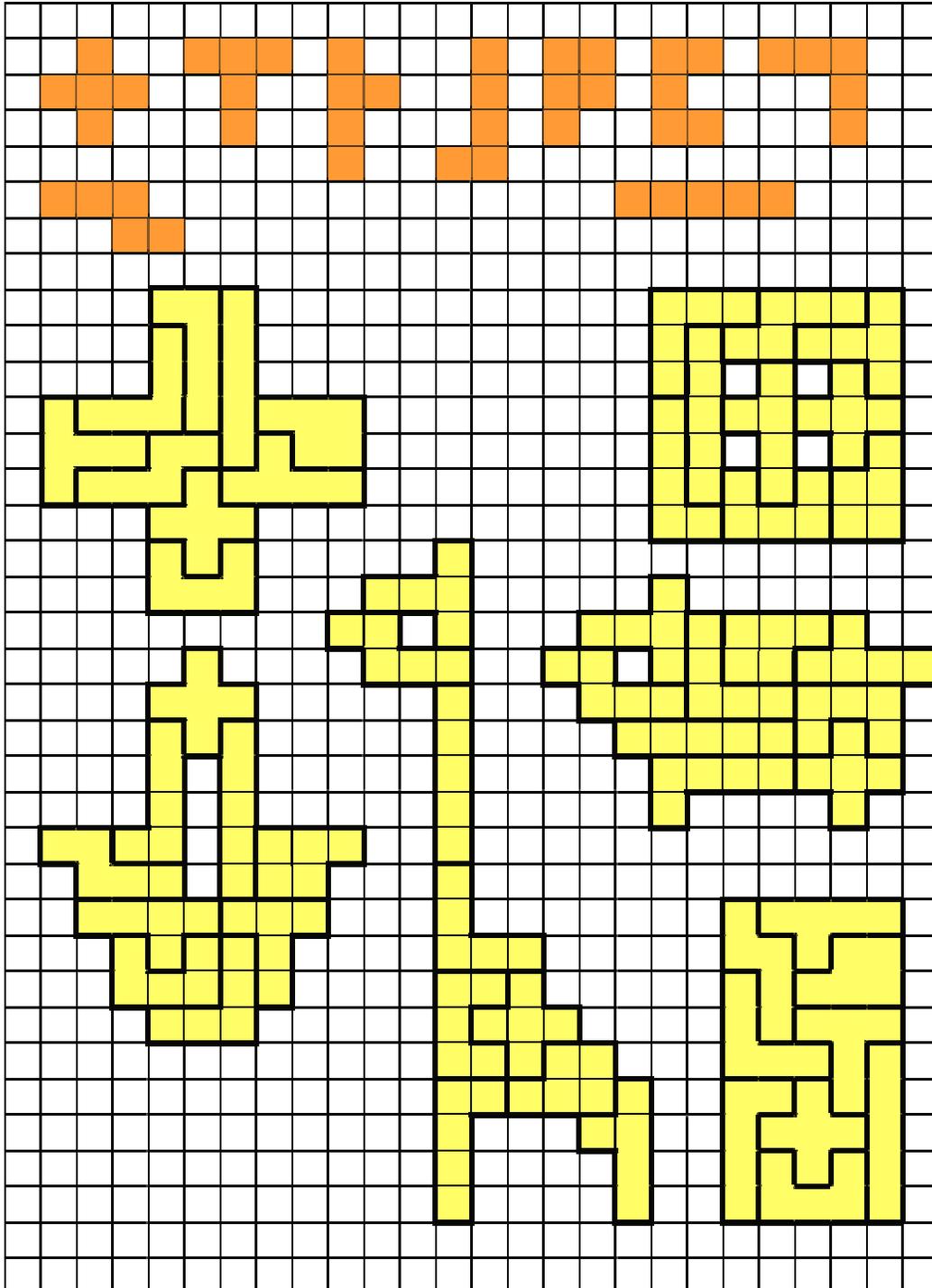
Try making the following figures using the shapes shown at the top of the page:



Possible solutions for each of the figures:  
(Note: It took days for us to figure them all out.  
They're tricky!)



Possible solutions for each of the figures:  
(Note: It took us days to figure them all out.  
It's hard work!)



## NEWT TESSELATIONS

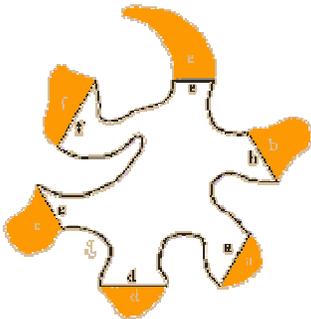
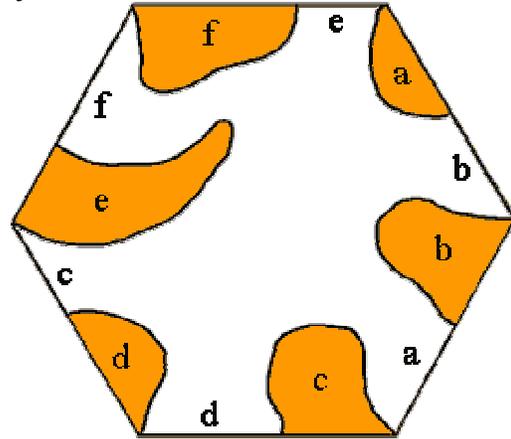
## Geometry

Purpose: To make a tesselating pattern

Skill: Understand the concept of tessellations, and the fact that area remains constant.

Directions:

1. Trace hexagon pattern and draw in shaded sections.
2. Carefully letter (a - f) and cut out shaded sections.



3. Tape cut- out sections to matching letter sections. Do not flip! Keep letters face up. Use tiny pieces of tape to join.
4. Trace your pattern in the middle of a sheet of paper.
5. Rotate the pattern so that it fits into the side of the newt already traced, like a puzzle piece. Trace again.
6. Continue rotating and tracing until sheet is filled, even those whose edges extend off the paper.
7. Decorate with eyes, stripes, etc.

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## TWO HALVES MAKE A WHOLE

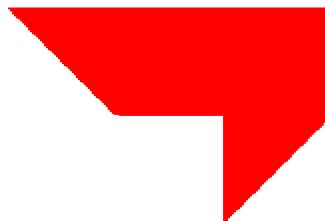
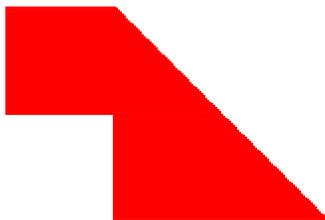
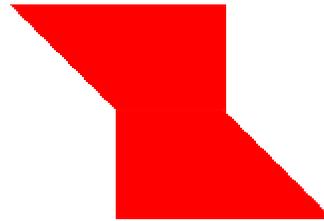
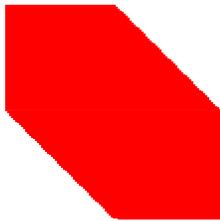
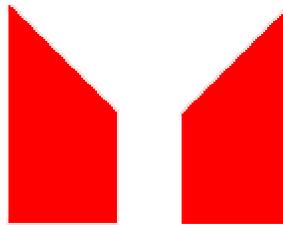
### Geometry

Purpose: To rearrange the two cut shapes to fit into every pattern on this page.

Skill: Spatial awareness

Directions:

**Match the patterns below using these two shapes:**



Suggestion: Use a timer or a clock to see how long it takes you. Challenge a friend to beat or match your time.

## MAKING BOXES

### Geometry

Purpose: To make as many patterns as possible for boxes (with tops)

Skill: Three dimensional visualization  
Spatial awareness



Directions:

1. Imagine you are a box manufacturer and you want to ship boxes flattened out. How many possible shapes of 6 squares could be folded into a box?
2. Using the square pattern and graph paper, make as many designs as possible. (Trace 6 adjoining squares in a pattern you decide upon.)
3. Cut out your pattern and fold to see if you can make a box of each in order to check your work.

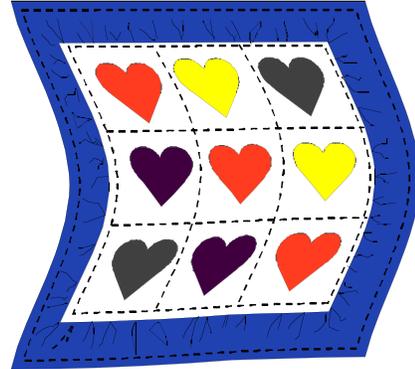
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## MAKING A QUILT BLOCK

### Geometry

Purpose: Arrange triangles in a geometric design to create a “quilt block”

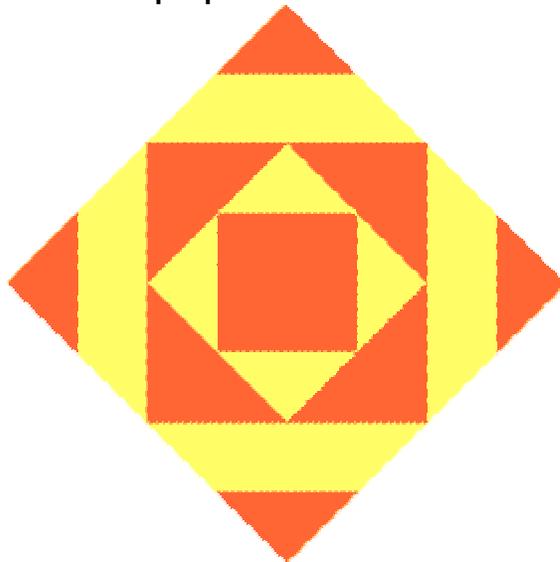
Skill: Recognize and design patterns that can be made with congruent triangles



Directions:

1. Choose 16 squares of contrasting colors. (8 each of 2 colors)
2. Cut each square diagonally to form 2 triangles
3. Arrange in an interesting pattern
4. When you have decided on a pattern, glue triangles on a piece of paper.

Sample:



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## FIGURES ON A GEOBOARD

### Geometry

Purpose: Make shapes on a geoboard based on knowledge of angles, triangle, and rectangles

Skill: Knowledge of polygons such as parallelograms, rectangles, and triangles.

Knowledge of angles.



Number of people: Possible to work alone, but working with a partner will help verify results and also will show that there is usually more than one correct answer.

Directions: 1. Use geoboards in the classroom OR geoboard sheets provided OR graph paper, using the intersections of lines as the “posts” on the geoboard.

2. Try making the following:

- a) triangle with a right angle
- b) triangle with no right angle
- c) a house containing right, acute, and obtuse angles.
- d) a sailboat with no right angles
- e) a Christmas tree using at least three triangles
- f) a rocket ship made of rectangles and squares
- g) a five sided figure
- h) a parallelogram that is not a rhombus, square, or rectangle.

3. If playing with a partner, make a shape and have your partner copy it. Describe it in geometric terms.