A Quadrilateral Quagmire*

Part 1—*Flip* the triangles to form as many different quadrilaterals as possible. *Trace* each quadrilateral, *label* it with a letter, and *draw* its line of symmetry. See the example provided for Triangle 1 below.

*A quagmire is defined as a difficult situation or predicament.*
The “Fun” Polygon

Cardstock paper cutouts make easy manipulatives for students to slide, flip, and turn.
A Quadrilateral Quagmire*

What quadrilaterals can be formed by flipping the following “fun” polygons?

Part 2—Classify the quadrilaterals from Part 1. You may use a 2-ring Venn Diagram, a 3-ring Venn Diagram, or another type of organizer. Label each classification or grouping according to its characteristics.

Part 3—Write a paragraph to explain the classifications shown above.

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________________________________________________________________________
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Quadrilateral Trivia Questions

1. This building, constructed in Athens in the 400s BC, incorporates golden sections and rectangles.

2. This French architect designed buildings in the 1900s that incorporated golden sections and rectangles.

3. Carpenters and cabinetmakers use this woodworking tool to measure angles and make straight lines.

4. This quadrilateral is also the name of one our wrist bones.

5. What role does a square play in a cotton plant?

6. Which U.S. President used the phrase a “square deal” to refer to his policy of social reform?

7. Name three ancient civilizations that used rectangular sails to power their sea vessels. What name did all three groups give to these sails?

8. Before WWII, the United States Army organized 4 infantry regiments under 2 brigades. What name did the U.S. Army assign to this type of division?

9. This type of American folk dancing is performed by groups of 4 couples.

10. Did you know that knots in a rope weaken the rope? Find out which knot weakens a rope by 50 percent.
A Quadrilateral Quandary*

*A quandary is a perplexing situation or state; a dilemma or problem.
A Quadrilateral Quandary

Part 1—*Sketch* a similar quadrilateral in the chart below. Then use appropriate geometric vocabulary to *describe* each quadrilateral.

<table>
<thead>
<tr>
<th>Shape</th>
<th>Similar Figure</th>
<th>Sides</th>
<th>Angles</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td><img src="image" alt="Rhombus" /></td>
<td>4 congruent sides 2 pairs of parallel sides</td>
<td>2 acute angles 2 obtuse angles</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
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<td></td>
<td></td>
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<td>E</td>
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<td>K</td>
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<tr>
<td>L</td>
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<td></td>
</tr>
</tbody>
</table>

A List of Appropriate Geometric Vocabulary:
A Quadrilateral Quandary

Part 2—Classify the quadrilaterals according to common characteristics. Sketch a similar figure of each shape and use letters (A, B, C, etc.) to identify it. Shapes MAY be used more than once.
Be sure to use the appropriate symbols (straight arrows, dotted lines, and curved arrows) to record whether the figure was slid, flipped, or turned.
Clockwise Rotations (Turns)

1st Turn 90°
2nd Turn 180°
3rd Turn 270°
4th Turn 360°
**Counter**clockwise Rotations (Turns)

- **1st Turn**: 90°
- **2nd Turn**: 180°
- **3rd Turn**: 270°
- **4th Turn**: 360°

Home 0° &
A General Quadrilateral
Copy on cardstock and distribute these manipulatives to students.
Building Code Check-Up #5

Part A
Quinton is in a quandary. He must select *four* of the following five quadrilaterals and write a paragraph to explain how they are related.

1. Complete the chart Quinton started.

<table>
<thead>
<tr>
<th>Shape</th>
<th>Sides</th>
<th>Angles</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>-opposite sides are congruent</td>
<td>-4 right angles</td>
</tr>
<tr>
<td></td>
<td>-2 sets of parallel sides</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Select four quadrilaterals (check the box beside the letter). Write a paragraph to explain how they are related. Include an introduction, descriptions from the chart that support your ideas, and a conclusion.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Part B
3. On each quadrilateral, draw all its lines of symmetry, or write NO SYMMETRY below the figure.

4. One line of symmetry has been drawn. Complete the other half of the quadrilateral.

Part C
5. Label the movement of each quadrilateral. Did it flip? Slide? Or Turn?

6. Select and perform a flip, slide, or turn using the quadrilateral below. Draw the result in the third column.

<table>
<thead>
<tr>
<th>Original Quadrilateral</th>
<th>Flip Slide Turn (Circle one)</th>
<th>Result</th>
</tr>
</thead>
</table>

7. Quinton colored the front and back of a square (see the original). He used the square to perform flips, slides, and clockwise turns.

a. Did Shape A result from a flip or a 90º turn? (circle one)
b. Did Shape B result from a flip or a slide? (circle one)
c. Did Shape C result from a flip or a 360º turn? (circle one)
d. Did Shape D result from a 180º or a 270º turn? (circle one)
Use the quadrilaterals below to answer questions 8 and 9.

8. The original quadrilateral was (flipped, slid, turned) to create the smaller square. (Circle one)

9. The smaller square was (flipped, slid, turned) to create the larger square. (Circle one)

Extra Credit (10 points)

10. The larger square is a section of the tessellation shown below. Create a color pattern in the larger square. Then flip, slide, or turn the larger square to create a color pattern in the tessellation below.

Explain how flips, slides, and/or turns are used in the pattern.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
## Building Code Check-Up #5
### Scoring Criteria

**Part A**

1. **16 points** Students complete the chart using appropriate vocabulary. (A sample chart is shown below. Accept all reasonable answers.)

<table>
<thead>
<tr>
<th>Shape</th>
<th>Sides</th>
<th>Angles</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>-opposite sides are congruent</td>
<td>-4 right angles</td>
</tr>
<tr>
<td></td>
<td>-2 sets of parallel sides</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>-opposite sides are congruent</td>
<td>-2 acute angles</td>
</tr>
<tr>
<td></td>
<td>-2 sets of parallel sides</td>
<td>-2 obtuse angles</td>
</tr>
<tr>
<td>C</td>
<td>-4 congruent sides</td>
<td>-4 right angles</td>
</tr>
<tr>
<td></td>
<td>-2 sets of parallel sides</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>-0 congruent sides</td>
<td>-1 right angle, 1 acute angle</td>
</tr>
<tr>
<td></td>
<td>-0 sets of parallel sides</td>
<td>-2 obtuse angles</td>
</tr>
<tr>
<td>E</td>
<td>-4 congruent sides</td>
<td>-2 acute angles</td>
</tr>
<tr>
<td></td>
<td>-2 sets of parallel sides</td>
<td>-2 obtuse angles</td>
</tr>
</tbody>
</table>

2a. **4 points** Students select four quadrilaterals.

2b. **20 points** The content of the paragraph is assessed as follows:

Students include descriptions from the chart to explain how the selected quadrilaterals are related. See the adapted Long-Answer Question rubric below to understand what a “clear and complete” answer looks like for this prompt (# points x 5).

<table>
<thead>
<tr>
<th>Explaining Your Answer</th>
<th>4 points</th>
<th>3 points</th>
<th>2 points</th>
<th>1 point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your explanation is so clear and complete that the reader can use the specific details and vocabulary you provide to draw another related quadrilateral.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your explanation is clear and complete. It is supported by specific and appropriate vocabulary. It is clear to the reader how the quadrilaterals are related.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Your explanation is hard to follow. Appropriate vocabulary may be used, but relationships are unclear. It is hard for the reader to understand how the quadrilaterals are related.</td>
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</tr>
<tr>
<td>Your explanation is unclear and/or incomplete. It contains inappropriate or insufficient vocabulary. The reader is confused about how the quadrilaterals are related.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

2c. The format of the paragraph may be assessed as follows:

- **3 points** Students begin the paragraph with an introductory sentence.
- **6-8 points** Students support ideas with little or no irrelevant or repetitious information (2 points per relevant piece of information).
- **3 points** Students conclude the paragraph.
Part B
3. **6 points** Students draw and identify all lines of symmetry (1 point per identification).

   ![No Symmetry Diagram]

4. **2 points** Students complete the other half of the quadrilateral.

Part C
5. **8 points** Students correctly identify Set 1 as a slide and Set 2 as a flip.

6. **6 points** Students select and perform a flip, slide, or turn.

   - Slide
   - Horizontal Flip
   - Vertical Flip
   - 90° or 270° Turn
   - 180° or 360° Turn

7. **16 points** Students correctly identify the effect of a flip, slide, or turn on the original quadrilateral (4 points each).
   
   a. 90° turn  
   b. slide  
   c. flip  
   d. 180° turn

8. **4 points** Students identify that the quadrilateral was turned.

9. **4 points** Students identify that the smaller square was flipped.

Extra Credit (10 points)
8. **8 points** Students a) create a coloring pattern in the larger square, and then b) flip, slide, or turn the larger square to create a color pattern in the tessellation.

2. **2 points** Students explain how flips, slides, or turns are used in the pattern. (Use the Short-Answer Question rubric to score the writing.)
Quadrilateral Trivia Answers

(Answers are underlined. Quadrilateral names and terms are italicized.)

1. The Parthenon incorporates golden sections and rectangles.

2. Le Corbusier was a French architect that designed buildings that incorporated golden sections and rectangles.

3. A square is used in woodworking to measure angles and make straight lines.

4. One of our wrist bones is called a trapezoid.

5. In a cotton plant, a “square” is the flower bud.

6. Theodore Roosevelt used the phrase, “a square deal.”

7. Ancient Egyptians, Greeks and Romans used a rectangular sail called the “square sail” to power heavy sea vessels.

8. Prior to WWII, the U.S. army used a square division.

9. Four couples can participate in square dancing.

10. Square knots weaken rope by 50 percent.
## Long-Answer Question Rubric

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Answering the Problem</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>You arrive at a correct answer. Minor errors in your response do not take away from the understanding shown by your work.</td>
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</tr>
<tr>
<td>You arrive at a correct answer, but minor errors in your response indicate that you have some misunderstanding of the concepts and procedures.</td>
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</tr>
<tr>
<td>You may arrive at a correct answer, but the errors in your response reveal that there are essential parts of the concepts and procedures that you do not understand.</td>
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<tr>
<td>You arrive at an incomplete answer. The errors in your response reveal many flaws in your understanding of the concepts and procedures.</td>
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<tr>
<td>Your answer was incorrect or not given at all.</td>
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<tr>
<td><strong>Showing your Work</strong></td>
<td></td>
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</tr>
<tr>
<td>You follow the given directions to show how the problem was solved. All steps are provided and they show correct math procedures.</td>
<td></td>
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</tr>
<tr>
<td>You follow the given directions to show how the problem was solved. Steps are provided, but careless errors are shown in the math procedures.</td>
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<td></td>
</tr>
<tr>
<td>You follow the given directions in an attempt to show how the problem was solved. Some of the steps provided show incorrect math procedures.</td>
<td></td>
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</tr>
<tr>
<td>You attempt to show how the problem was solved. Some of the steps are addressed, but you fail to arrive at a complete answer.</td>
<td></td>
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<tr>
<td>You make no attempt to show how the problem was solved, or the procedures shown are all incorrect.</td>
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</tr>
<tr>
<td><strong>Explaining &amp; Interpreting your Answer</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>You explain how to solve the problem so clearly and completely that someone else can find the answer in a new situation. The interpretations you give can be inferred from the information.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>You explain how to solve the problem so that someone else can find the answer. The interpretations you give can be supported by the information.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>You may begin to explain how to solve the problem, but you do not clearly show how to find the answer. The interpretations you give are not always supported by the information.</td>
<td></td>
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</tr>
<tr>
<td>Your explanation of how to solve the problem is incomplete or flawed. The interpretations you give can not be supported by the information.</td>
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</tr>
<tr>
<td>Your explanations and interpretations are not correct, understood, or given.</td>
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</tbody>
</table>

**What each point value means...**

- **Your work shows a complete understanding of the concepts & procedures.**
- **Your work shows an essential understanding of the concepts & procedures.**
- **Your work shows a partial understanding of the concepts & procedures.**
- **Your work shows a limited understanding of the concepts & procedures.**
- **Your work shows no understanding of the concepts & procedures.**
A Concept Map for Quadrilaterals

Directions: Sketch the similar figures from “A Quadrilateral Quandary” that match the descriptions provided.

**QUADRILATERALS**
Polygons with 4 sides and 4 angles

**SPECIAL QUADRILATERALS**
1 or 2 pairs of parallel sides

**TRAPEZOID**
only one pair of opposite sides is parallel (4)

**GENERAL QUADRILATERALS**
0 pairs of parallel sides (2)

**PARALLELOGRAM**
both pairs of opposite sides are congruent and parallel (6)

**RECTANGLE**
opposite sides are congruent and parallel, AND four right angles (3)

**RHOMBUS**
all sides are congruent and parallel (4)

**SQUARE**
all sides are congruent and parallel, AND four right angles (2)
Clockwise Rotation (or Turns)

Counter clockwise Rotations (or Turns)
Remember: As each object is turned, use arrowheads to label the direction it is rotated (clockwise or counterclockwise) and write in the number of degrees it has moved.