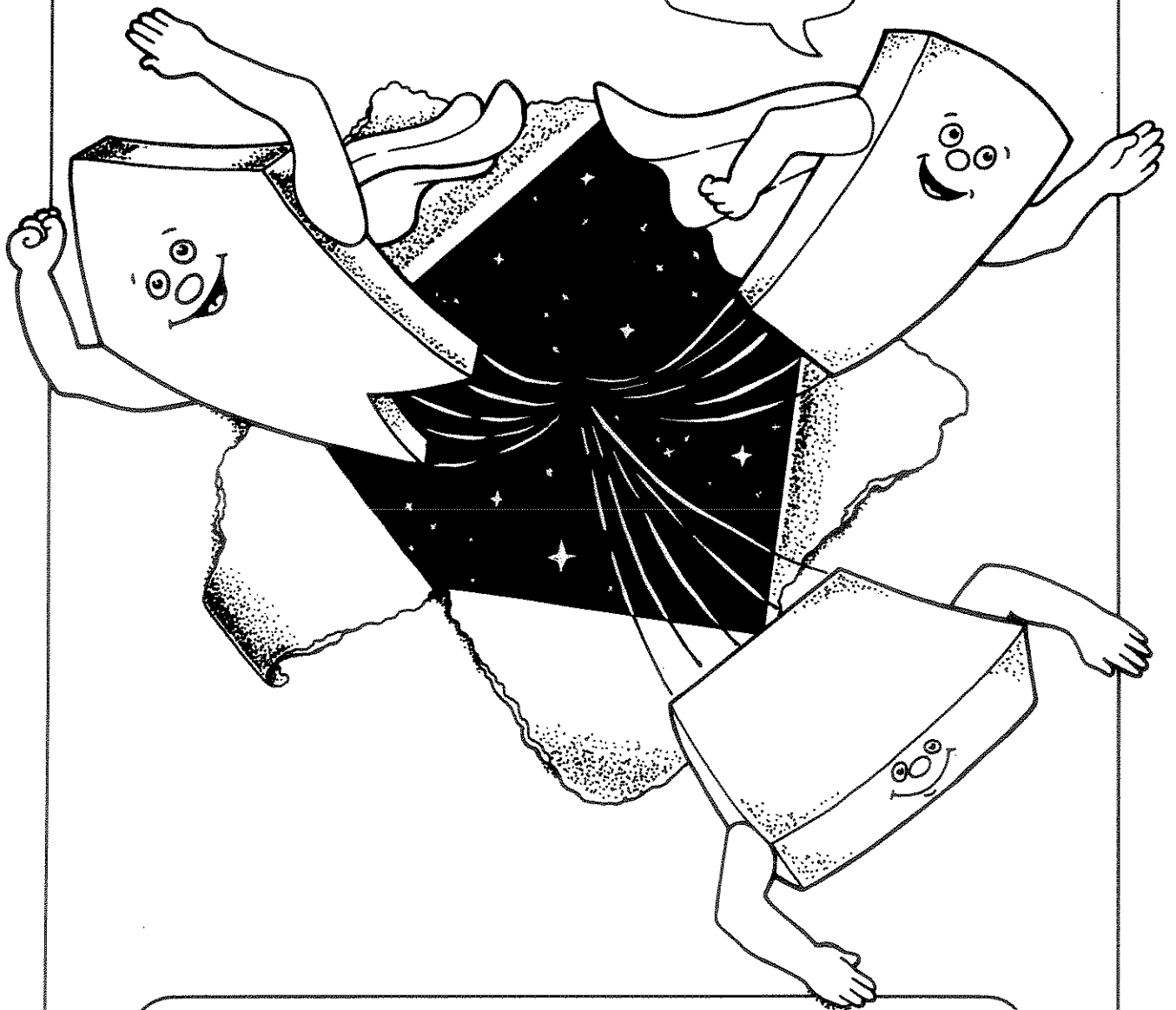


# SUPERTANGRAMS

For Beginners

1



Henri Picciotto ♦ [www.picciotto.org/math-ed](http://www.picciotto.org/math-ed)

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For more activities involving superTangrams and related shapes, see  
<<http://www.picciotto.org/math-ed>>. Search for "puzzles".

Cover design by JoAnne Hammer  
Cover illustration by Deborah Morse  
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## NOTES TO THE TEACHER

SuperTangrams™ are the geometric shapes that are formed by joining four isosceles right triangles (half-squares) edge-to-edge. They are called SuperTangrams™ because their underlying geometry is that of the old Chinese tangram puzzle. In fact, three of the SuperTangrams™ are identical to three of the tangram pieces. As with the tangrams, you can combine the SuperTangrams™ in an infinite number of ways to create various shapes.

Like tangrams, and pentominoes (to which they are also related), the SuperTangrams™ offer a recreational approach to many mathematical questions. Solving puzzles can help students develop their intuitive feel for two-dimensional space which will provide a solid foundation for the formal study of geometry.

Even students who have had experience with other geometric puzzles may find SuperTangrams™ quite challenging. There are two reasons for this. First, there are fourteen shapes, all different, whereas there are only seven tangram pieces in three different shapes. Second, because there are 45-degree and 135-degree angles, in addition to 90-degree angles, and the fact that all sides are not multiples of the same unit length, make the SuperTangrams™ trickier to put together than tangrams or pentominoes. With this in mind, the exercises in this book have been carefully designed to provide a step-by-step introduction to these exciting and brain-twisting shapes.

## HOW TO USE THIS BOOK

You may want to keep copies of the puzzles in each set in separate folders. This will help keep them organized, and will make it easier for a student to work with a whole set at one time.

As much as possible, the puzzles are ordered by difficulty within each set, the easier ones coming first. The first puzzle in one set may be easier than the last puzzle in an earlier set. If a student is frustrated by a puzzle, encourage her or him to try an easier one.

Students may solve the puzzles in any order, but it is important that they keep track of their successes by marking on the checklist the puzzles they solve correctly. This allows students to see their progress, and motivates them to solve more puzzles.

There is a more comprehensive introduction to SuperTangrams™ in *SuperTangrams™ for Beginners: Book 2*. More difficult puzzles than those in the two beginner books are in *SuperTangram™ Activities: Book 1* and *Book 2*.

### Set 1 (Pages 1-17)

These pages will familiarize students with the SuperTangrams™. Students simply need to identify the correct pieces and orient them correctly on the page. (Note that in some cases a piece may need to be flipped over before it will fit.)

The first six pages are explained in more detail below and include three extra questions for older or more capable students.

**Pages 1-2:** All the shapes on page 1 are convex. This means that any line segment with endpoints in the shape lies completely within the shape. The figures on page 2 are not convex. That is, it is possible to draw a straight line segment that connects two points within a shape, but passes through the outside of it.

After they have covered the shapes on these two pages with SuperTangrams™, ask your students to decide on which page each of the remaining three pieces belongs.

**Pages 3-4:** All the shapes on page 3 are flip-symmetric. If you flip a piece over, it will still fit within its outline. The shapes on page 4 are not flip-symmetric. Once flipped over, the pieces do not fit their outlines.

After they have covered the shapes on these two pages with SuperTangrams™, ask your students to decide on which page each of the remaining three pieces belongs.

**Pages 5-6:** All the shapes on page 5 are turn-symmetric. They will fit their outlines after being turned 180 degrees. The shapes on page 6 are not turn-symmetric. They must be turned a full 360 degrees before they will fit their outlines again.

After they have covered the shapes on these two pages with SuperTangrams™, ask your students to decide on which page each of the four remaining pieces belongs.

## **Set 2 (Pages 18-25)**

These puzzles are self-explanatory: Cover each shape with the SuperTangrams™ shown. Pieces should not overlap or stick out beyond the boundaries of the shape.

## **Set 3 (Pages 26-33)**

All or both shapes on each page should be covered simultaneously. The pieces to use are not shown. Very young students, or anyone who finds these puzzles too difficult, could cover just one shape on a page.

## **Set 4 (Pages 34-41)**

The puzzles in this set are the hardest in this book. Very young children can be shown the solutions. Merely just copying them will present enough of a challenge.

Use the shapes on page vi as patterns to make SuperTangrams™ or as a check to make sure you have a complete set. Assign students to check the sets periodically to see that they are complete.

NAME \_\_\_\_\_

## CHECKLIST FOR THE SUPERTANGRAM™ PUZZLES

Use this checklist to keep track of which puzzles you have solved.

### Set 1:

1    2    3    4    5    6    7    8    9    10  
11   12   13   14   15   16   17

### Set 2:

18   19   20   21   22   23   24   25

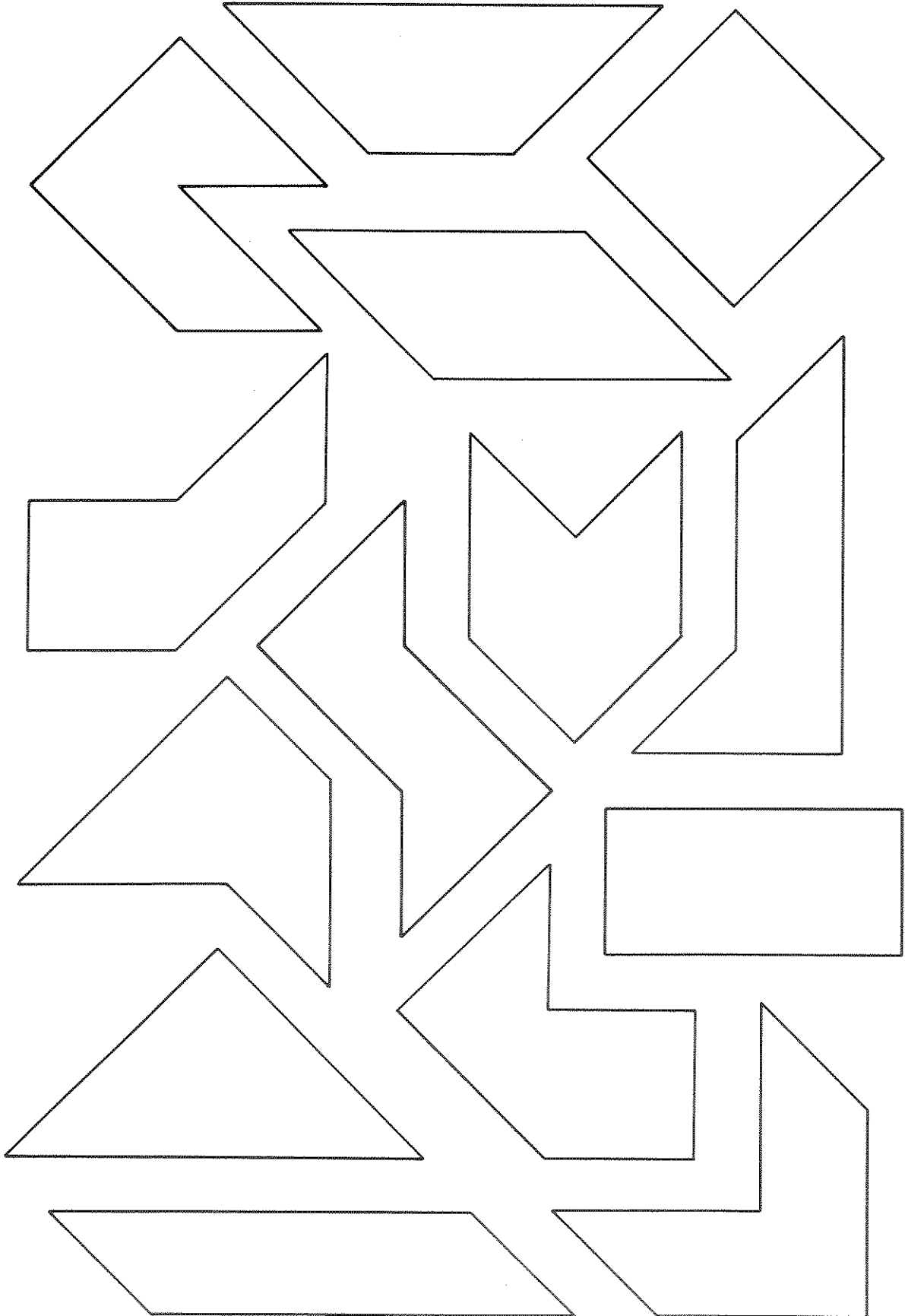
### Set 3:

26   27   28   29   30   31   32   33

### Set 4:

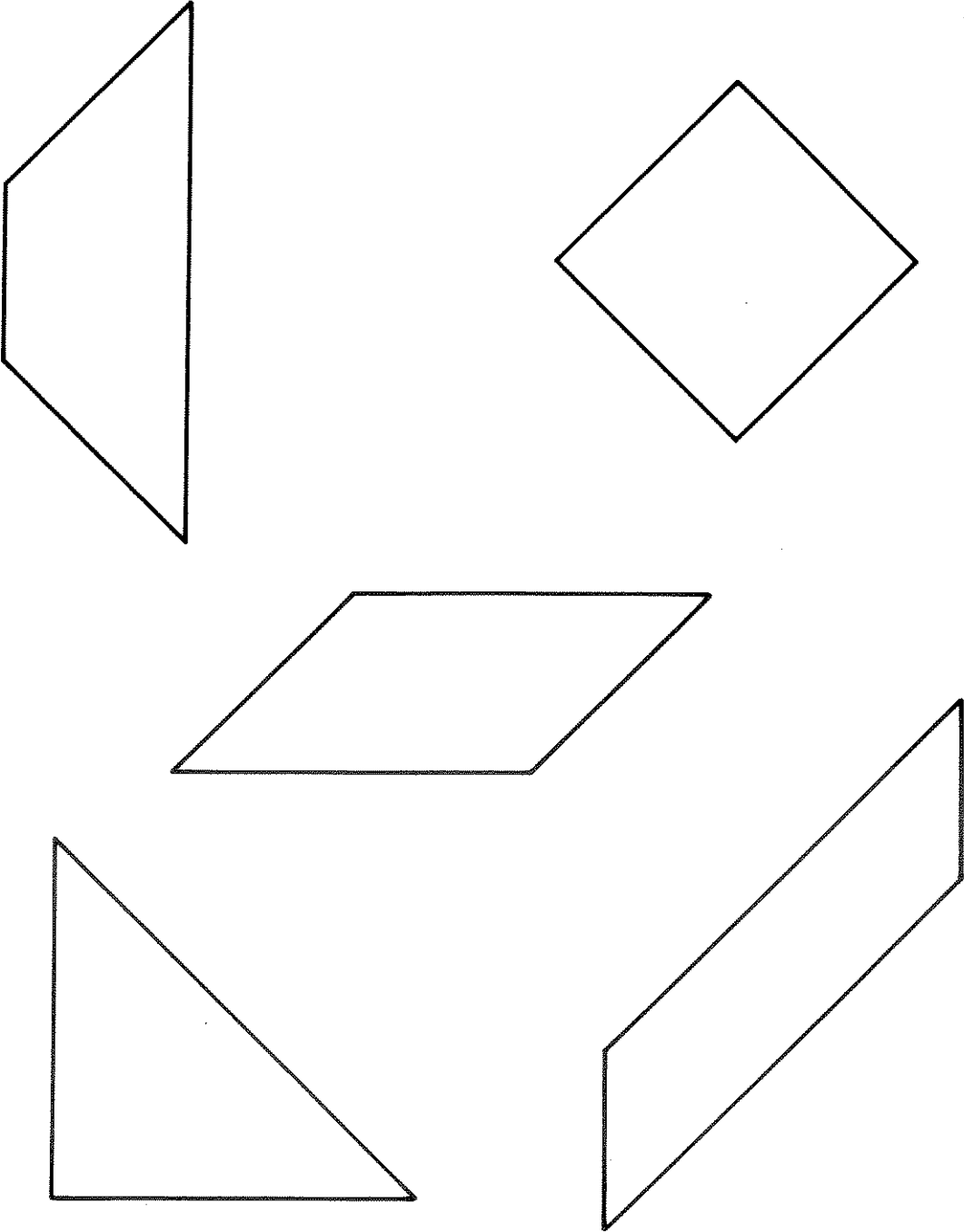
34   35   36   37   38   39   40   41

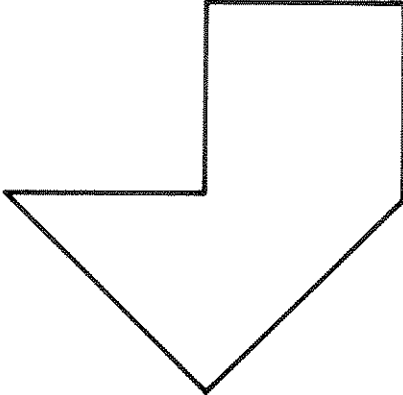
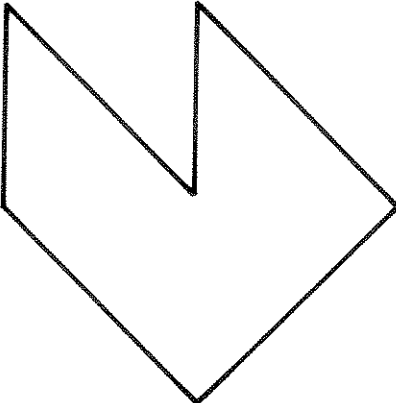
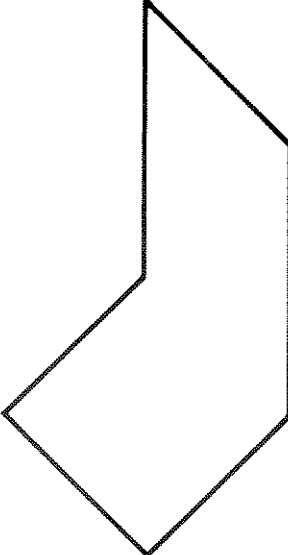
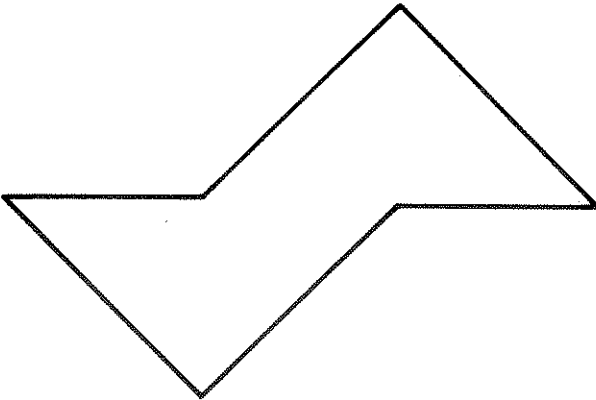
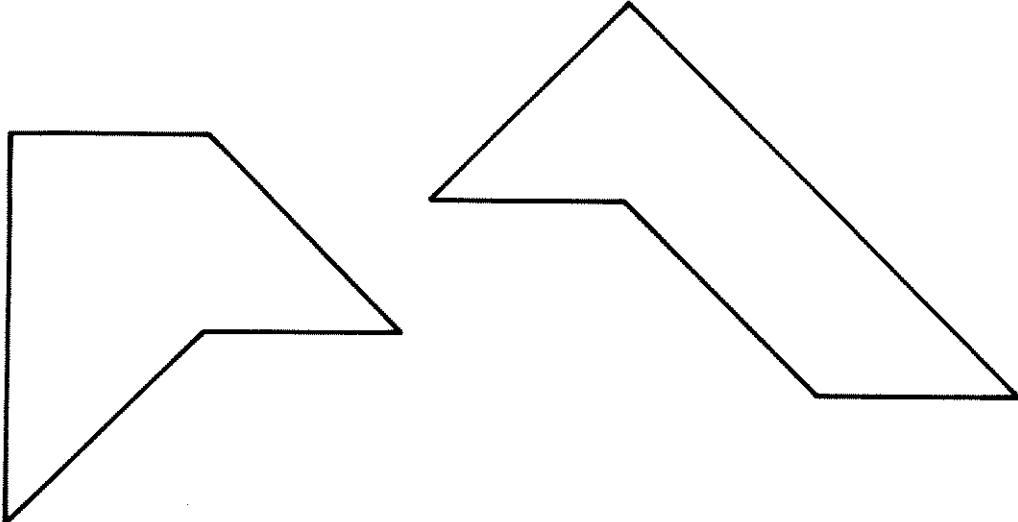
# SUPERTANGRAM™ PATTERNS

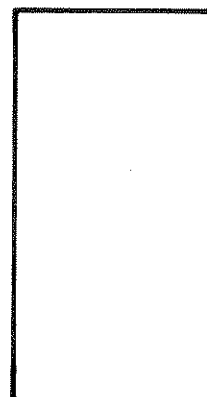
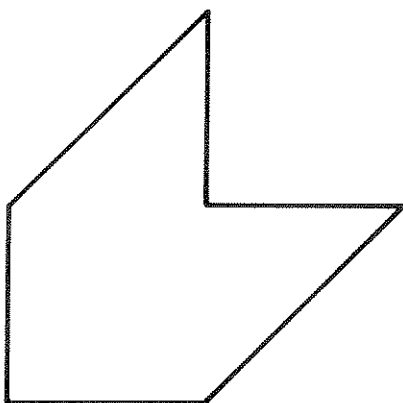
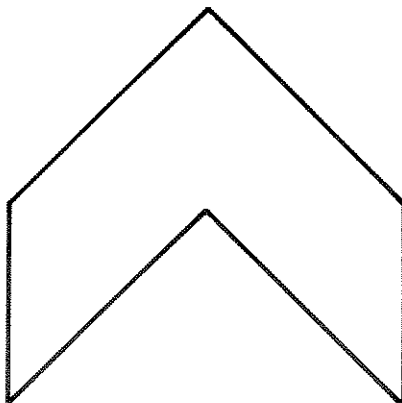
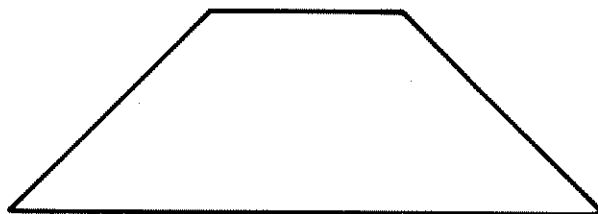
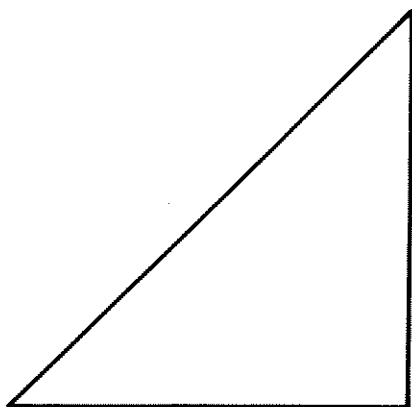


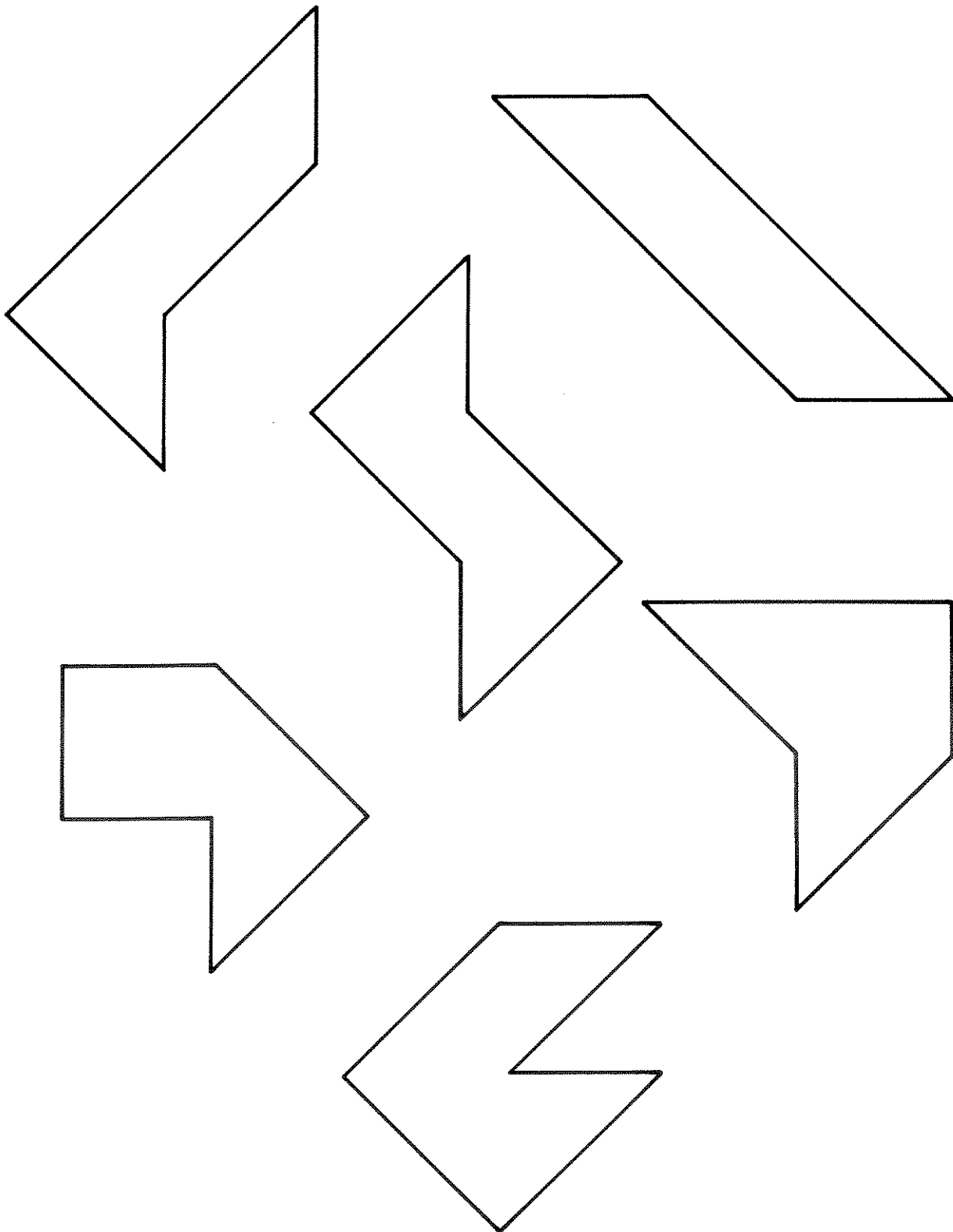
Cover each shape with a SuperTangram™

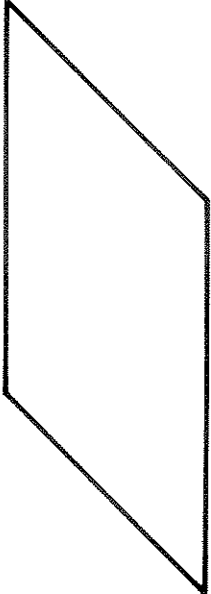
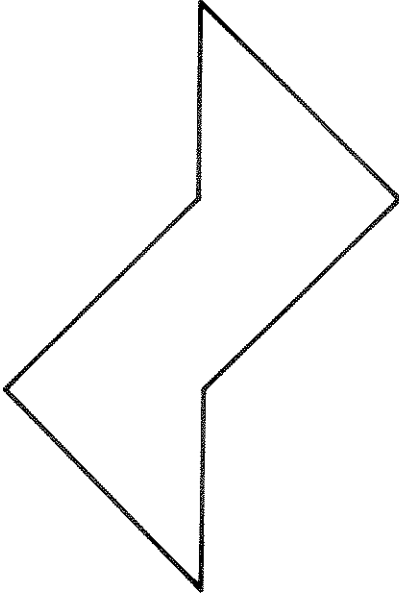
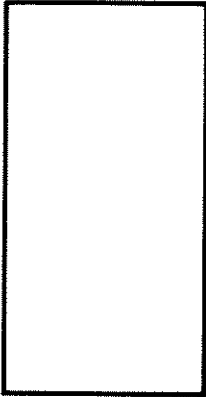
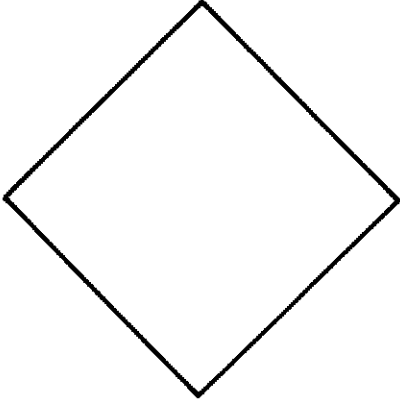
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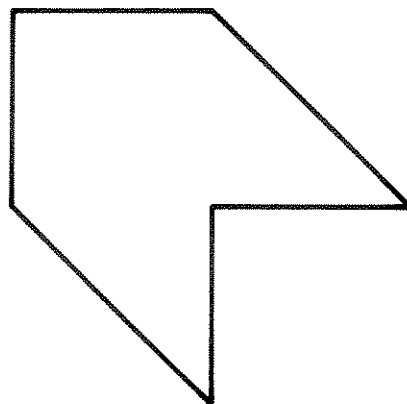
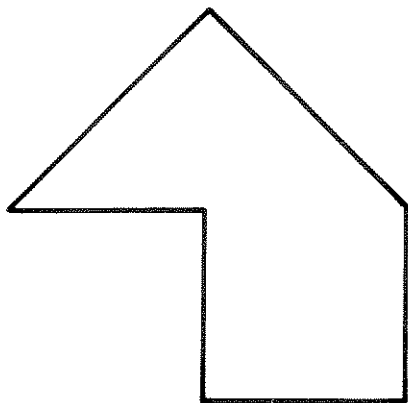
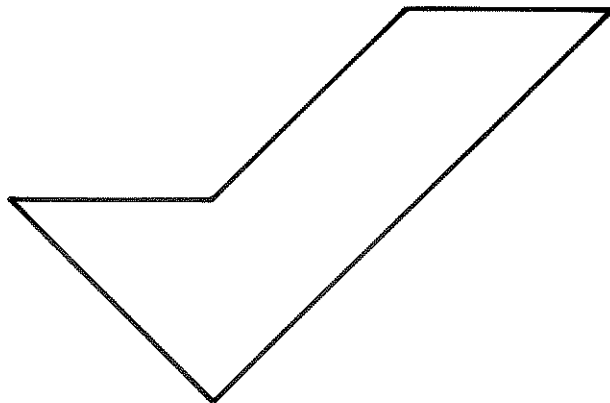
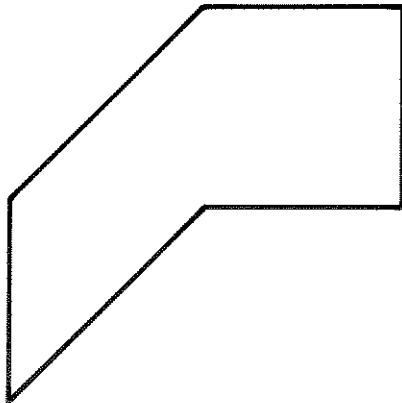
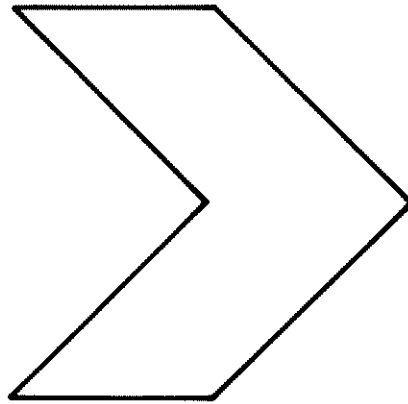
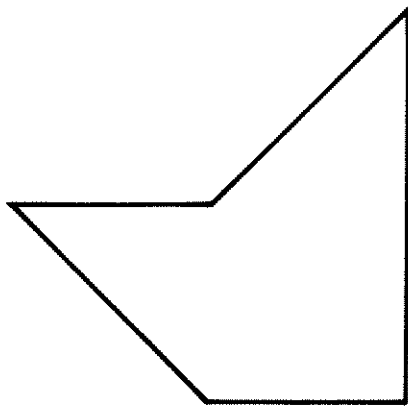


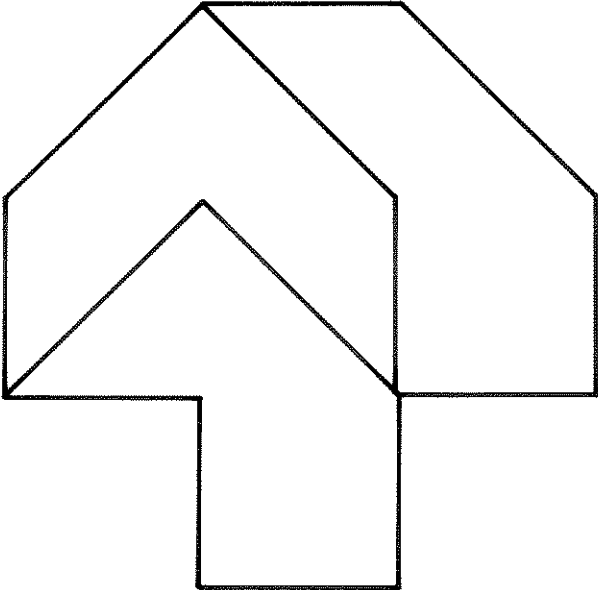
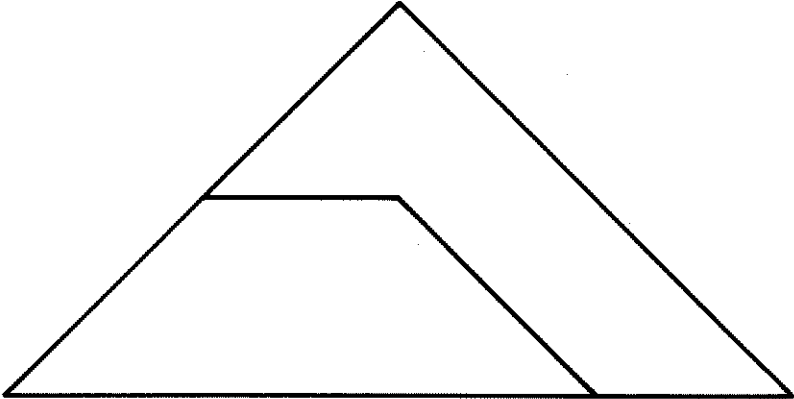




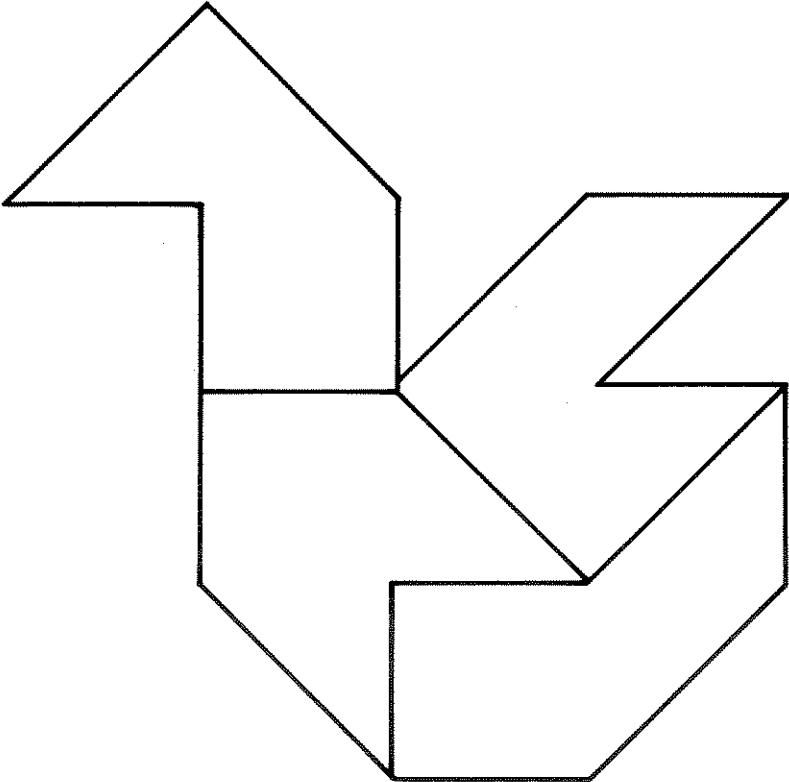




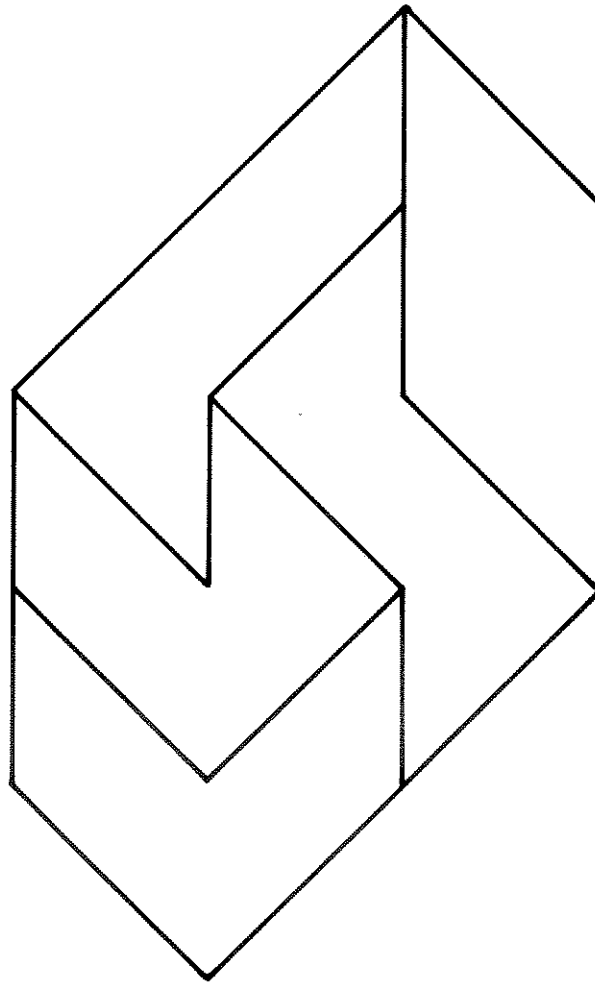




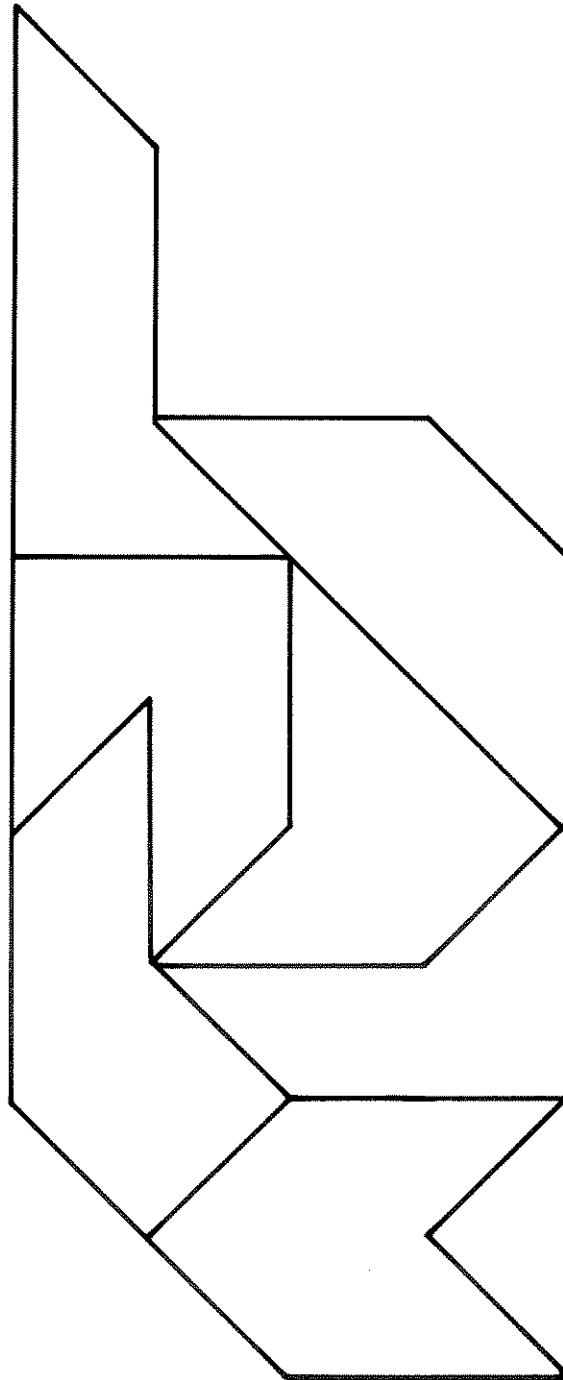
**MOUNTAIN AND TREE**



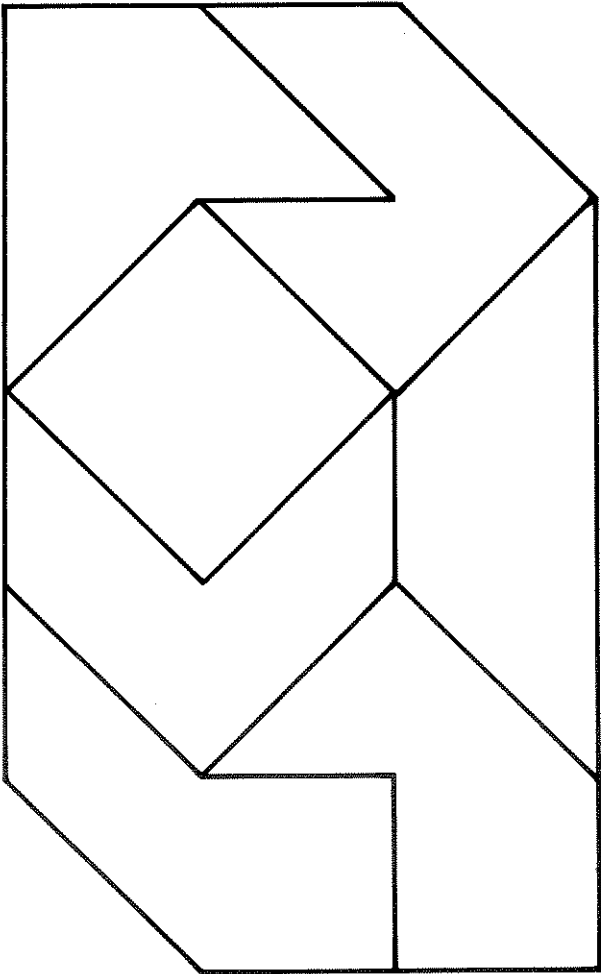
**RUBBER DUCK**



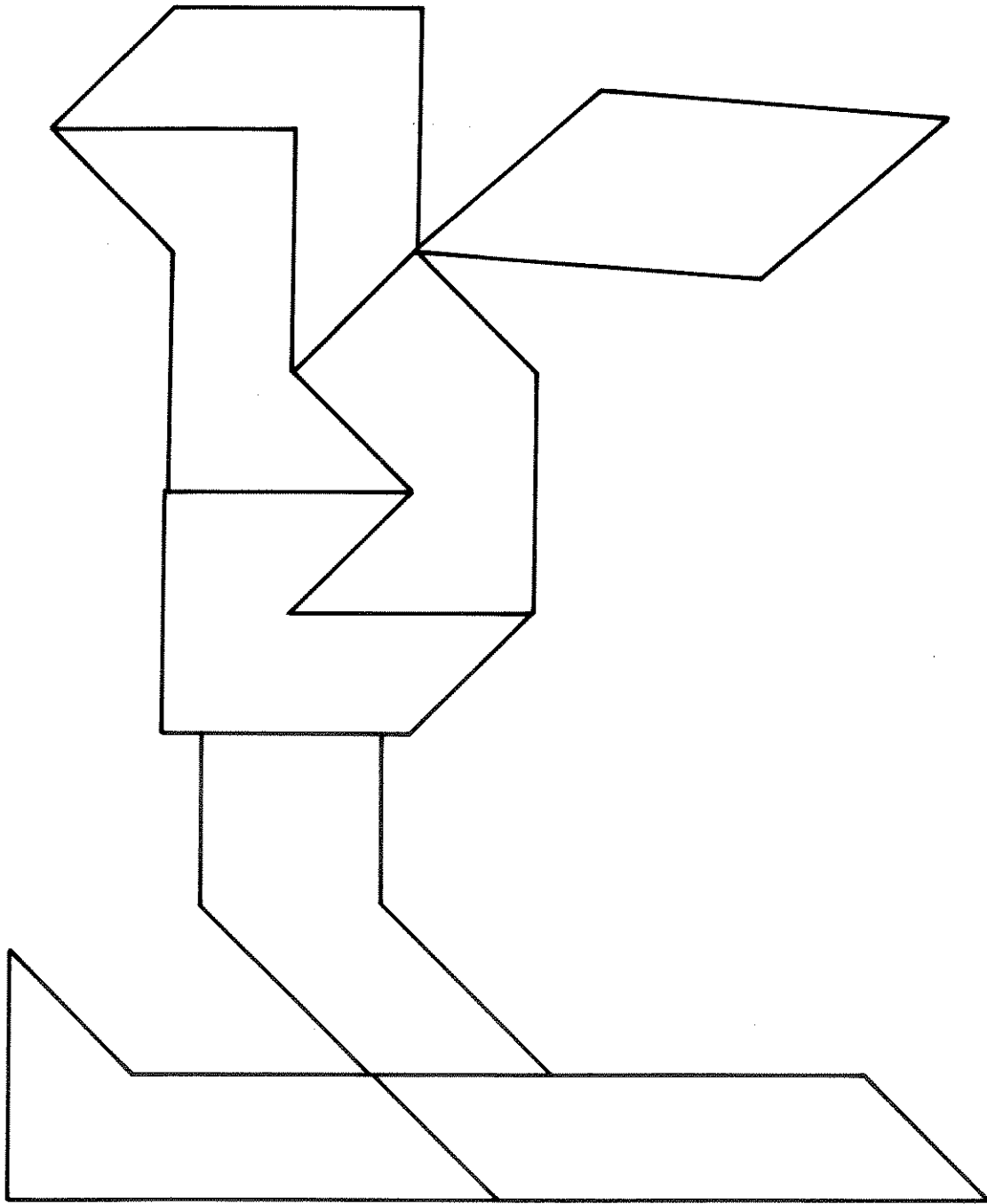
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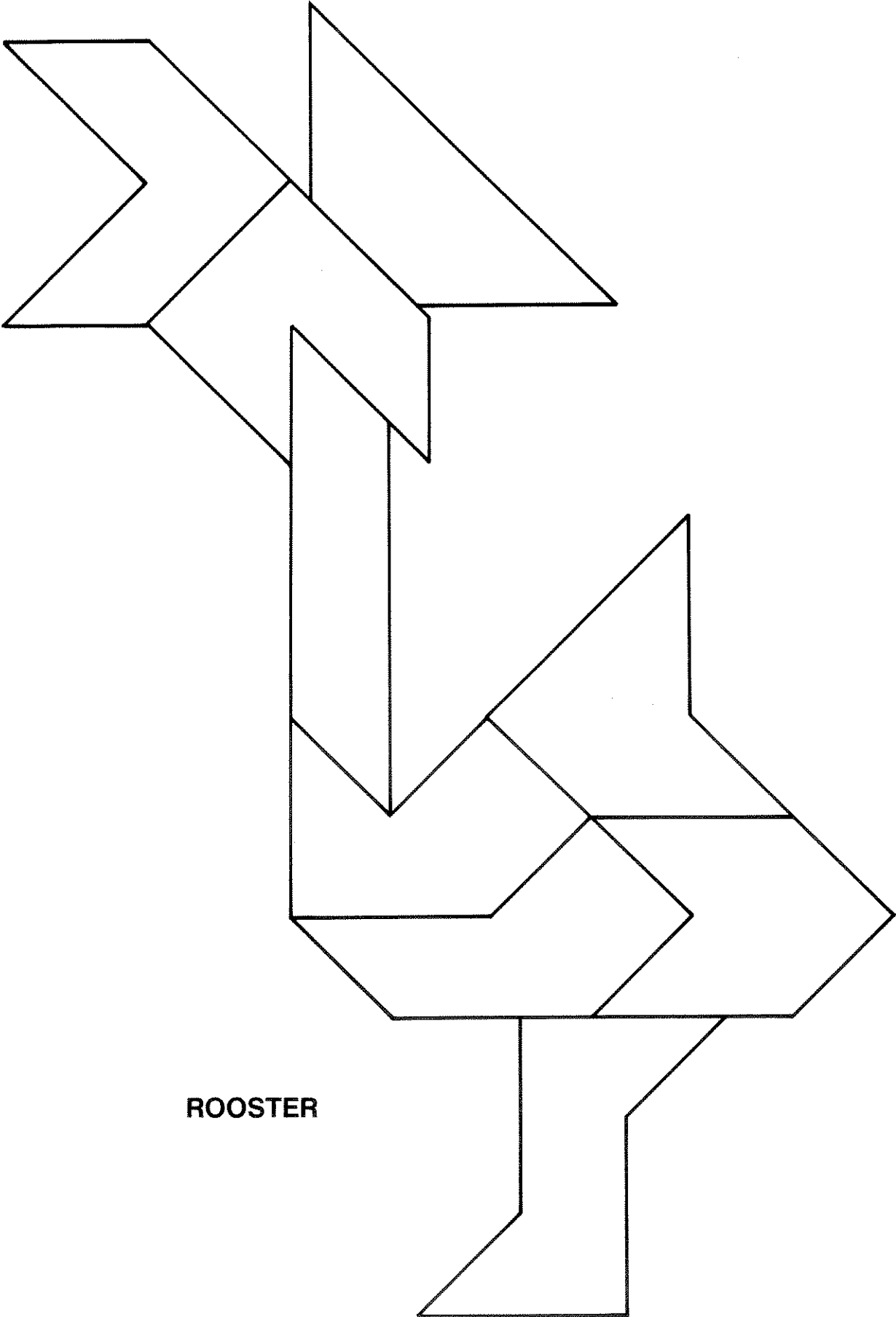
**SNAIL 1**



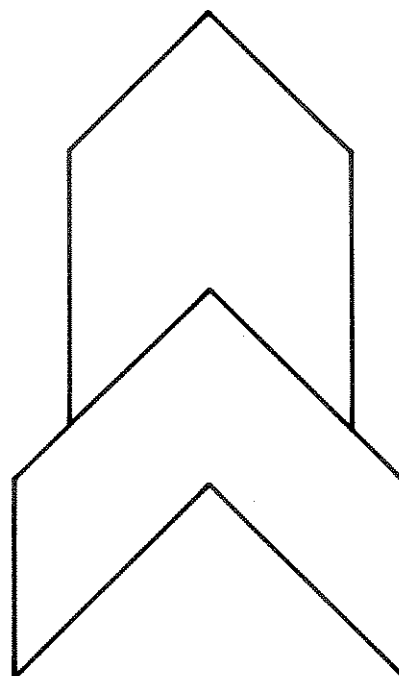
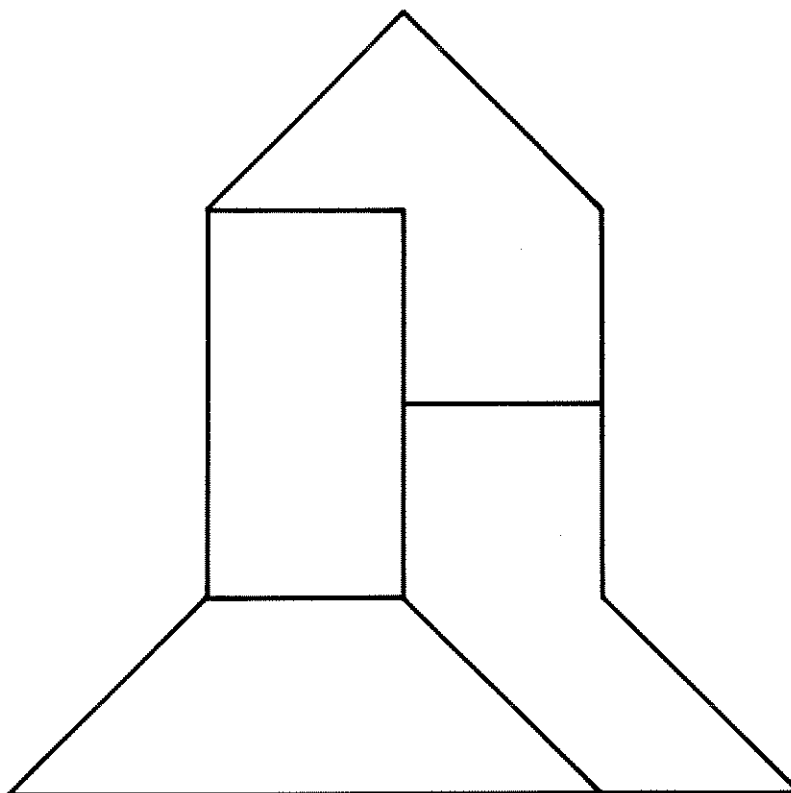
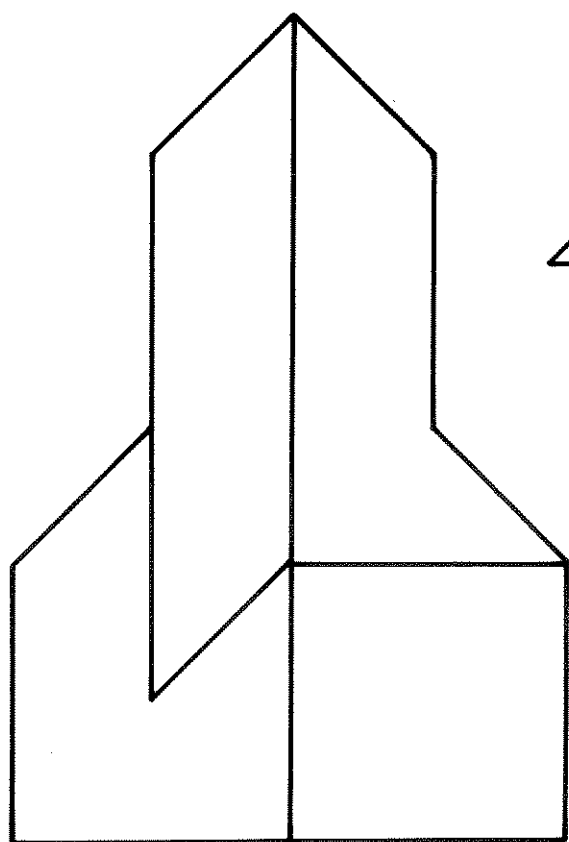
**HEXAGON 2**



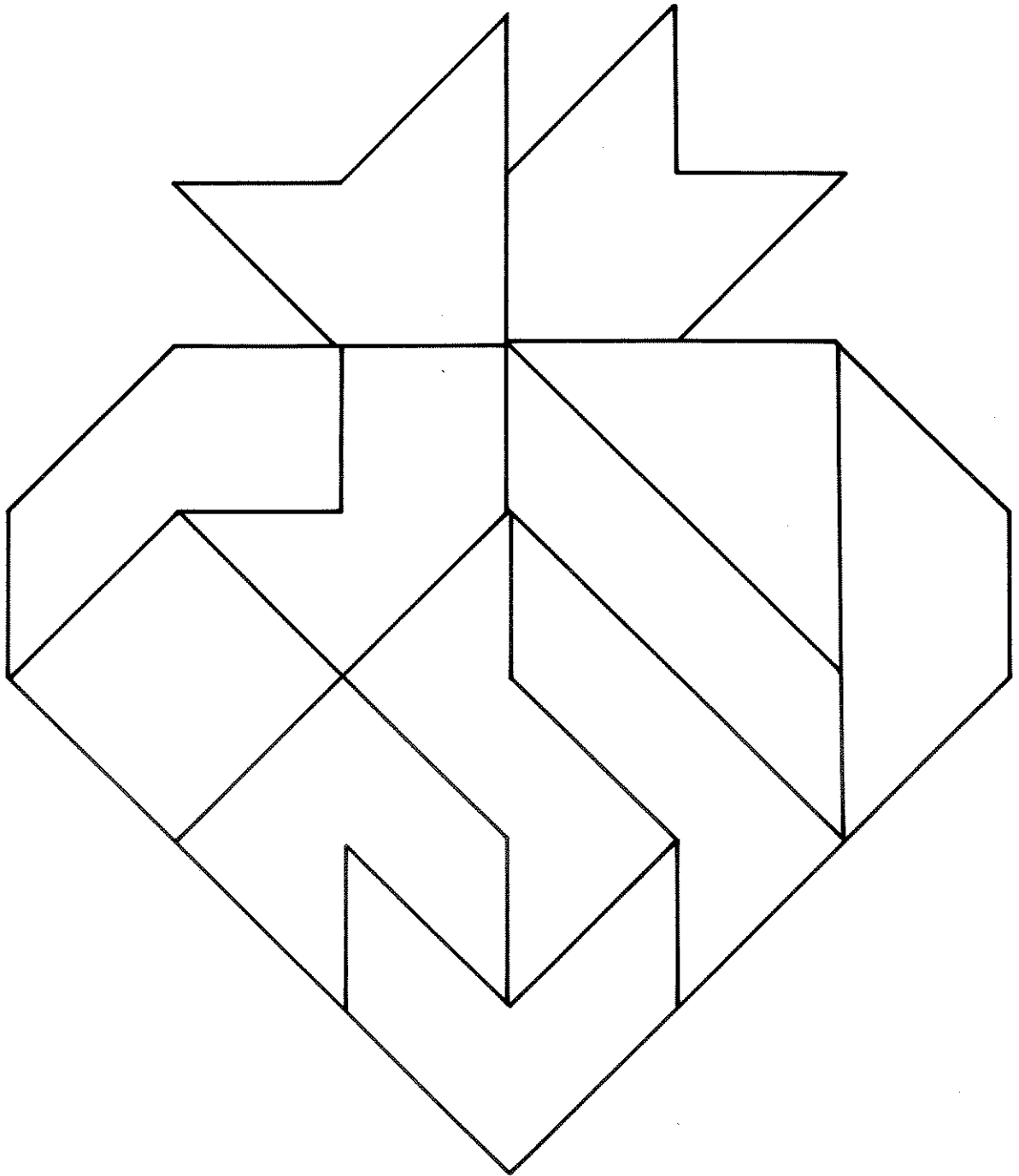
**SKIER**



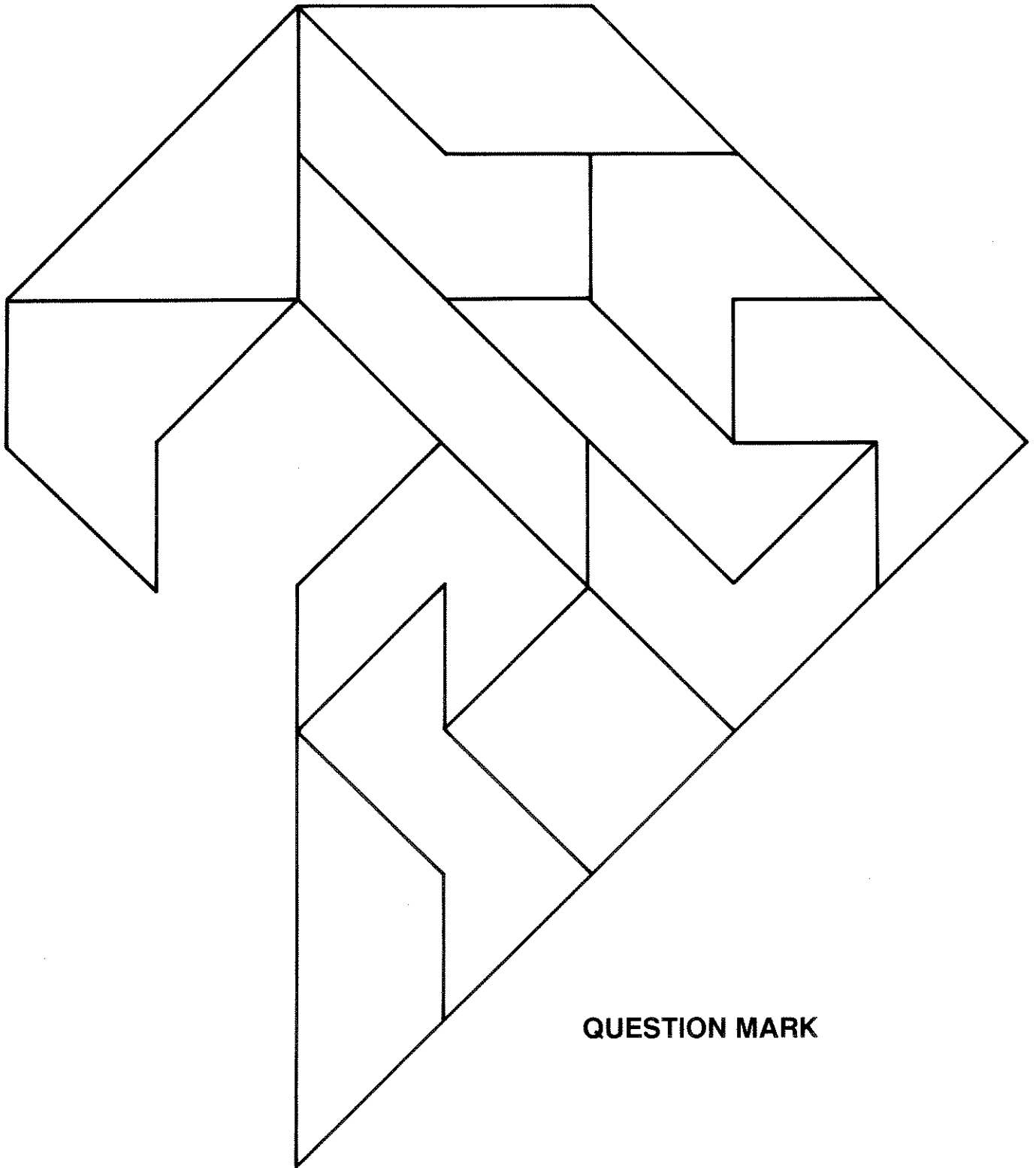
**ROOSTER**



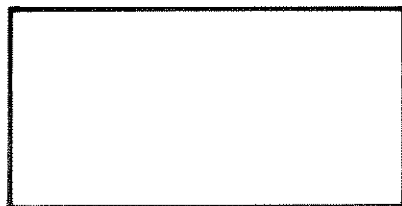
**ROCKETS**



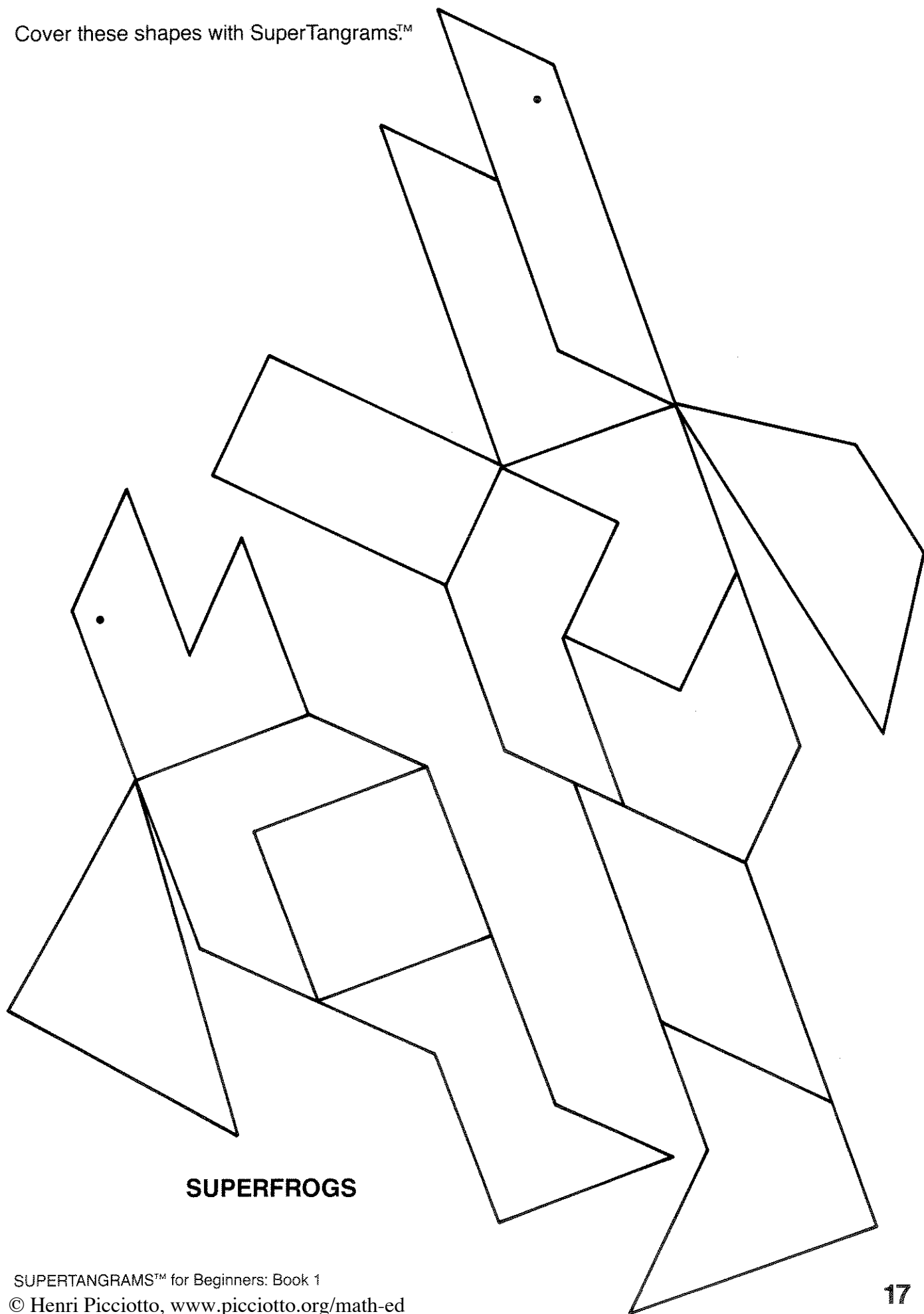
**STRAWBERRY**



**QUESTION MARK**



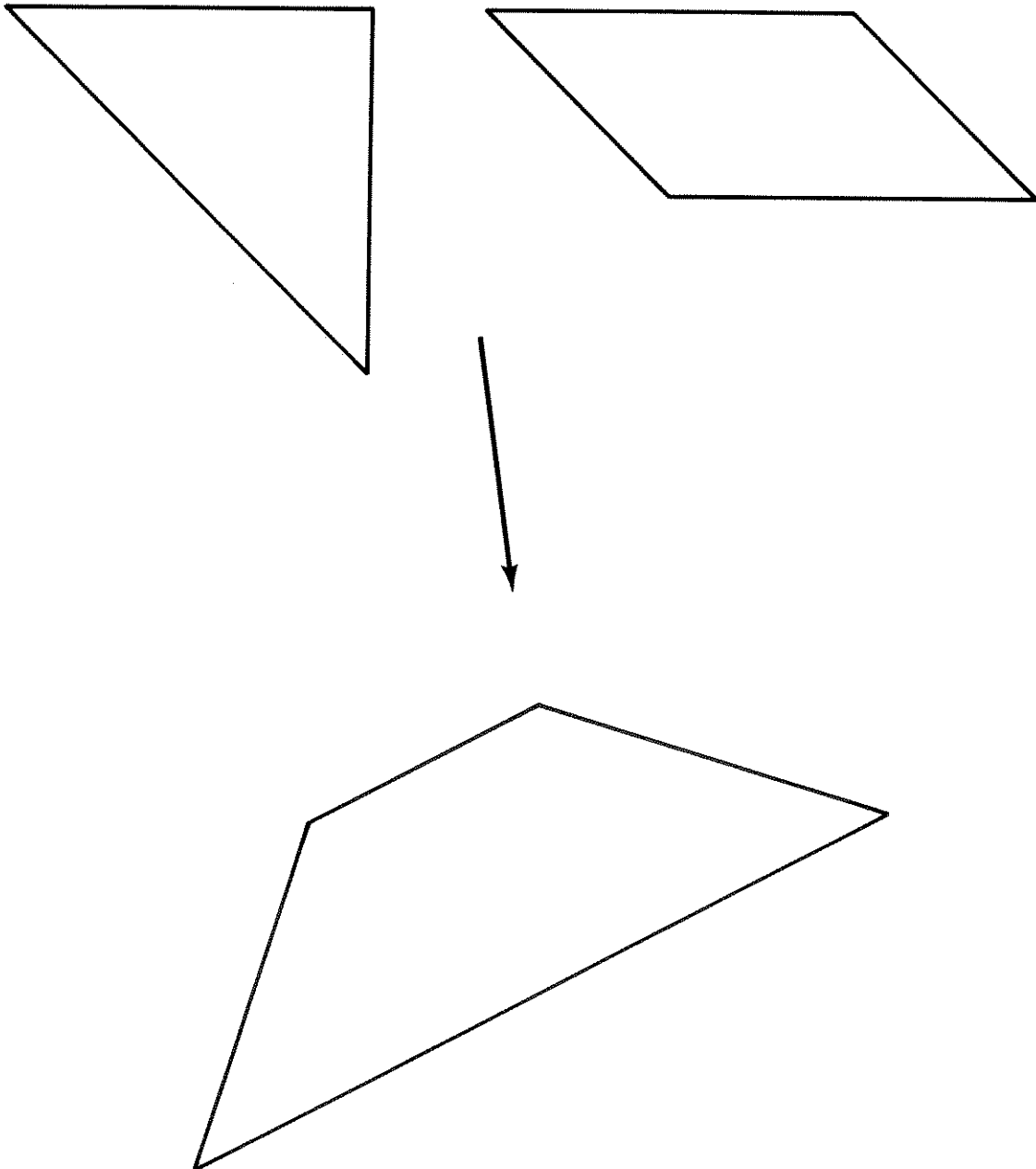
Cover these shapes with SuperTangrams™



**SUPERFROGS**

Use these SuperTangrams™ to solve the puzzle below.

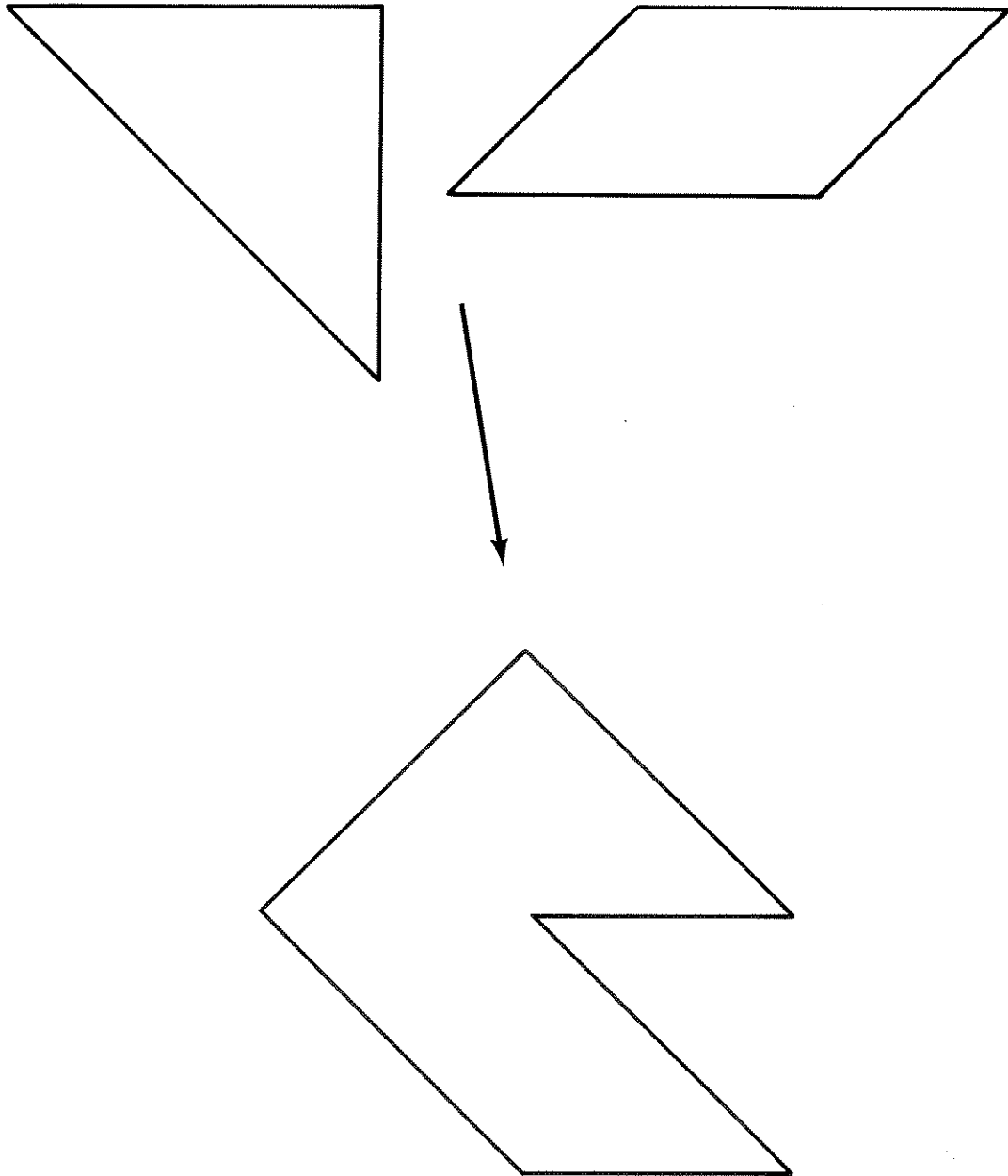
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**TRAPEZOID**

Use these SuperTangrams™ to solve the puzzle below.

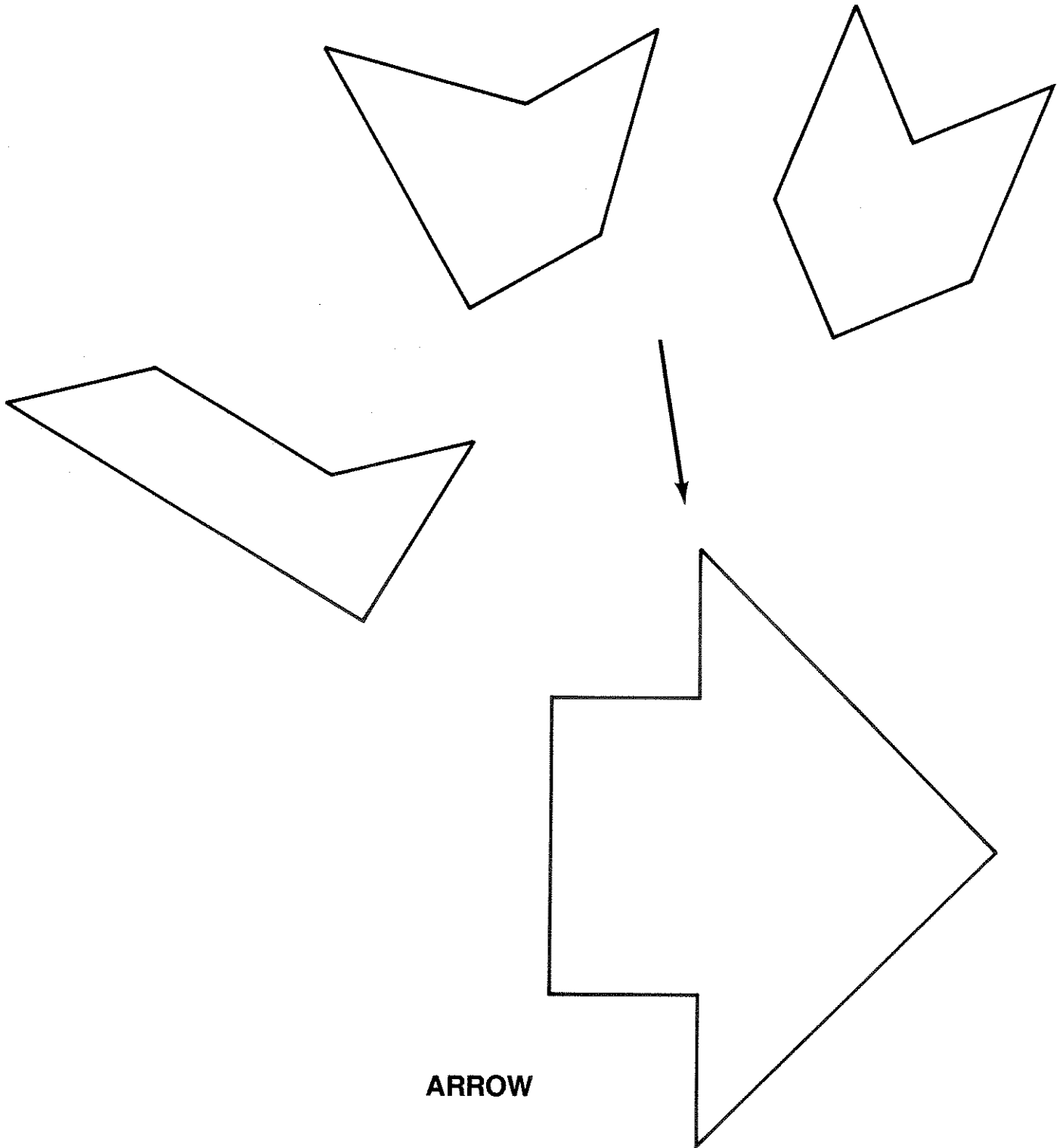
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**HELMET**

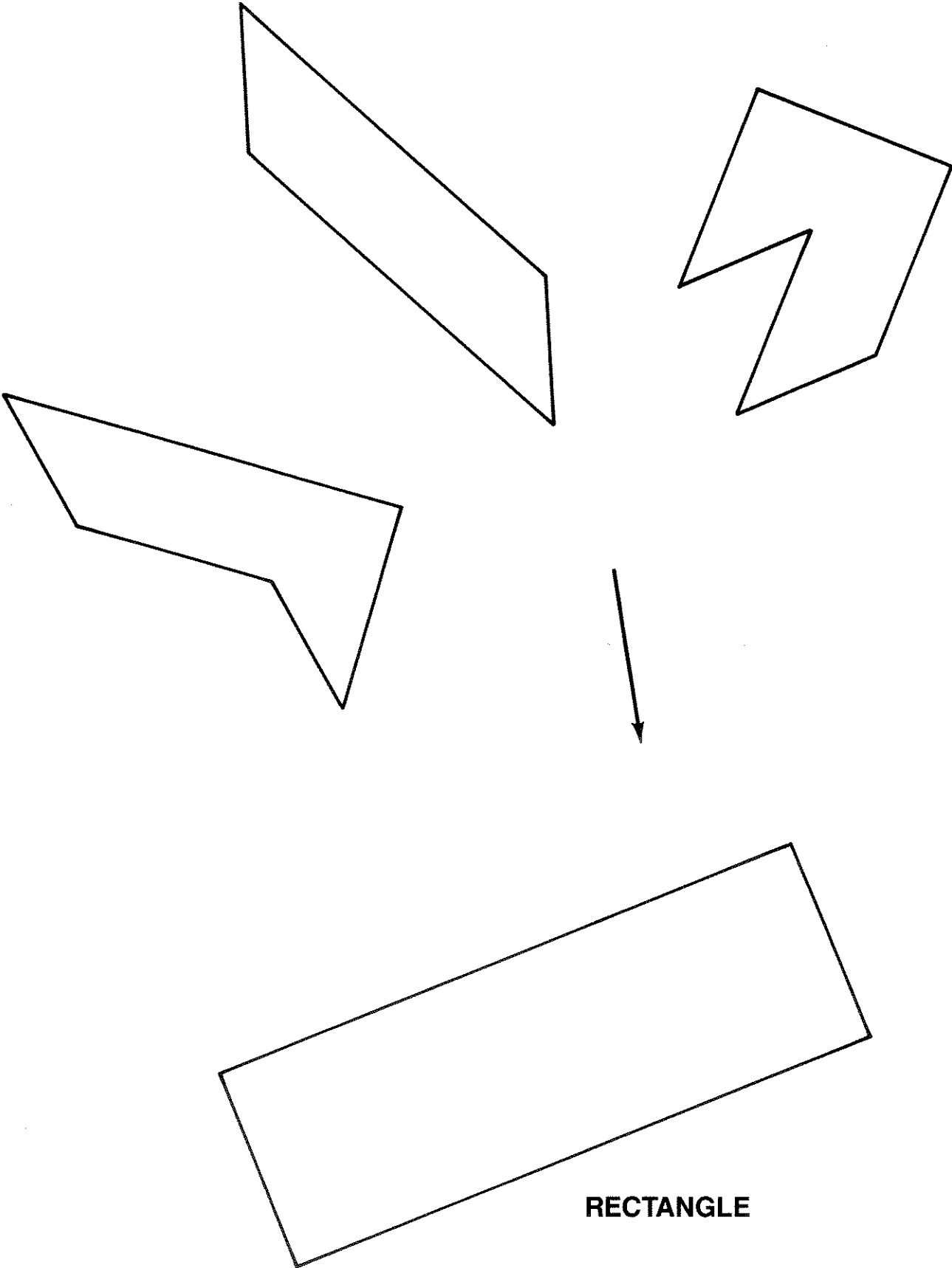
Use these SuperTangrams™ to solve the puzzle below.

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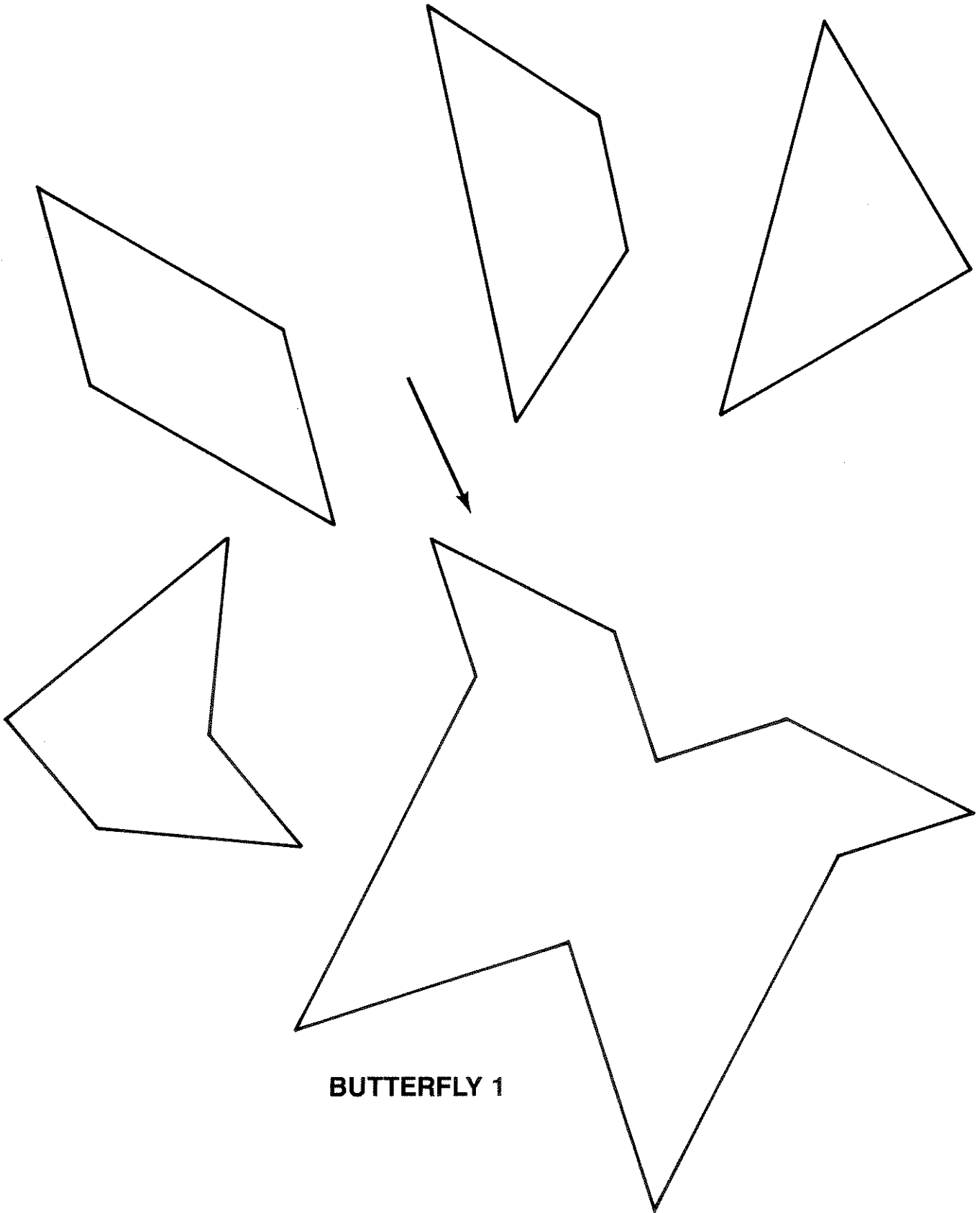
Use these SuperTangrams™ to solve the puzzle below.

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Use these SuperTangrams™ to solve the puzzle below.

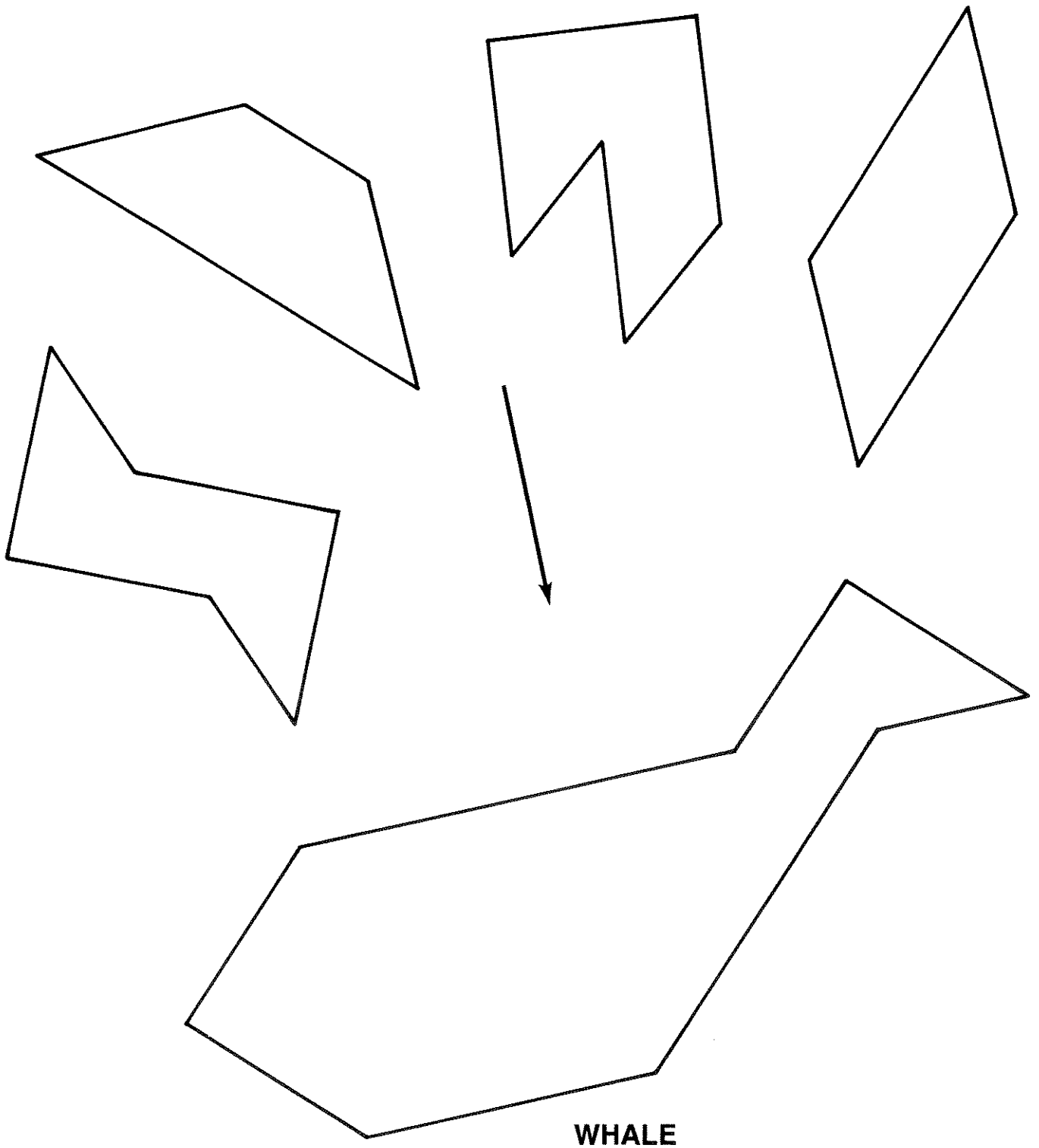
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**BUTTERFLY 1**

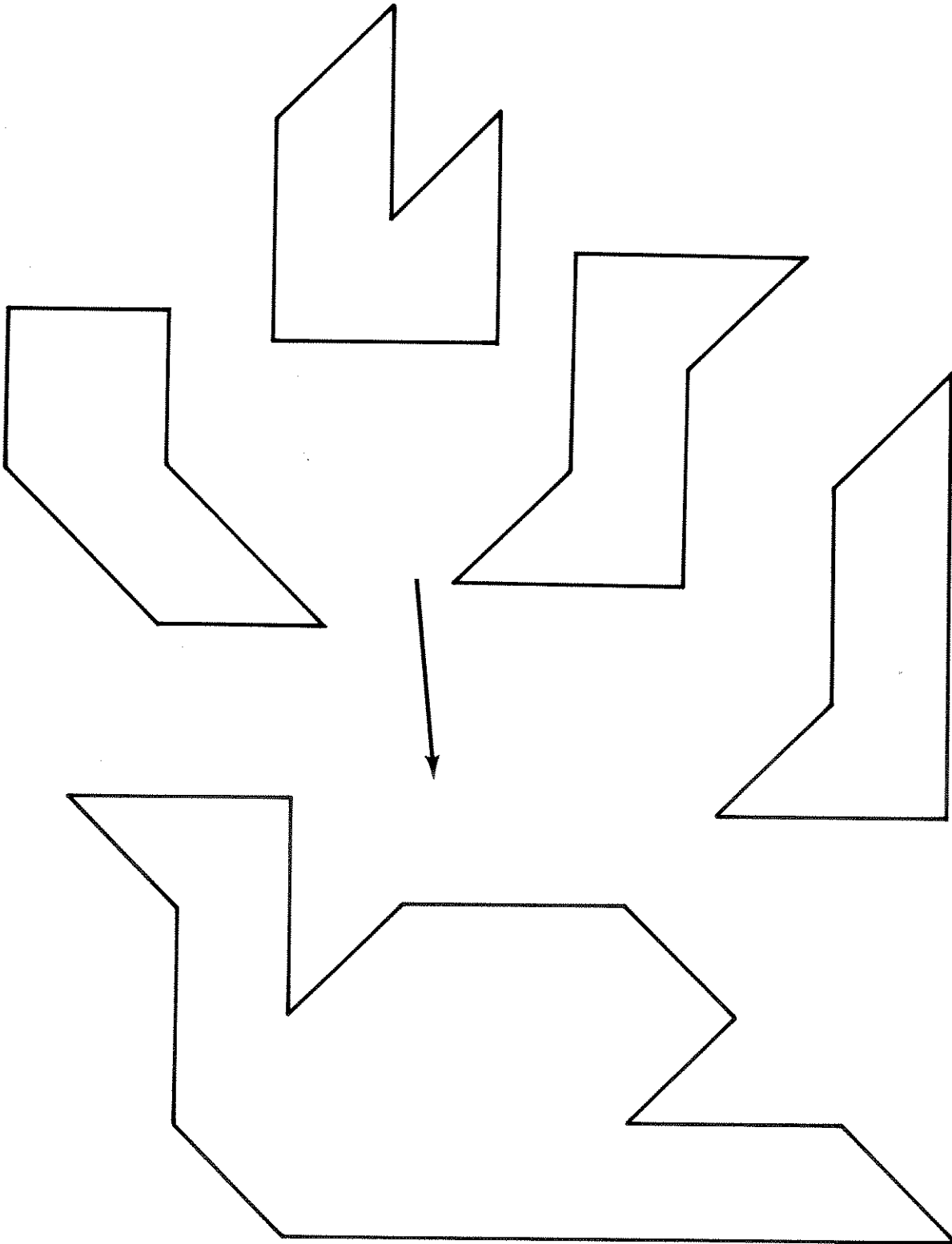
Use these SuperTangrams™ to solve the puzzle below.

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Use these SuperTangrams™ to solve the puzzle below.

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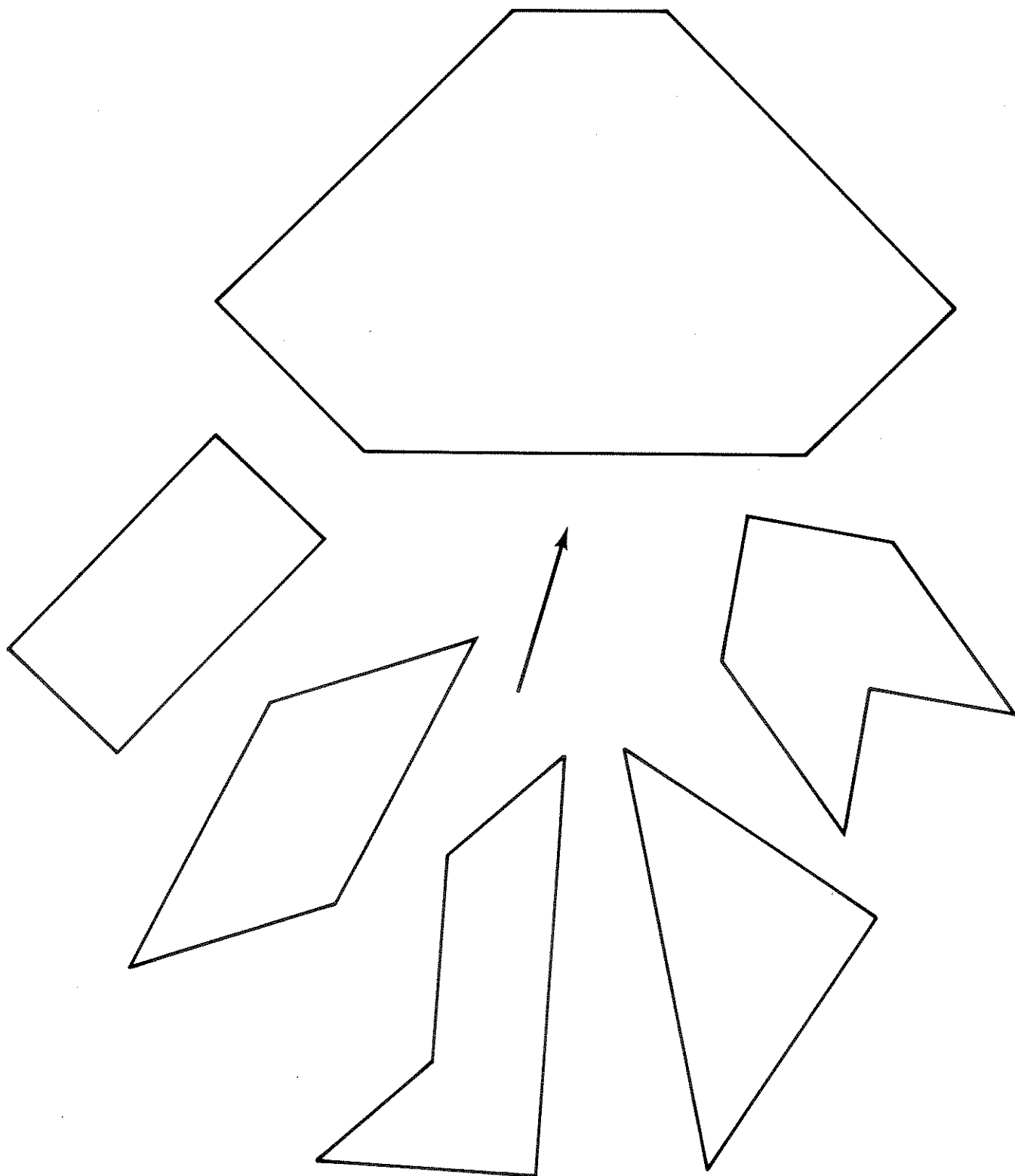


**SNAIL 2**

Use these SuperTangrams™ to solve the puzzle below.

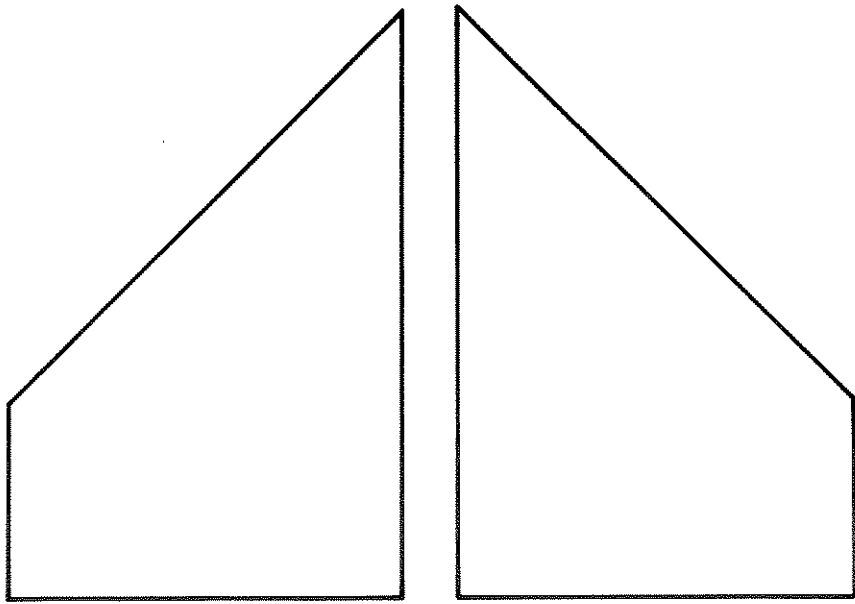
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## FLYING SAUCER



Solve the puzzles. Both shapes must be covered with SuperTangrams™  
at the same time.

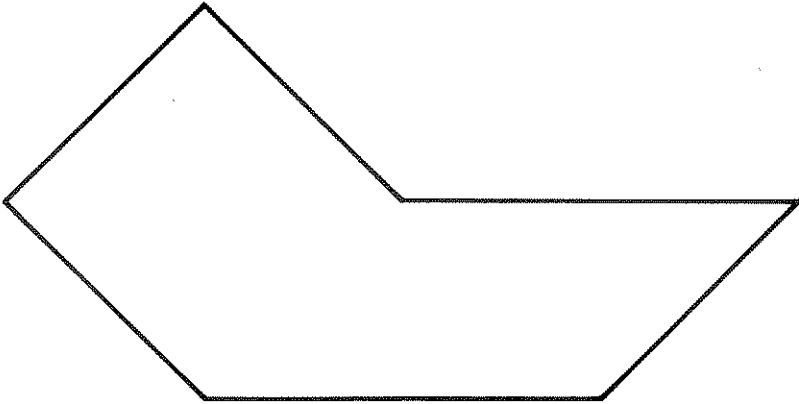
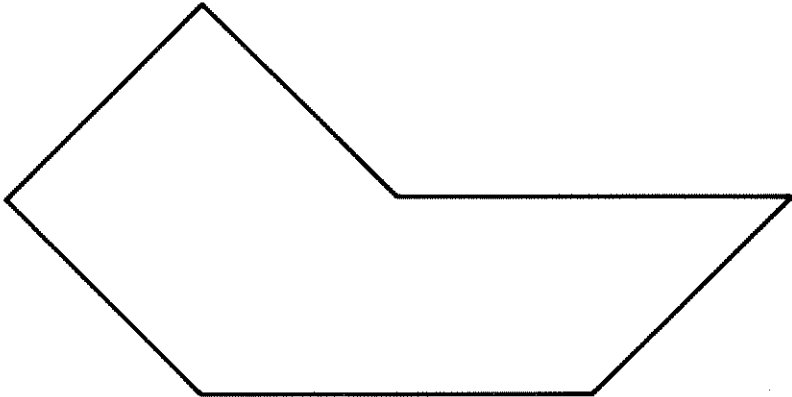
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**HOUSE**

Solve the puzzles. Both shapes must be covered with SuperTangrams™  
at the same time.

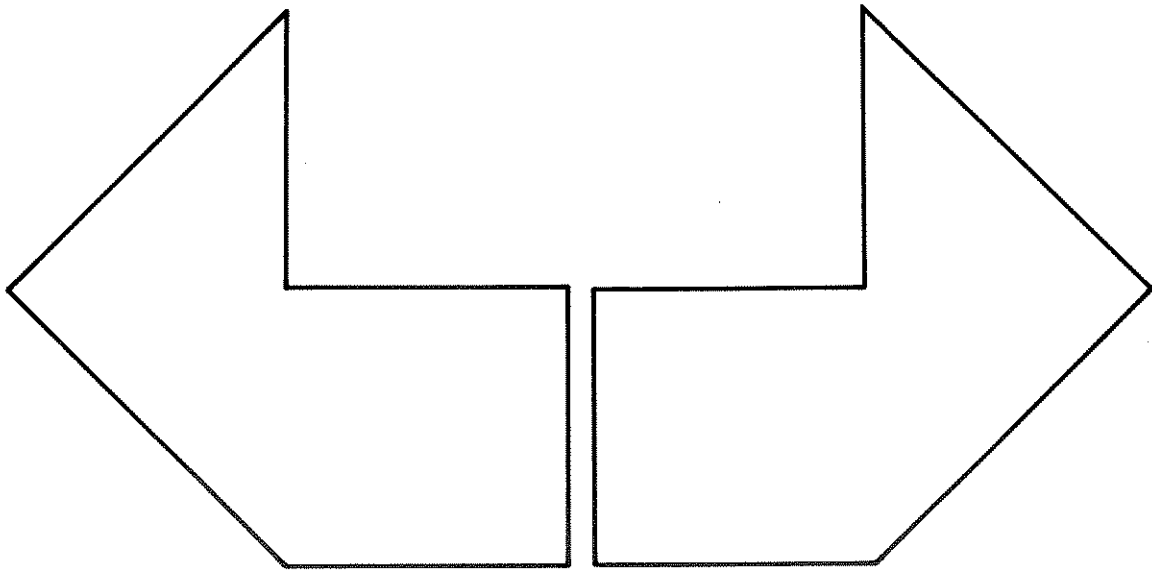
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**SOCKS**

Solve the puzzles. Both shapes must be covered with SuperTangrams™  
at the same time.

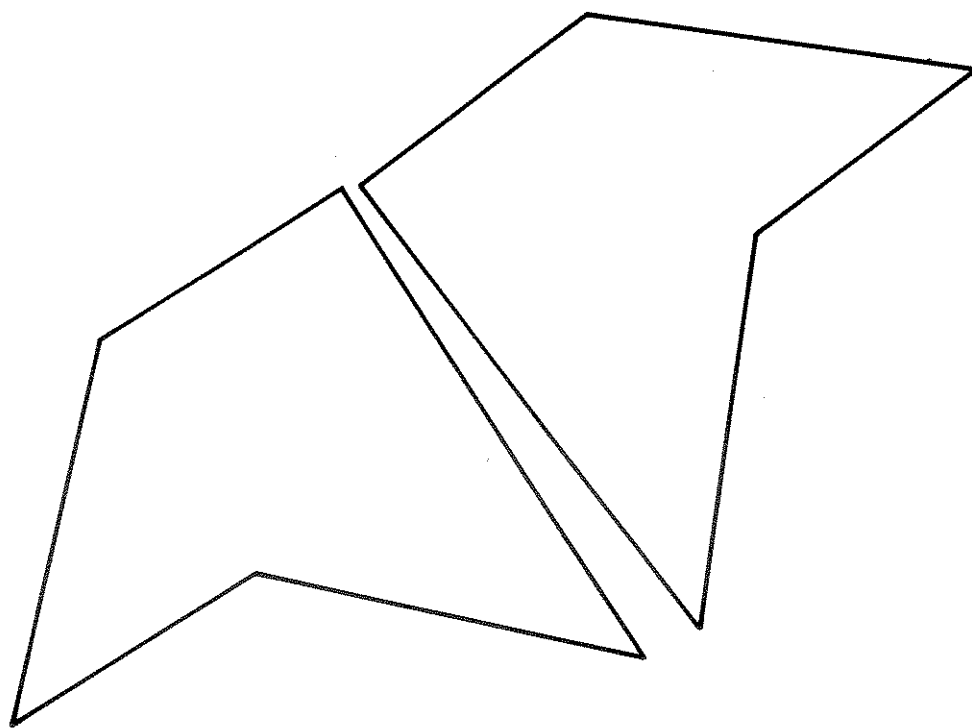
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**CANOE**

Solve the puzzles. Both shapes must be covered with SuperTangrams™  
at the same time.

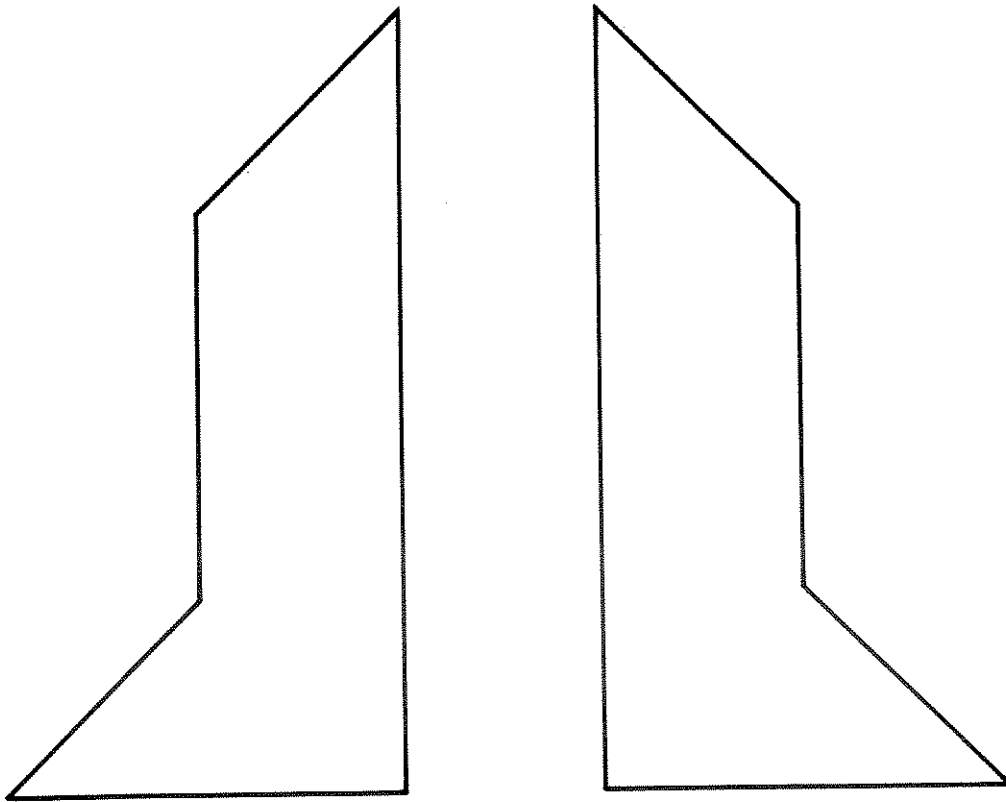
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**BAT**

Solve the puzzles. Both shapes must be covered with SuperTangrams™  
at the same time.

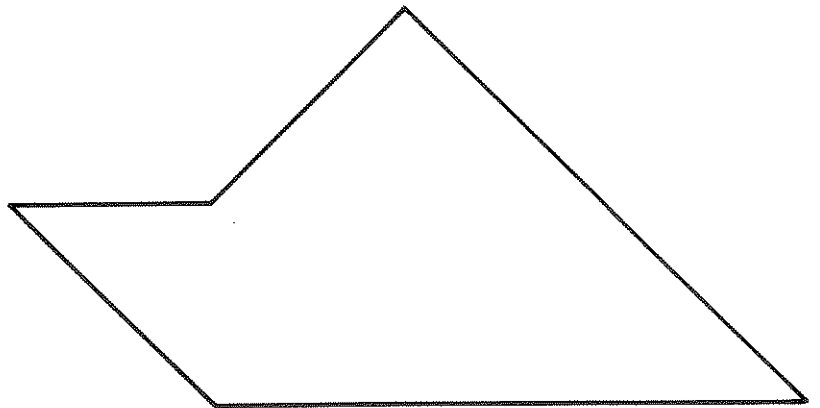
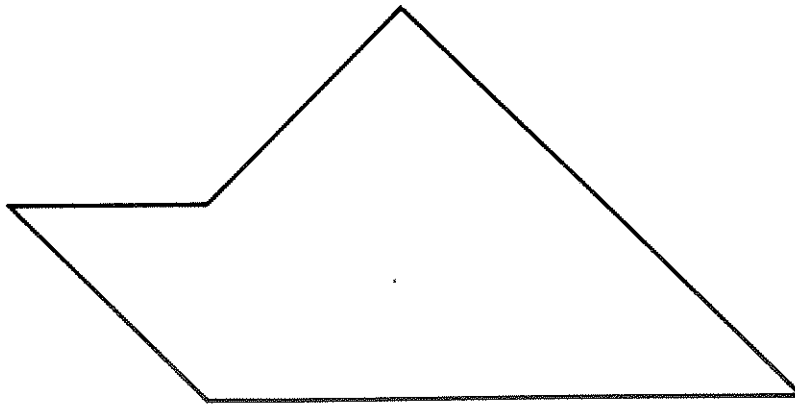
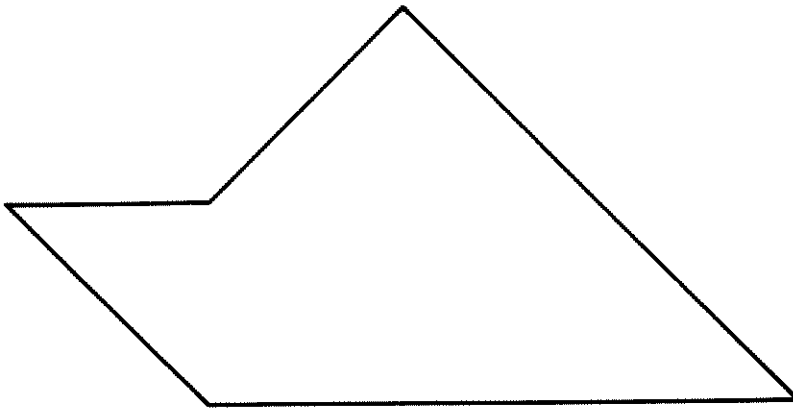
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**BOOTS**

Solve the puzzles. All the shapes must be covered with SuperTangrams™ at the same time.

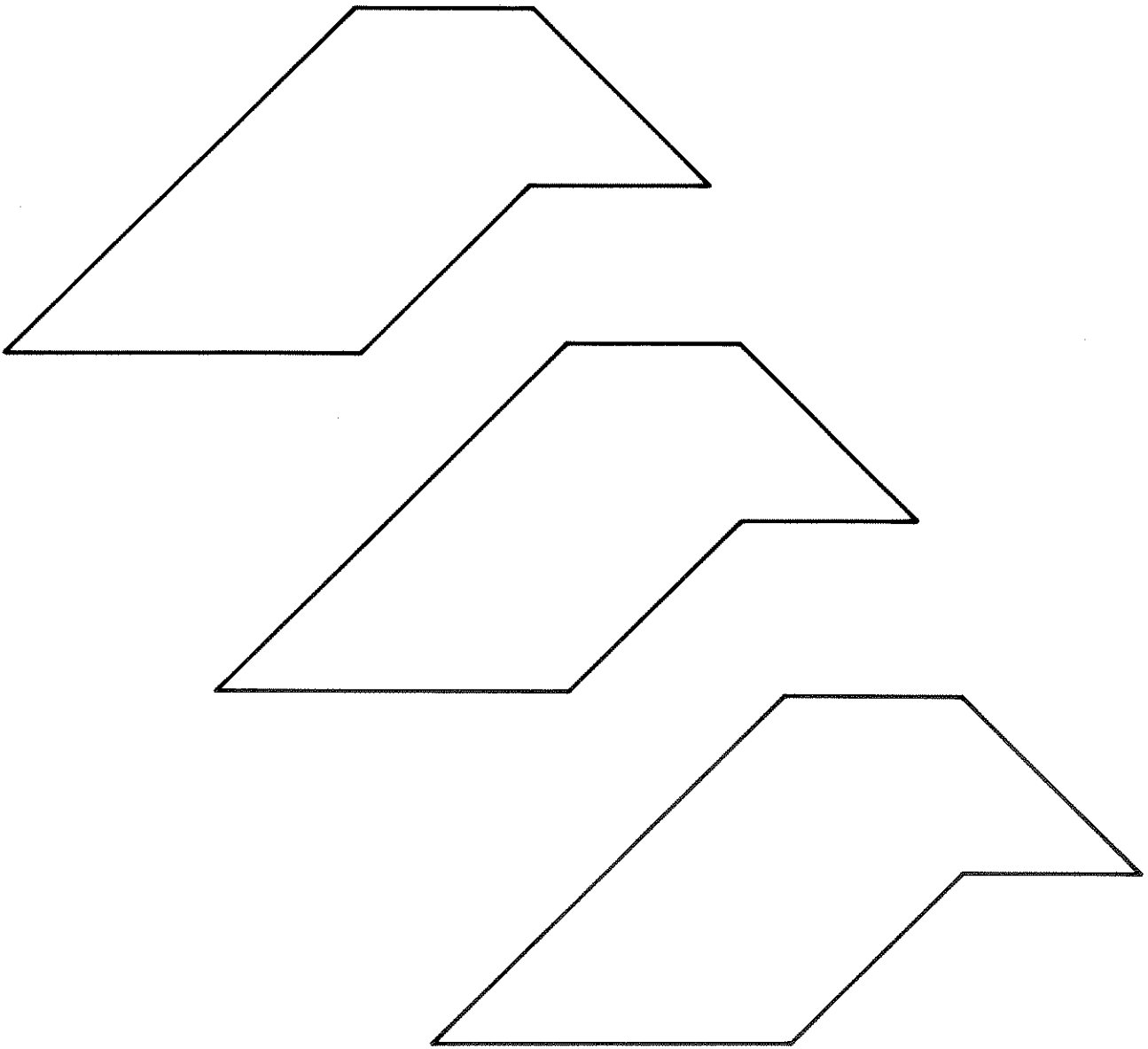
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**THREE TIMES TWO 1**

Solve the puzzles. All the shapes must be covered with  
SuperTangrams™ at the same time.

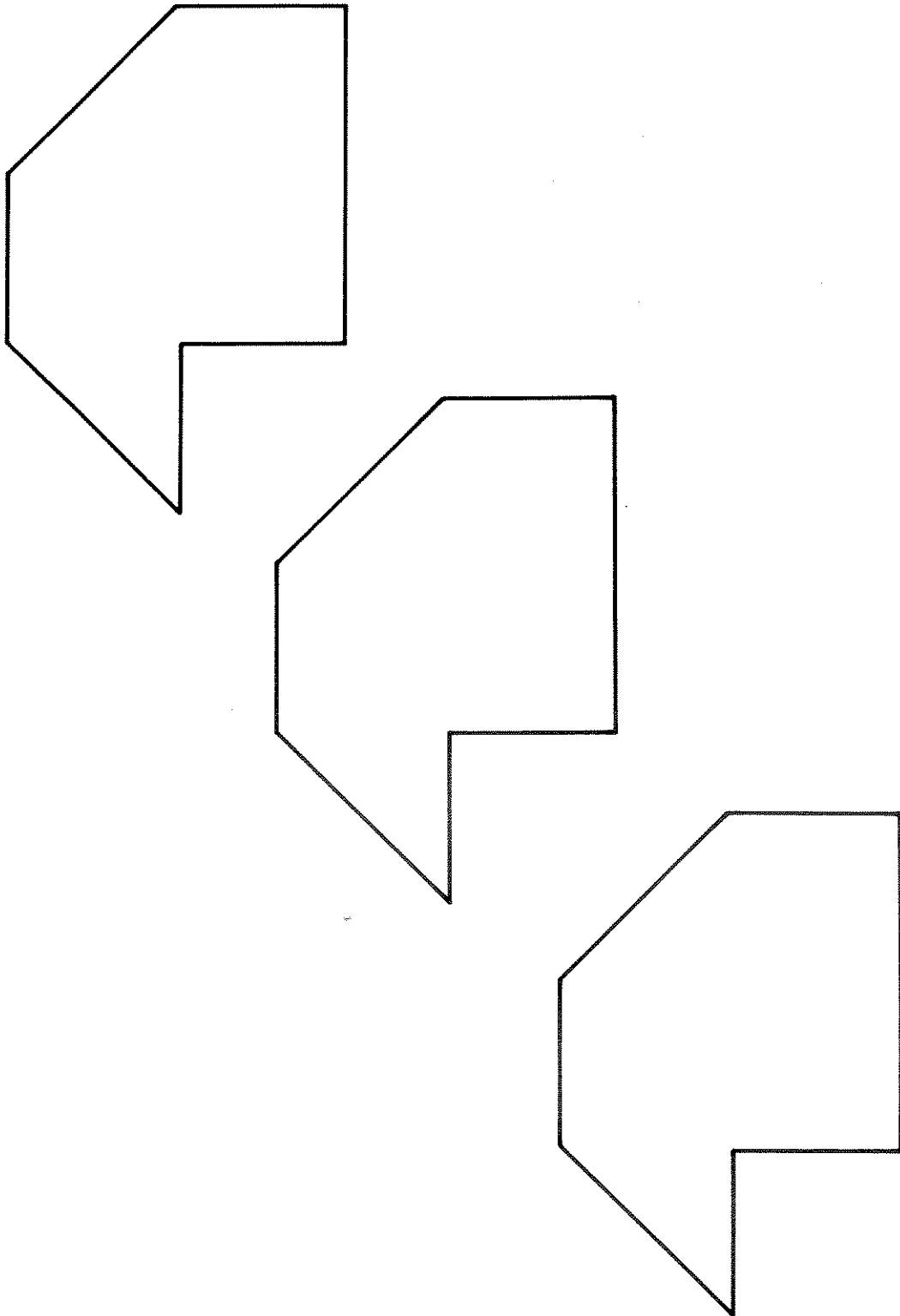
© Henri Picciotto, [www.picciotto.org/math-ed](http://www.picciotto.org/math-ed)



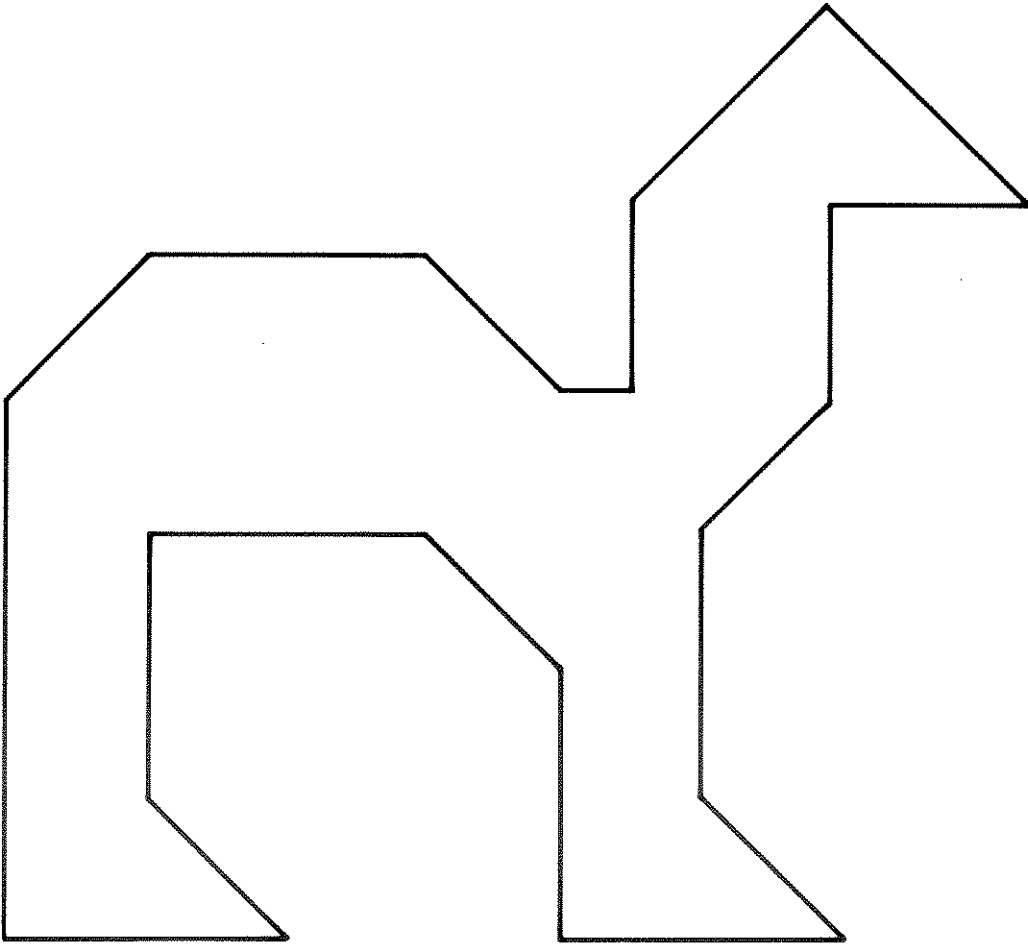
**THREE TIMES TWO 2**

Solve the puzzles. All the shapes must be covered with SuperTangrams™ at the same time.

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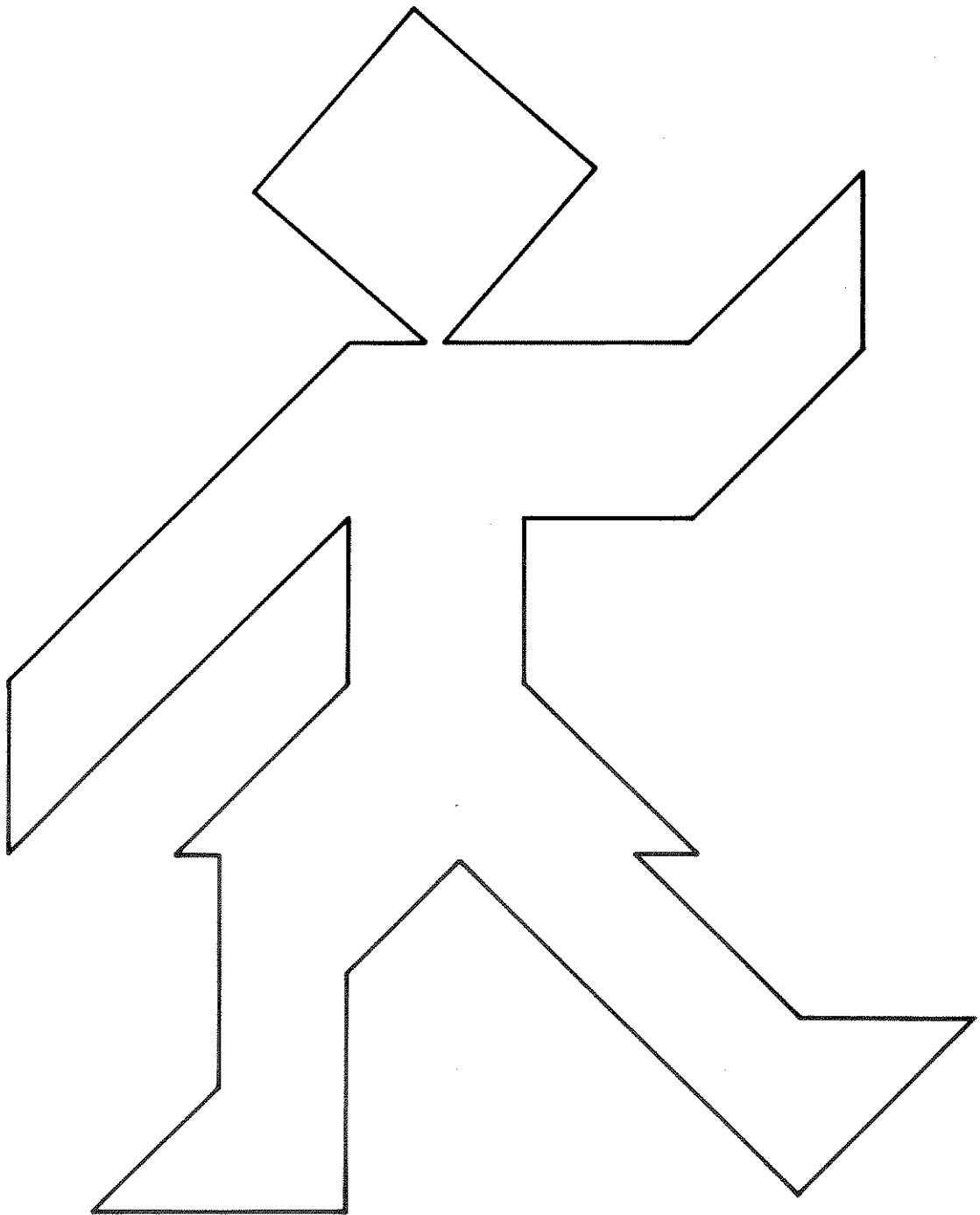


**THREE TIMES TWO 3**



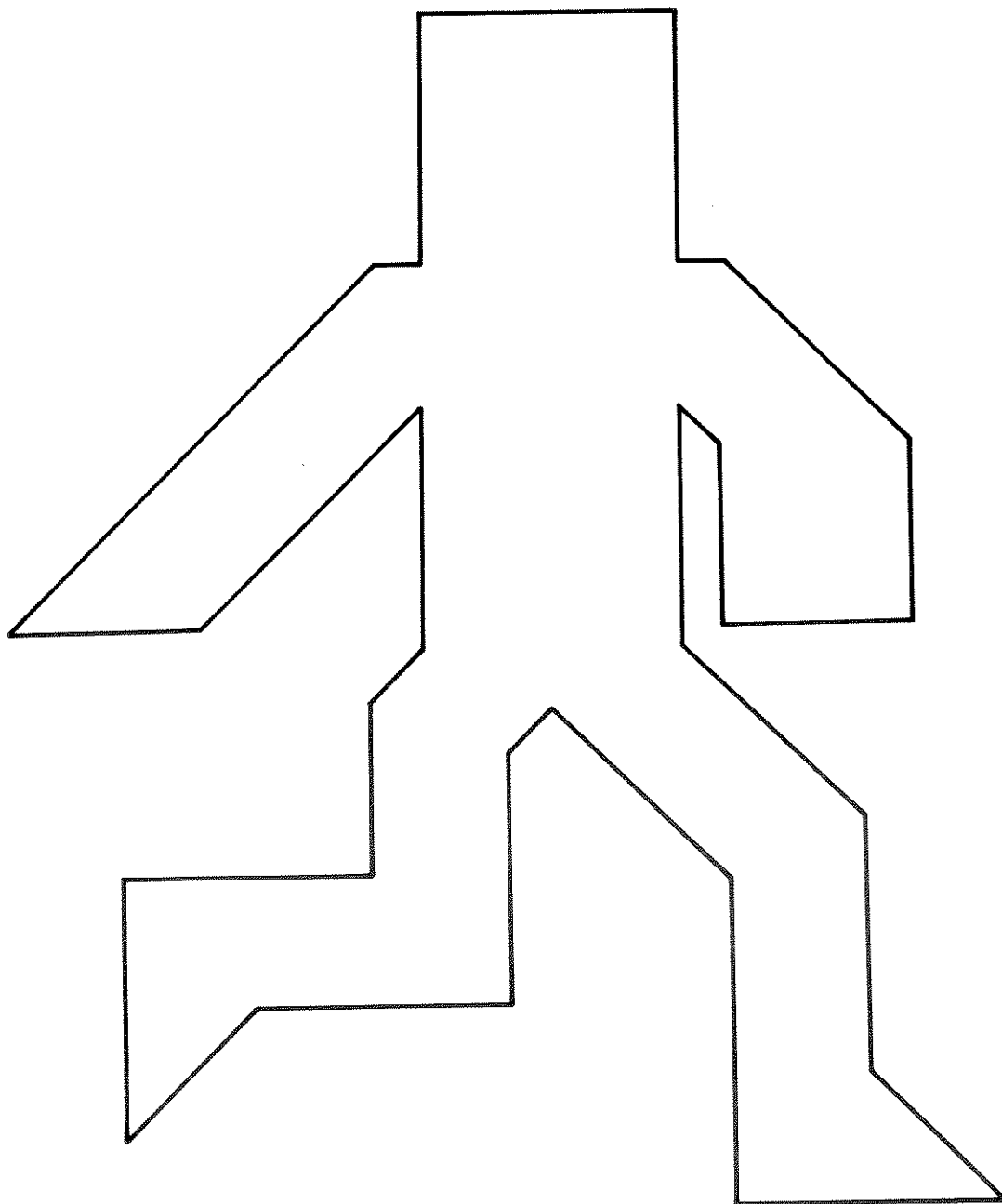
**CAMEL**

Solve the puzzle.



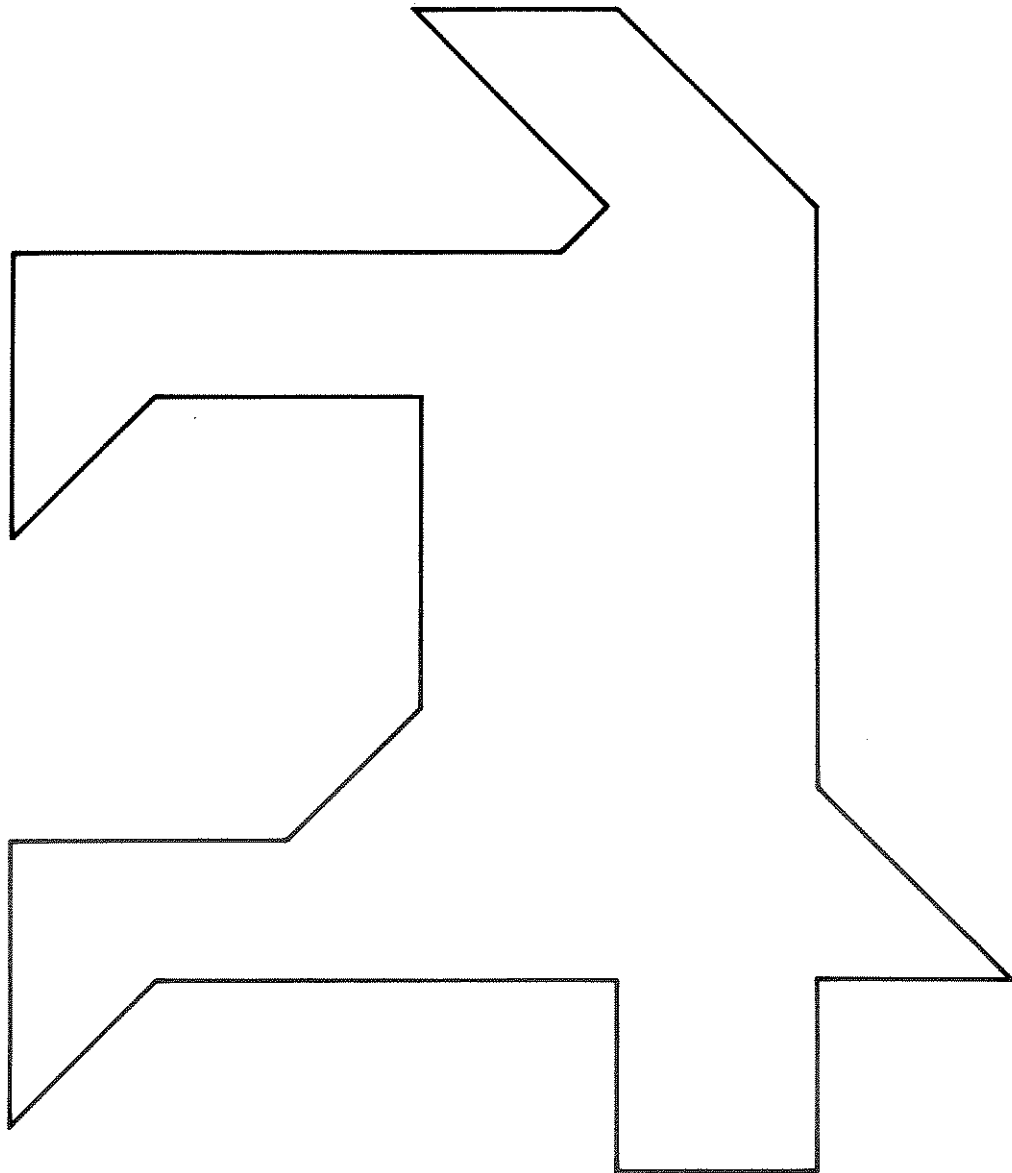
**GIRL**

Solve the puzzle.



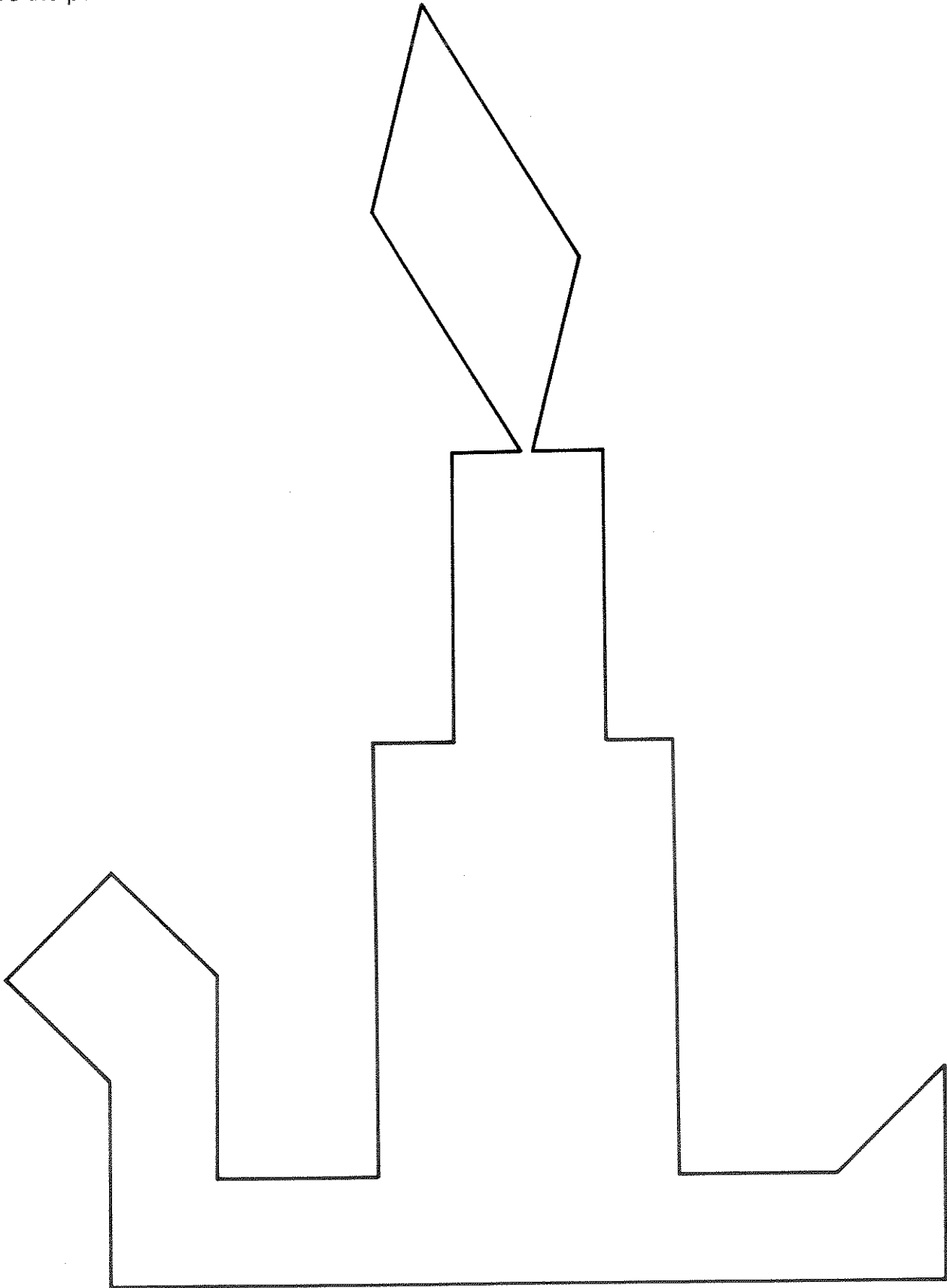
**BOY**

Solve the puzzle.



**DOG**

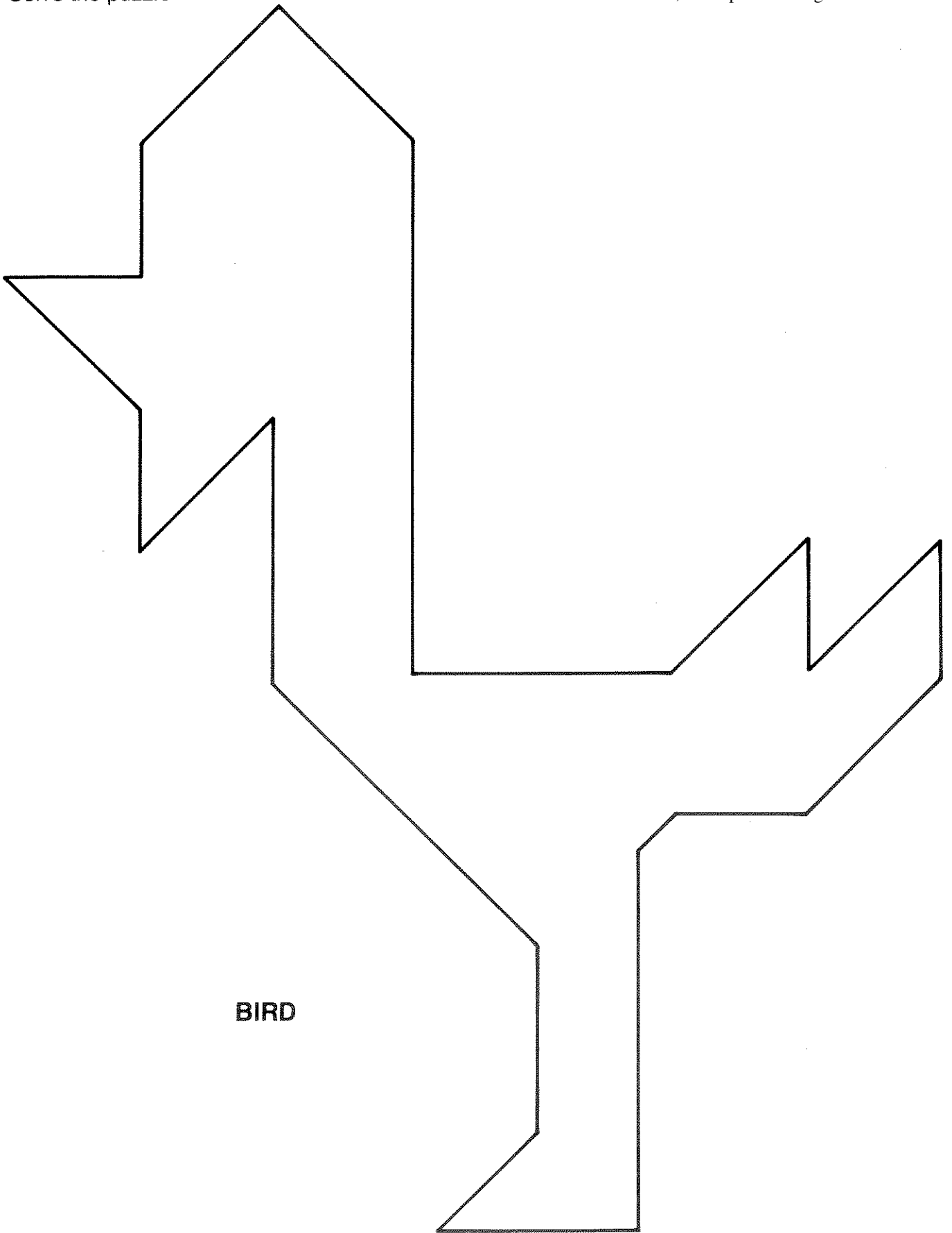
Solve the puzzle.



**CANDLE**

Solve the puzzle.

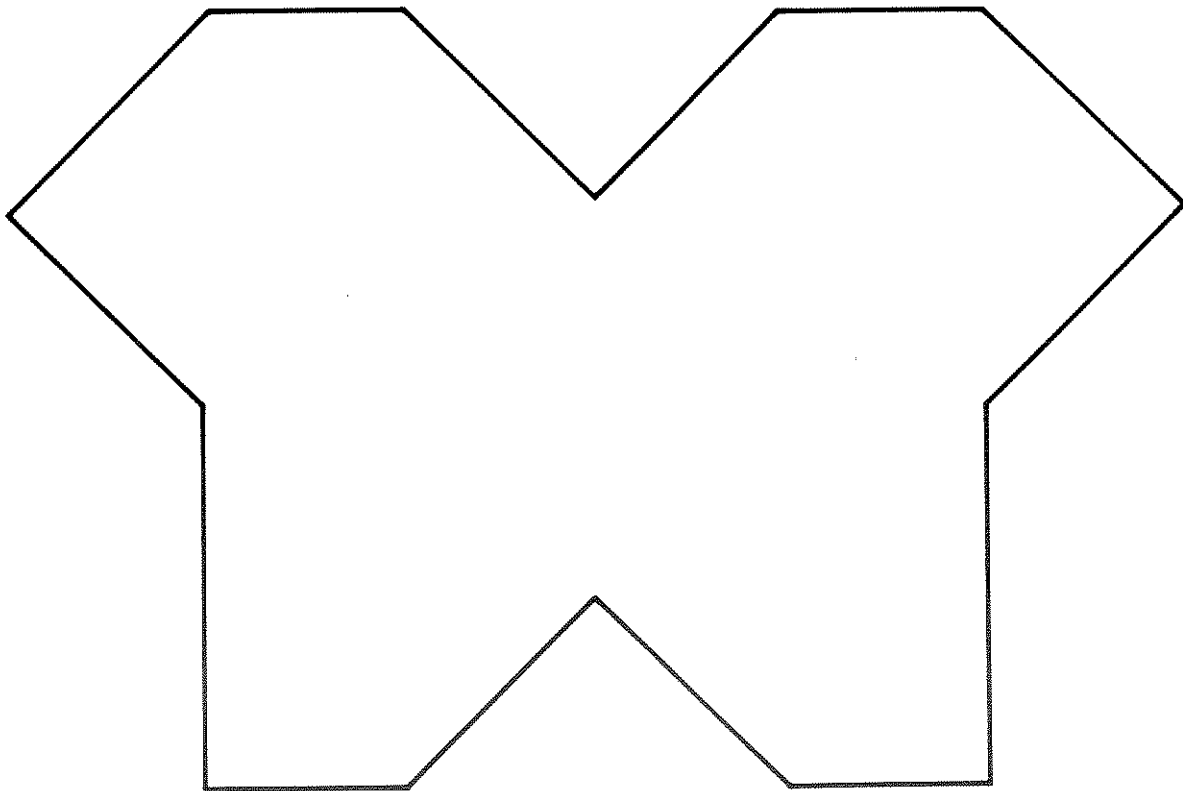
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**BIRD**

Solve the puzzle.

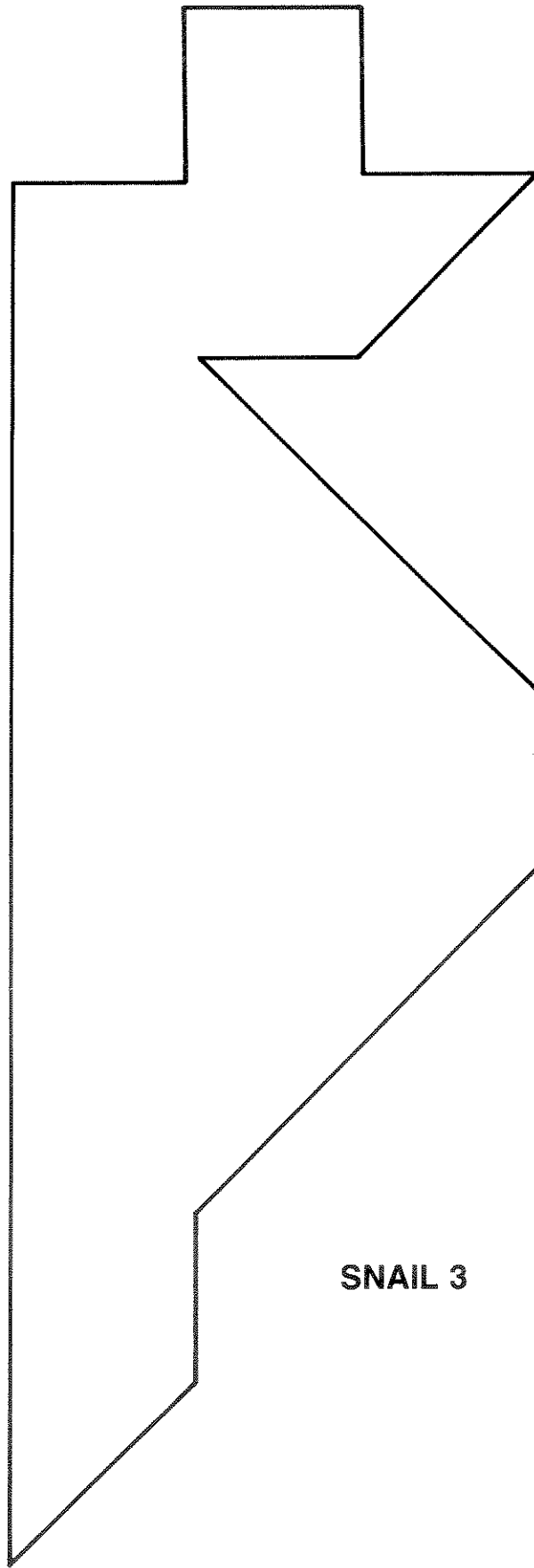
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**BUTTERFLY 2**

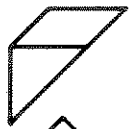
Solve the puzzle.

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**SNAIL 3**

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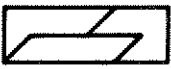
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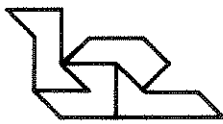
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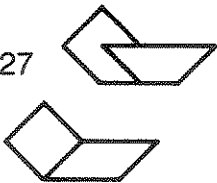
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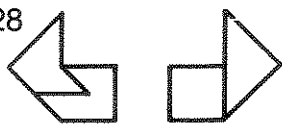
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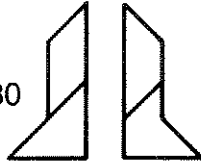


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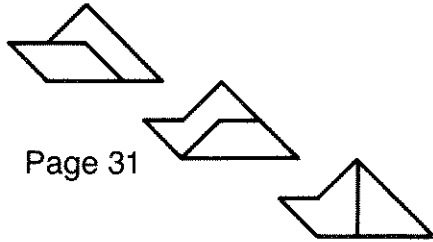


# SOLUTIONS

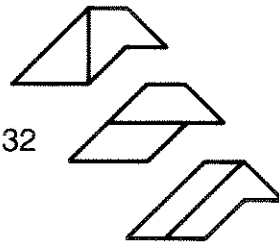
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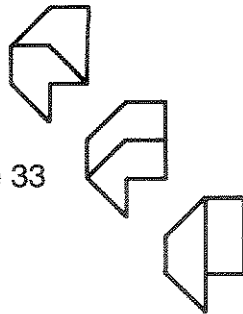
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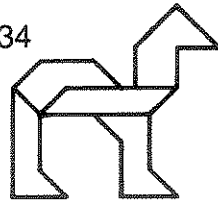
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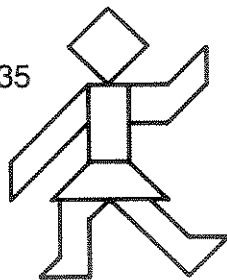
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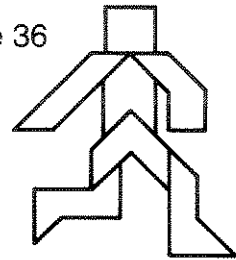
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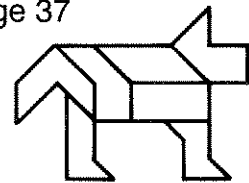
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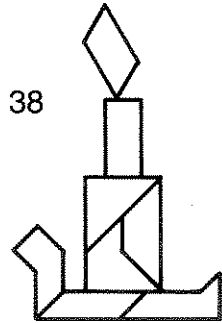
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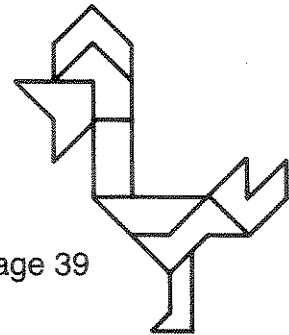
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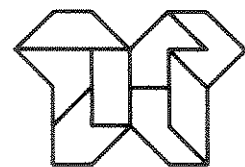
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