

Unit V: Geometric Shapes
Instructional Days 85-112

Enrichment Investigation #1

Common Core State Standard(s):

1.G.2

Standard(s) for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
4. Model with mathematics.
7. Look for and make use of structure.

Materials Needed:

- Blackline Masters
 - *Tables for the Party* Directions
 - *Tables for the Party* Ideas (2 pages)
 - *Tables for the Party* Grid Paper
 - *Tables for the Party* Reflection
 - *Tables for the Party* Answer Key
- Square and Triangle pattern blocks
- Markers or crayons

Instructions:

1. Students will arrange four square “tables” and four triangular “tables” to find ways to provide seating for exactly 20 people.
2. Students will find as many different ways as they can to combine the shape tables to accomplish their task.
3. Students will record their solutions by drawing them on grid paper.
4. Students will complete a reflection after they have finished their task.

Sources:

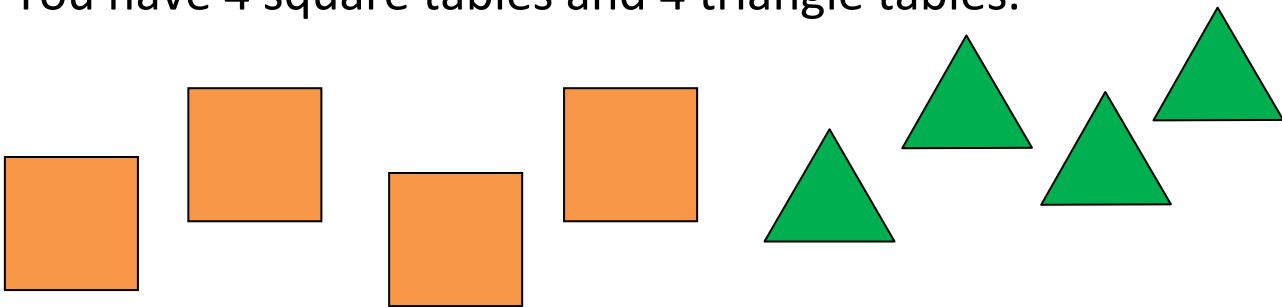
None

Tables for the Party

Directions

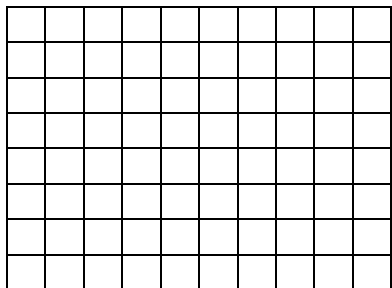
You and your friends will plan a party!

You have 4 square tables and 4 triangle tables.



Your job is to put the tables together so you have seats for **exactly 20 people**. You do not have to use all the tables.

Find all the different ways you can do this. Draw your answers on your grid paper.

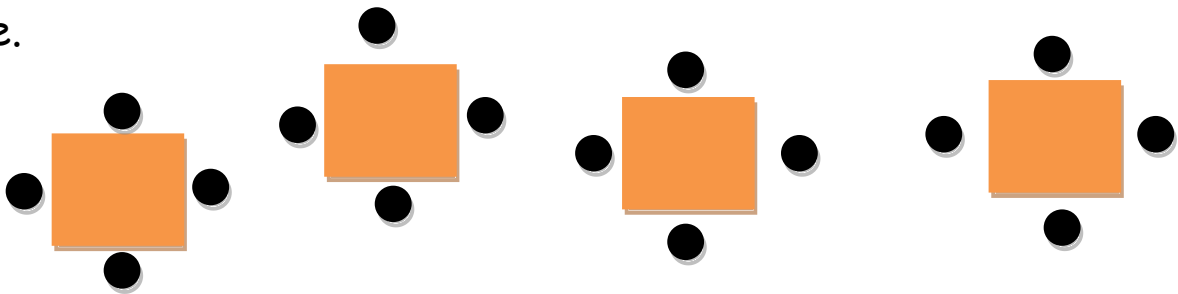


Tables for the Party Ideas

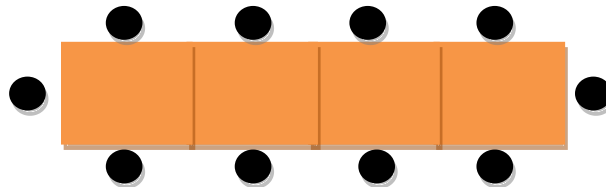


Here are some table ideas to help you.

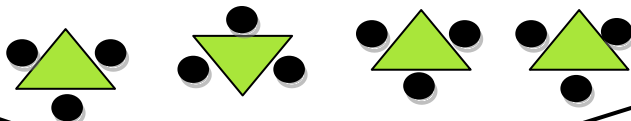
When put like this, the 4 square tables have room to seat 16 people.



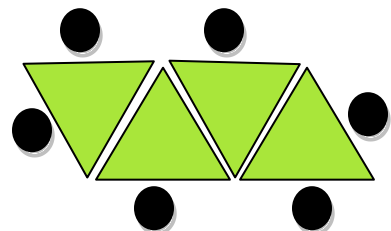
If you put the tables like this, there is only room for 10 people.



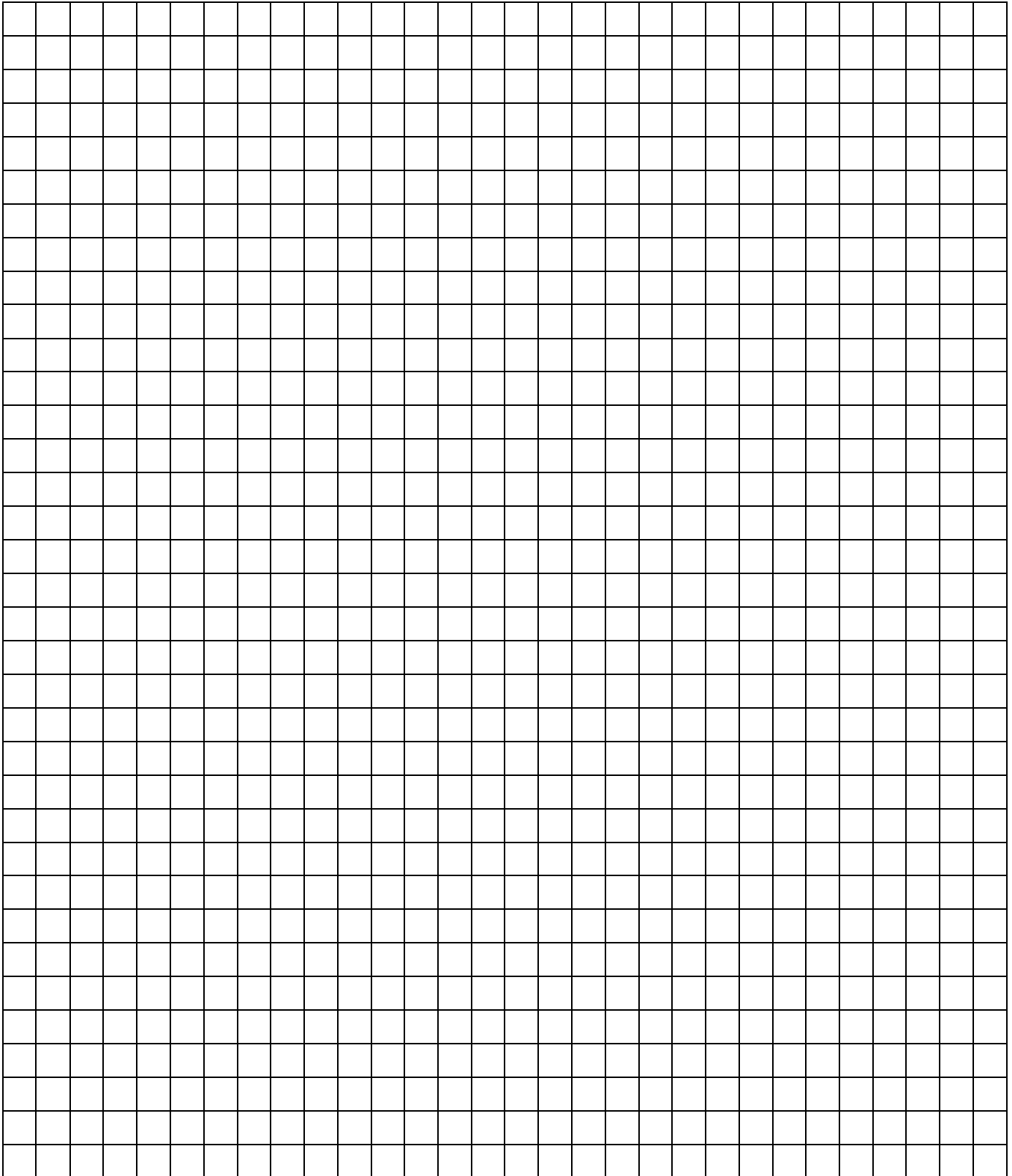
Each triangle table has room for 3 people, if it is by itself. So 4 of them will seat 12 people.



But push them together, and there is room for only 6 seats.



Tables for the Party Grid Paper



Tables for the Party Reflection



Directions: After you determine different ways to seat exactly 20 people at the party using 4 square tables and 4 triangle tables, think about and answer the following questions:

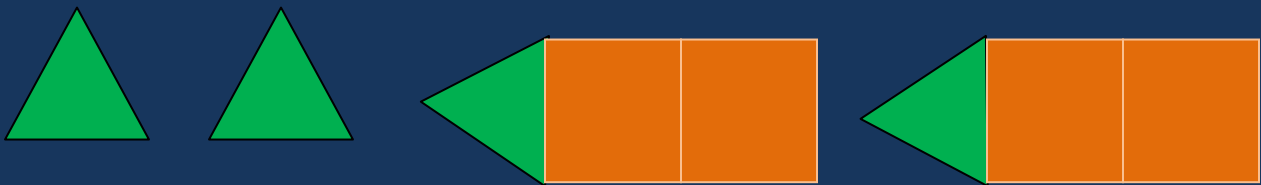
1. How many different ways did you arrange your tables?
2. What was the least amount of tables you used to seat exactly 20 people?
3. What was the greatest amount of tables you used to seat exactly 20 people?
4. How did you determine if you found all the different ways to arrange the tables?
5. Did you create any new shapes by putting tables together? If yes, what shapes did you create?

Tables for the Party

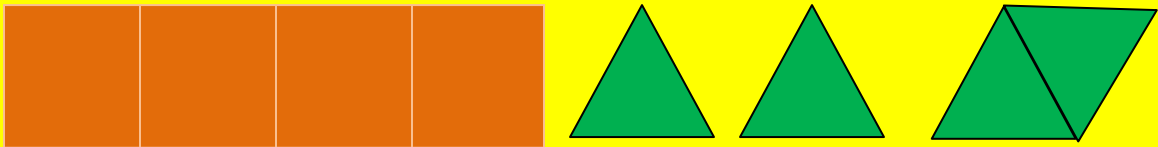
Answer Key

Here are four possible solutions to the table arrangement task (there are others).

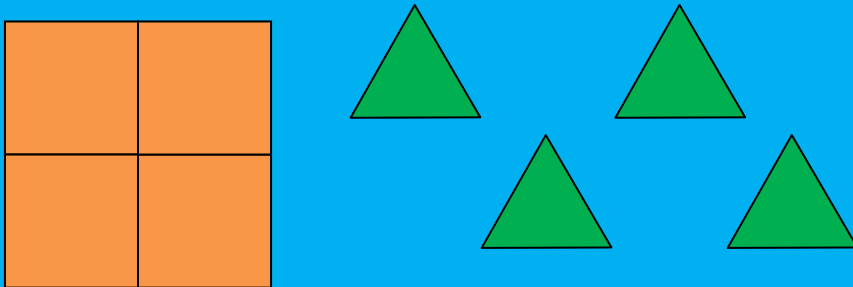
1)



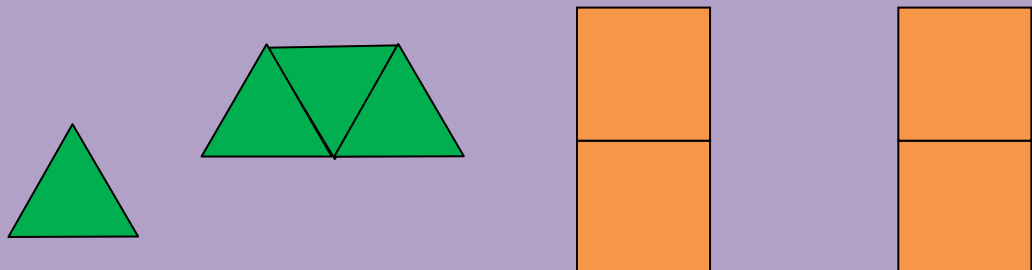
2)



3)



4)



Unit V: Geometric Shapes
Instructional Days 85-112

Enrichment Investigation #2

Common Core State Standard(s):

1.G.1

Standard(s) for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
4. Model with mathematics.
7. Look for and make use of structure.

Materials Needed:

- Blackline Masters:
 - *Sandwiches for the Party* Introduction Sheet
 - *Sandwich Halves* Planning Guide
 - *Cutting Sandwiches in Half* Record Sheet
- *Sandwich Halves* Answer Key
- Color Tiles (need two different colors)
- Markers, crayons, and/or pencils

Instructions:

1. Students will partition square sandwiches into halves.
2. Students will find as many different ways as they can to combine the halves of sandwiches to create whole sandwiches.
3. Students will record their solutions on the Record Sheet.

Source:

Aligns with Instructional Days 110 and 111

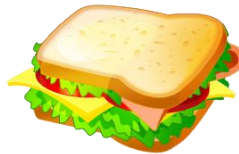
Sandwiches for the Party

You and your friends will plan a party!



Your job is to make sandwiches for the party.

Since some people may not like the same thing, you want to use 4 different kinds of sandwich.



You want everyone to have as much choice as they can, so you cut all the sandwiches into two parts. Each part is half of a sandwich.

What are all the different ways that someone can make a whole sandwich from 2 halves of the different kinds of sandwich you make for the party?

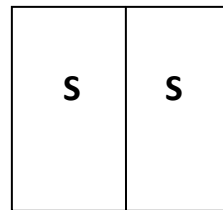
Use the *Cutting Sandwiches in Half* Record Sheet to show all these different ways.

Sandwich Halves Planning Guide

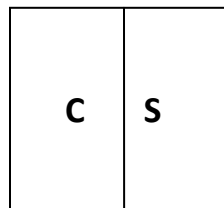
Some people might want all of the halves to be the same kind of sandwich. They would have a whole sandwich that is all the same. Other people might want one half of each sandwich to be a different flavor. They would have one half of one flavor and another half of a different flavor.

For example, imagine that your 4 kinds of sandwiches are snail, carrot, lemon, and mud.

Someone might want a whole snail sandwich, so she gets 2 snail halves.

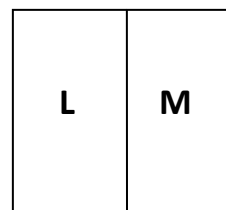


Another person likes carrot sandwiches, but he wants to try snail. So he gets 1 carrot half and 1 snail half.



There might even be someone there who likes adventure, and so decides to try two halves of different flavors.

This person might want to make their whole sandwich so that it is one half lemon sandwich and one half mud sandwich.



On the *Cutting Sandwiches in Half* Record Sheet, show all the different ways to combine 2 halves of a sandwich to make a whole sandwich. Try to find every possible way to do this.

Cutting Sandwiches in Half

Record Sheet





Sandwich Halves

Answer Key

Sandwich Combinations for sandwich types Snail (S), Carrot (C), Lemon (L) and Mud (M).

(Students may choose flavors other than these.)

S/S	C/C	L/L	M/M
S/C	C/L	L/M	
S/L	C/M		
S/M			

There are 10 different ways to combine these.

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Enrichment Investigation #3

Common Core State Standard(s):

1.G.1

Standard(s) for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.

Materials Needed:

- Blackline Masters
 - *Which One Doesn't Belong* activity sheets (3 pages)
 - *Make Your Own Shape Cards* Directions
 - *Make Your Own Shape Cards* Templates
- Pattern blocks (one of each per student pair: square, triangle, trapezoid, hexagon, blue rhombus and tan rhombus)
- Brown bags (one per student pair)
- Old magazines that can be cut up
- Scissors
- Glue, paste, or glue sticks
- Index Cards (Optional)

Instructions:

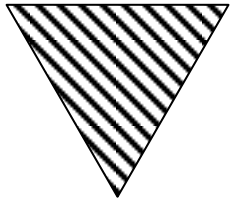
1. Students will work in pairs.
2. Pattern blocks will be placed in a brown paper bag, one bag per pair of students. One student from each pair will reach into the bag and pull out 3-4 blocks. The student will describe the blocks to the partner in terms of attributes, and decide which one doesn't belong and explain why.
3. The student will put the blocks back in the bag and the other partner will now take a turn and perform the same tasks as the first student. Students will each take several turns.
4. Students will complete the *Which One Doesn't Belong* activity sheets. Students will choose the shape that does not belong and describe how the shape is different. **Note: Each of these will have several possible answers. Accept all answers that fit the pictures.**

5. Students will create their own Shape Cards using pictures cut from the magazines. They will trade them with a partner to solve and discuss.

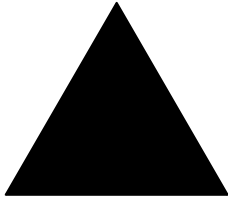
Source:

Adapted from an activity from the *Georgia Department of Education*.

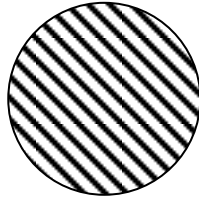
Which One Doesn't Belong?
(Number One)



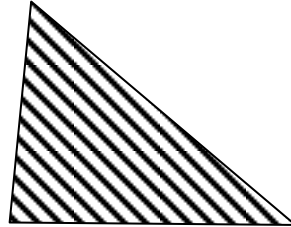
A



B



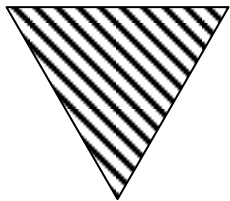
C



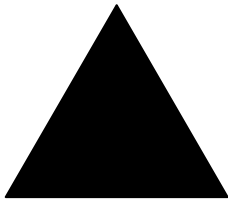
D

Shape _____ does not belong because _____

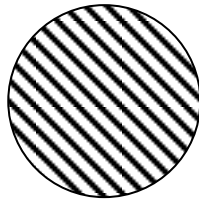
Could you choose a different shape to be the one that does not belong?



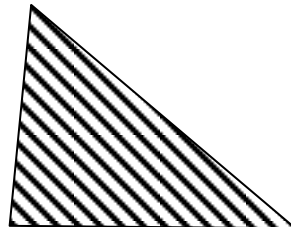
A



B



C



D

Shape _____ does not belong because _____

Which One Doesn't Belong?
(Number Two)



A



B



C



D

Shape _____ does not belong because _____

Could you choose a different shape to be the one that does not belong?



A



B



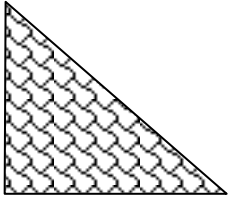
C



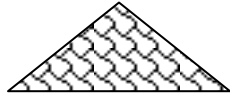
D

Shape _____ does not belong because _____

Which One Doesn't Belong?
(Number Three)



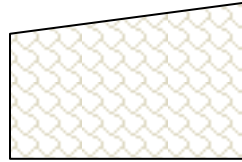
A



B



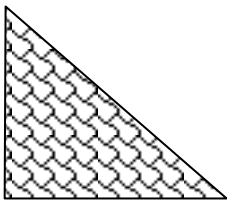
C



D

Shape _____ does not belong because _____

Could you choose a different shape to be the one that does not belong?



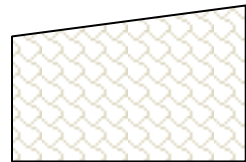
A



B

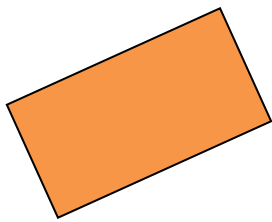


C

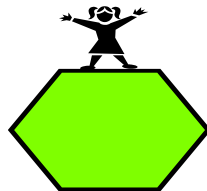
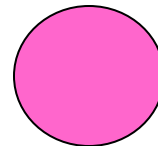


D

Shape _____ does not belong because _____



Make Your Own Shape Cards

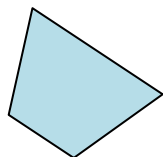


Now it's your turn to make some shapes puzzles.

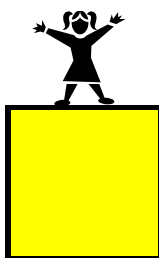
1. Look in the magazines and cut out lots of shapes from real world pictures.



2. Use these shapes to make your own puzzle cards. Take the shapes you cut out and glue them to the Shape Cards Template or index cards to make your own shape puzzles.



3. Trade cards with a partner to find the shape that does not belong. Talk about why you picked that shape and why it does not fit with the other ones.



Make Your Own Shape Cards Templates

Paste Shape Here	Paste Shape Here	Paste Shape Here	Paste Shape Here
A	B	C	D
Shape _____ does not belong because _____			

Paste Shape Here	Paste Shape Here	Paste Shape Here	Paste Shape Here
A	B	C	D
Shape _____ does not belong because _____			

Answer Key: Which One Doesn't Belong?

Number One

Possible answers include:

- Shape C doesn't belong because it is a circle and the others are all triangles.
- Shape C doesn't belong because it is not a polygon but all the others are polygons.
- Shape B doesn't belong because it is solid black and the others all have stripes.
- Shape D doesn't belong because all the other ones are regular shapes and D is a funny triangle.

Number Two

Possible answers include:

- Shape D doesn't belong because it has six sides (or angles/corners) and the others just have four sides.
- Shape D doesn't belong because it is a hexagon and the others are quadrilaterals.
- Shape C doesn't belong because it has a different airplane from all the others.
- Shape C doesn't belong because it has unequal sides but all the other shapes have all equal sides.
- Shape A doesn't belong because it has an angle/corner on the bottom and all the others have a flat side on the bottom.
- Shape B doesn't belong because it is the only one with square corners.
- Shape B doesn't belong because it is the only one that doesn't have slanted sides.

Number Three

Possible answers include:

- Shape C doesn't belong because it has all equal sides and none of the other shapes have all equal sides.
- Shape C doesn't belong because it doesn't have any slanted (diagonal) lines, but all the other shapes do.
- Shape C doesn't belong because the bottoms of all the others are 3 cm, but the bottom of C is shorter than that. (This answer was suggested by a second grader.)
- Shape B doesn't belong because it doesn't have any square corners, but all the others have at least one.

Unit V: Geometric Shapes

Instructional Days 85-112

Enrichment Investigation #4

Common Core State Standard(s):

1.G.1

Standard(s) for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
7. Look for and make use of structure.

Materials Needed:

- Blackline Masters
 - How to Play Polygon Rummy
 - Polygon Rummy Cards
- Scissors
- Plastic Bag (store each set of Rummy cards)
- Glue
- Paper

Instructions:

1. Prior to this investigation, cut out the Rummy Cards. You may have students cut them out if needed.
2. Students will work in pairs or groups of three or four to play *Polygon Rummy*.
3. Students will analyze cards that will have either the name of a polygon, a picture of a polygon, or a description of a polygon's attributes in order to determine which cards go together.
4. Students will discuss the different matches made by each other in order to evaluate the accuracy of a match.
5. Optional Assessment: Have students select and glue 2-3 matches (can be from other players) on a piece of paper to prove why the cards match, using pictures and words. They can also prove and/or disprove another player's matches.

Source:

Adapted from an activity from the Georgia Department of Education.

How to Play Polygon Rummy

For a game with 2 players: Each player gets 12 cards.

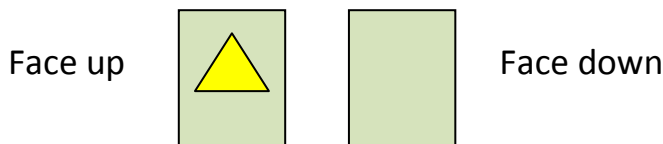
For a game with 3 or 4 players: Each player gets 9 cards.

Object: To be the player with the most matches at the end of the game.

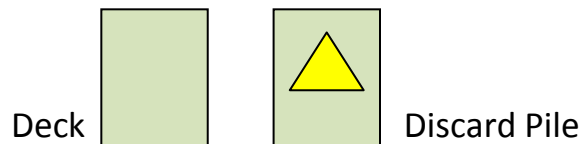
1. Choose a person to pass out the cards (the **dealer**).



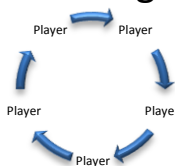
2. The dealer passes out the correct number of cards face-down to all the players, including the dealer. The group of cards that each player has is called the player's **hand** (think of a **hand** full of cards). *Once the cards have been dealt, you may want to place your hand of cards on the table to help you see them better.*



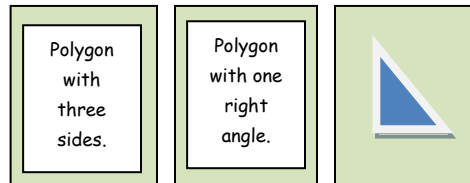
3. The rest of the cards (called **the deck**) are put face down in a stack in the middle of the table. The dealer takes one card from the deck and puts it face-up next to the deck. This will be the **discard pile**.



4. The player who sits to the left of the dealer goes first. The players all take turns in order, with the next turn going to the person to the left.

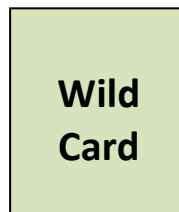


5. The player with the first turn takes one card from the deck or can take the top card of the discard pile. If the player has three cards that match, he puts the matching cards face-up together on the table in front of him. *The three card match can be any arrangement, but you cannot use the exact same cards.* Then the player discards one card from his hand by putting it face-up on the discard pile. This is the end of his turn.



****Note:** Once you make a three card match, you will need to **prove** why you put the cards together. This can be done with words and drawings. The other players may **ask you questions** about your matches, so be prepared to talk about them.

6. Wild cards may be used to make a 3-way match with any other two matching cards.



7. Players keep taking turns until all of the cards in the deck are gone or a player has “gone out,” which means a player has used all the cards in his/her hand.

The player with the most matches laid on the table is the winner.

Polygon Rummy Cards

Polygon
with all
equal
sides.

Polygon
with only
two equal
sides.

Polygon
with all
equal
sides.

Polygon
with only
two equal
sides.

Polygon
with three
equal
sides.

Polygon
with three
equal
sides.

Polygon
with three
sides.

Polygon
with three
sides.

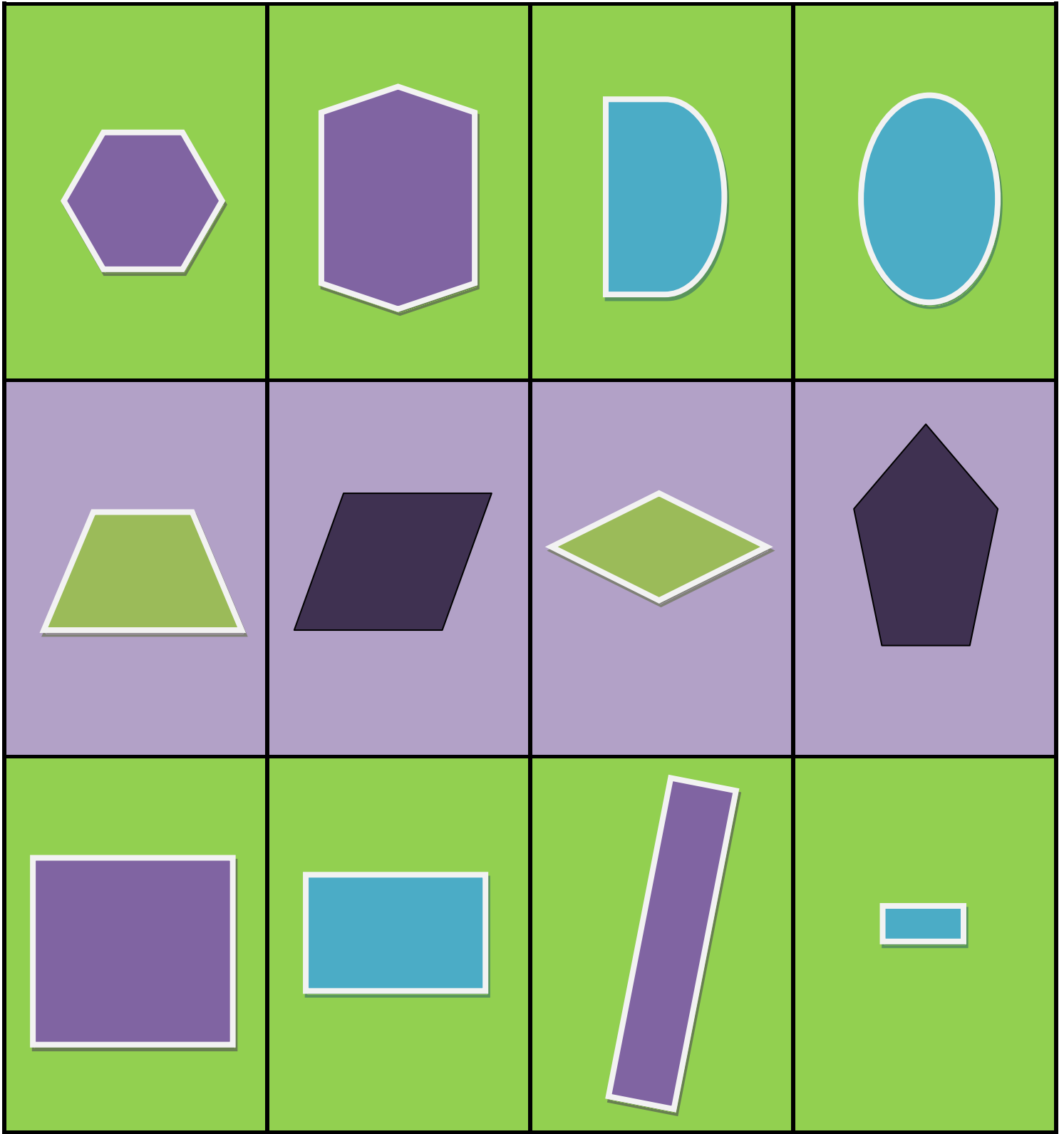
Polygon
with two
pairs of
equal sides.

Polygon
with two
pairs of
equal sides.

Polygon
with two
right angles

Polygon
with two
right angles

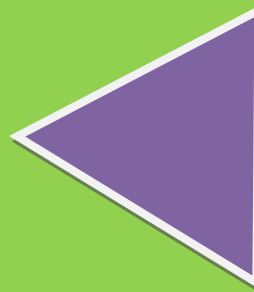
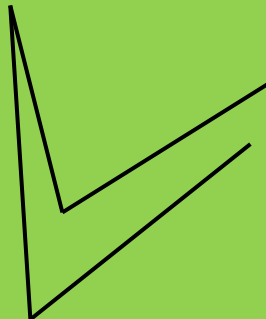
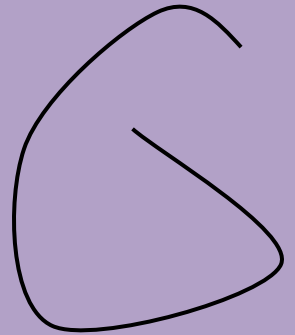
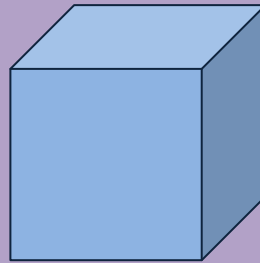
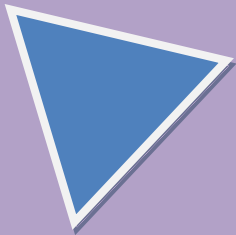
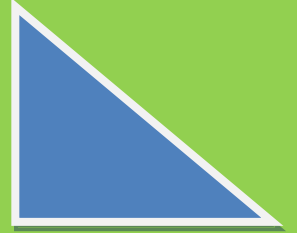
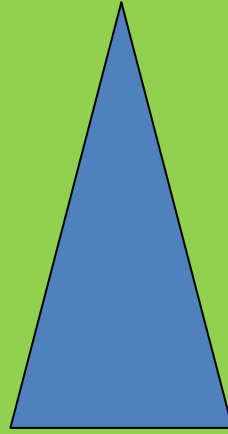
Polygon with right angles	Polygon with right angles	Polygon with no right angles	Polygon with no right angles
Polygon with four sides	Polygon with four sides	Polygon with five sides	Polygon with five sides
Polygon with six sides	Polygon with six sides	Not a polygon	Not a polygon

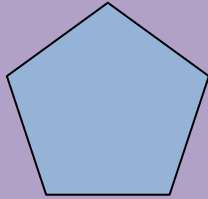
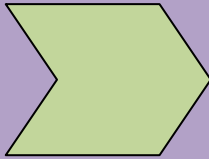
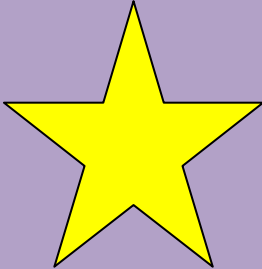
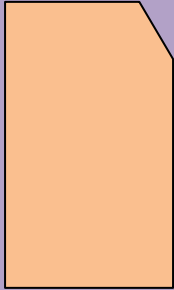


Square	Square	Rectangle	Rectangle
Circle	Oval	Pentagon	Hexagon
Hexagon	Trapezoid	Trapezoid	Triangle

Triangle

Triangle



Open figure	Open figure	Has curved sides	Has curved sides
3-D figure	3-D figure	Wild Card	Wild Card
			

Unit V: Geometric Shapes
Instructional Days 85-112

Enrichment Investigation #5

Common Core State Standard(s):

1.G.2

Standard(s) for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
7. Look for and make use of structure.

Materials Needed:

- Blackline Masters
 - *Crazy Fives!* Directions
 - 1-inch grid paper
 - *Crazy Fives!* Make a Square and Rectangle
- Square-inch tiles or 1-inch square pattern blocks
- Scissors
- *Crazy Fives!* Answer Key

Instructions:

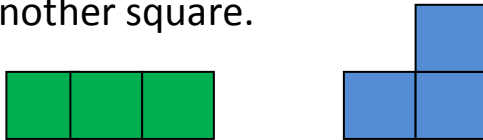
1. Students will work individually or in pairs to explore different ways to arrange five squares according to the directions on the activity sheet. They will be creating pentominoes, which are plane geometric figures formed by joining 5 squares edge to edge.
2. Students will rearrange square inch tiles to create new polygon shapes. Students should draw their designs on grid paper, outlining the outside sides of each. There are a total of 12 possible pentominoes.
3. Students should cut out each pentomino, writing the name of the new polygon on the back.
4. Students will rearrange the pentominoes in order to form a square and/or a rectangle. Then they should trace and color the squares on the square and rectangle grids to show how they made each shape.

Source:

Adapted from an extension activity from Silver Burdett Ginn, *Mathematics, Grade 5*

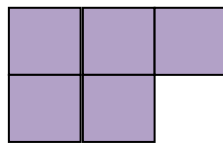
Crazy Fives! Directions

There are only 2 ways to join 3 squares so that each square shares at least one side with another square.



There are MANY ways to join 5 squares so that each square shares at least one side with another square, and all the squares are together.

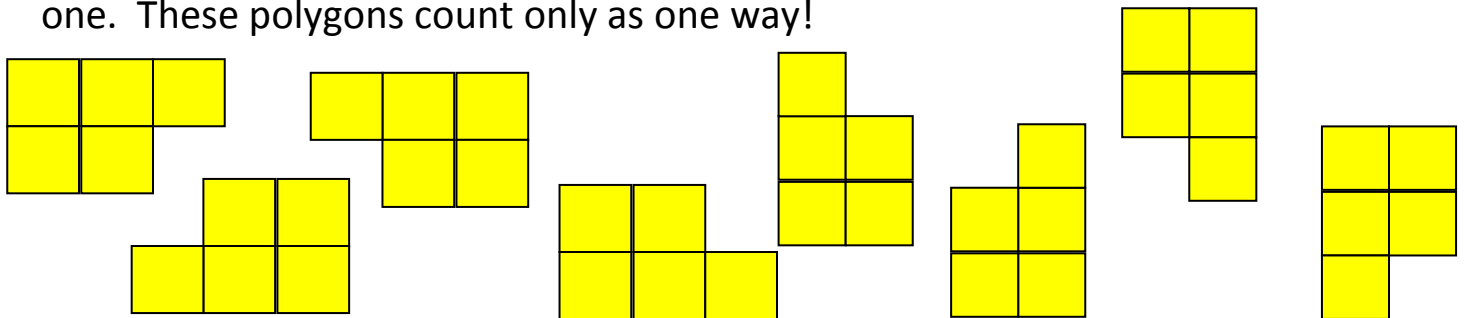
Here is one way to do it.



Use the square-inch tiles to create all the different ways you can put 5 squares together so that each square shares a side with at least one other square.

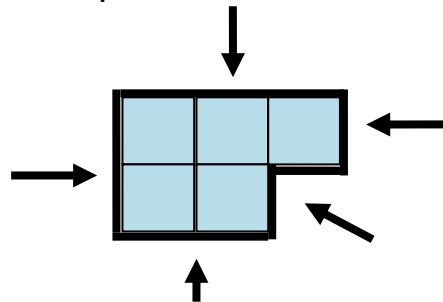


Note: If you just flip or turn one of your shapes, this does not count as a new one. These polygons count only as one way!

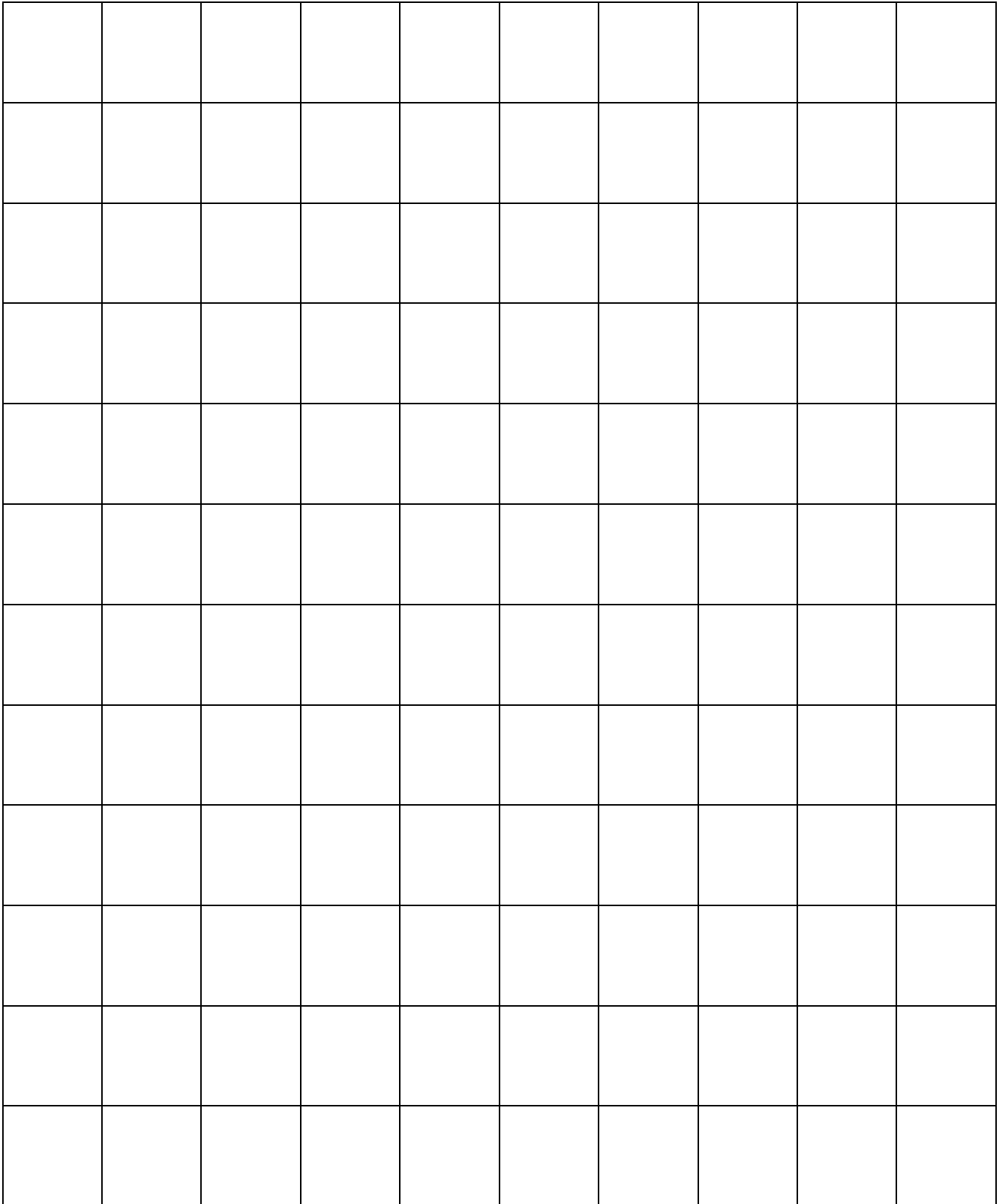


Then draw the different ways on the grid paper. Color the different shapes so they are easier to see. Then outline the shapes with a marker. Can you identify the new polygon you created?

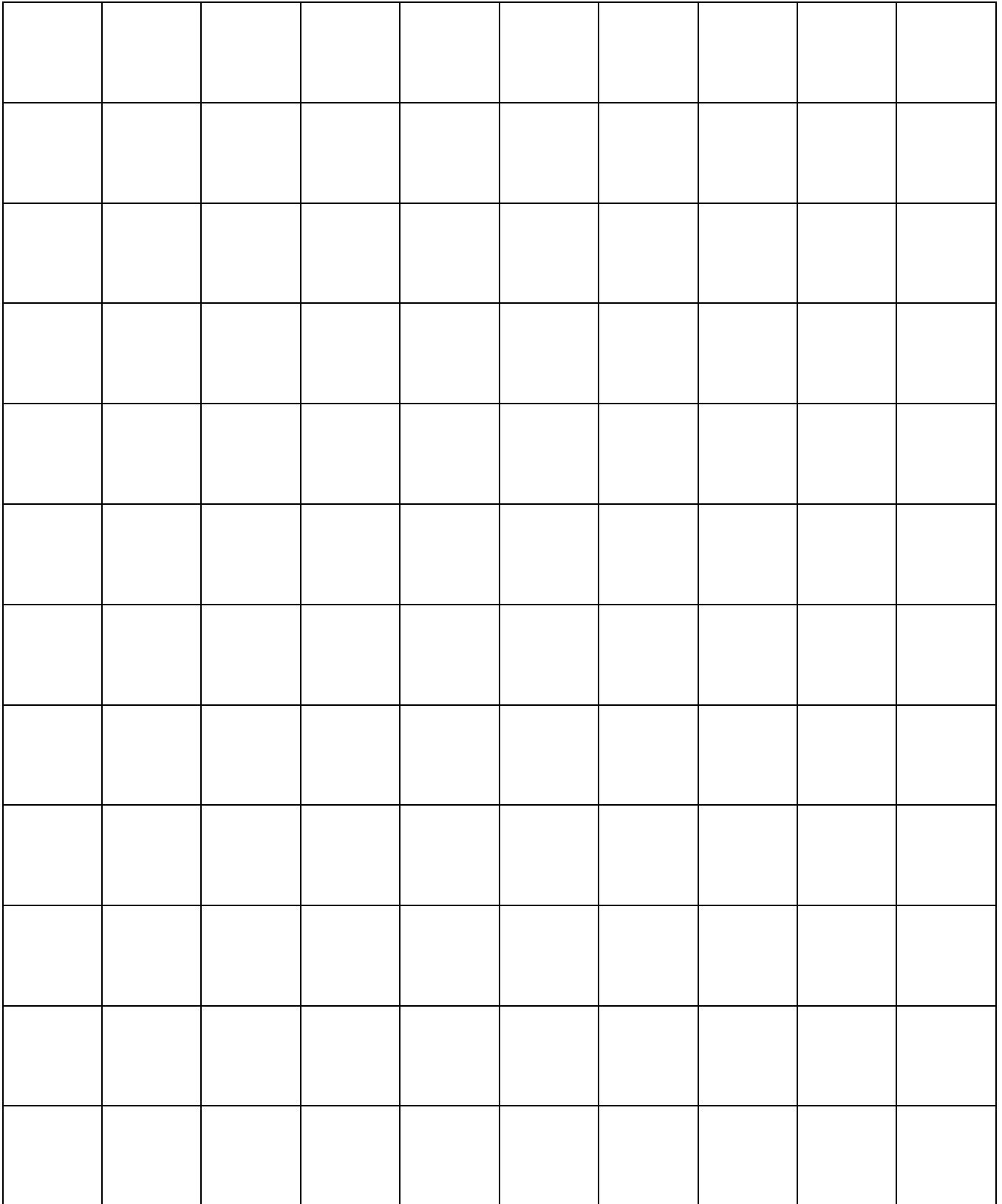
Outline your new shape. What is your new shape?



Grid Paper



Grid Paper

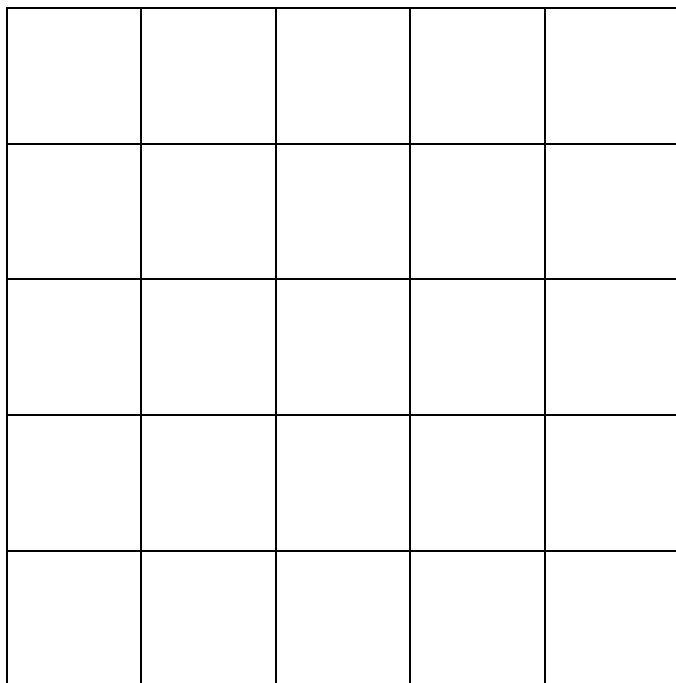


Crazy Fives! Make a Square and Rectangle

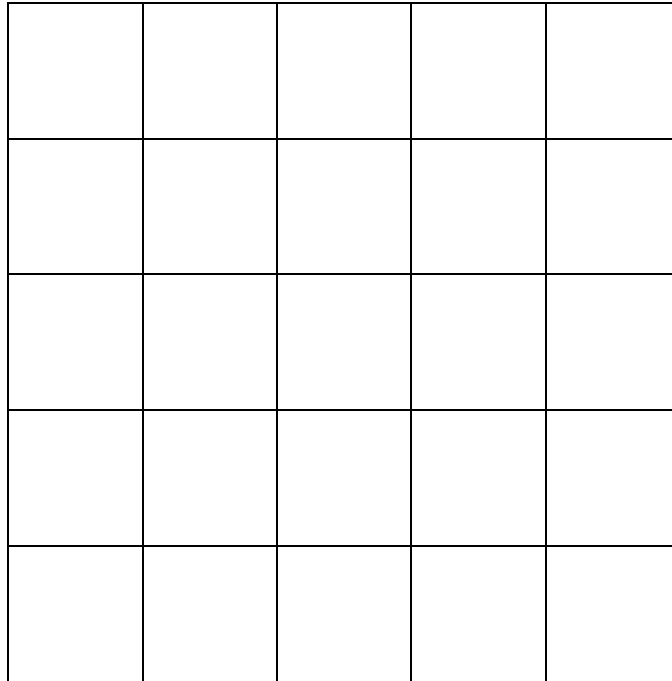


Cut out the pentominoes you drew on the grid paper. On the back, write the name of the polygon you created.

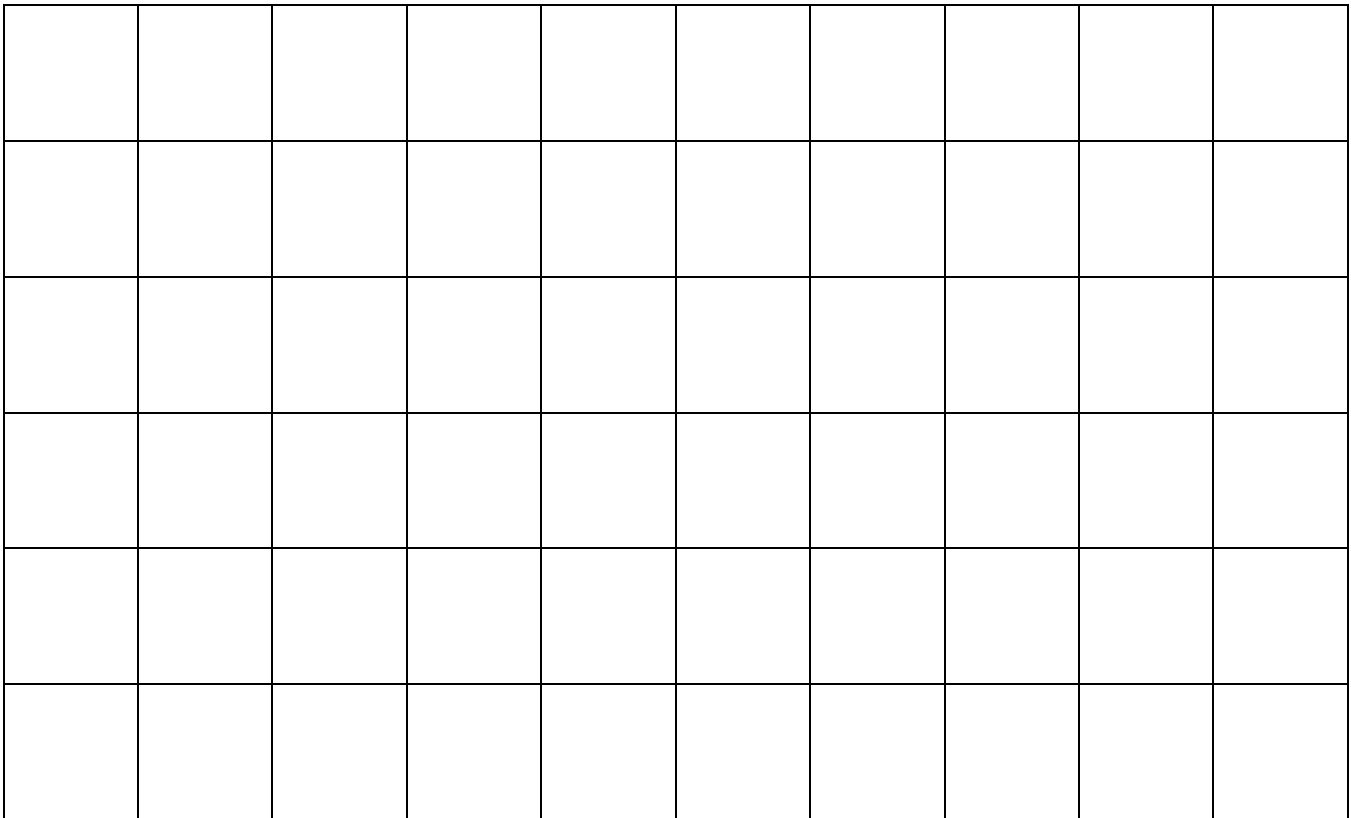
Then, find 5 pentominoes that you drew and cut out that will fit in this square perfectly without going on top of each other. Trace them in the square.



Can you use different pentominoes to create another square?



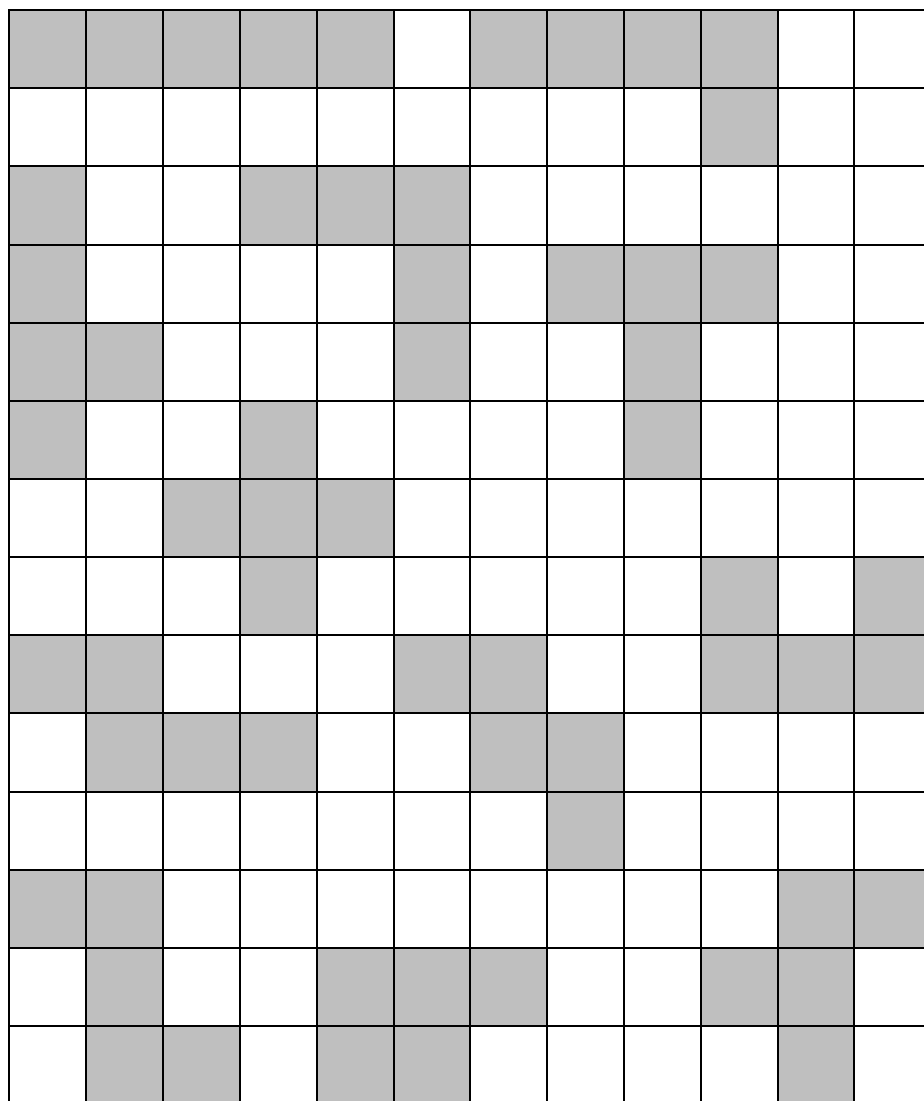
What about a rectangle?



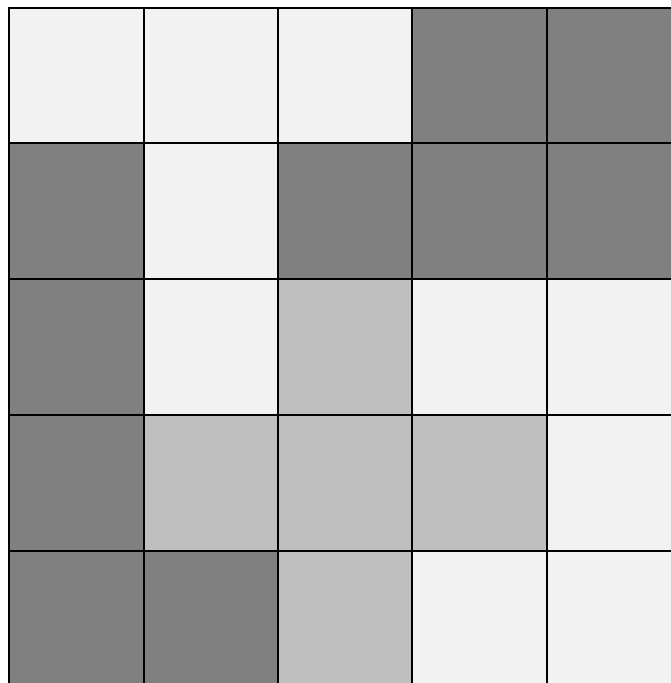
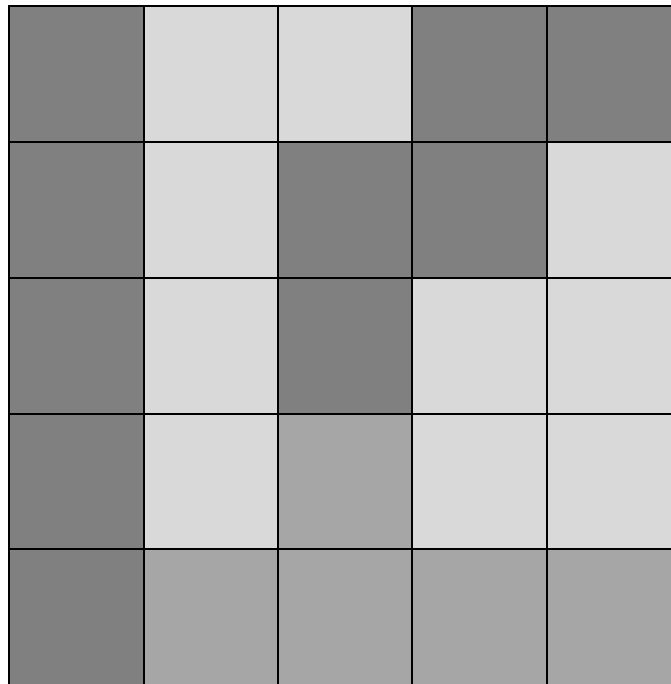
Crazy Fives! Answer Keys

There are 12 pentominoes that count. Remember that students may turn or flip each of these, so the orientation may look different. However, no matter how it is flipped or turned, it only counts one time!

Here are the 12 solutions.



There are different ways to make the square. Here are two possible solutions.



Here is one possible solution for the rectangle:

