


Classifying Shapes


The Flatopia Polygon Zoo

Professor Peabody had a dream that he lived in a two-dimensional town called Flatopia. There were two-dimensional creatures in town, all shaped like polygons.

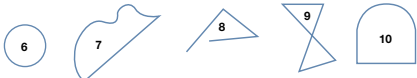


Help Professor Peabody design the Flatopia Polygon Zoo for these creatures.

These shapes are polygons:



These shapes are not polygons:



1. Write a definition for a polygon using your own words.

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- Cut apart the shapes on the *Shapes Zoo Pieces* page in the *Student Activity Book* and sort the shapes into two groups: polygons and shapes that are not polygons.
- Professor Peabody decides that Flatopia Polygon Zoo will have a Triangle section and a Quadrilateral section. Sort the polygons into three groups: triangles, quadrilaterals, and neither.
 - Which shapes are triangles?
 - Which shapes are quadrilaterals?
 - Which shapes are neither triangles nor quadrilaterals?
 - Sketch another polygon. Place it in the appropriate group.
- Draw and name the Triangle section and Quadrilateral section of the Flatopia Polygon Zoo. Sort the shapes into the appropriate sections.

Triangles

A zoologist is assisting Professor Peabody in setting up his Flatopia Polygon Zoo. She tells Professor Peabody the triangle polygons should be sorted into smaller areas.

- Sort the triangles into three groups: right triangles, acute triangles, and obtuse triangles. Draw and label a section inside the Triangle section for each type of triangle. Place the triangles in the appropriate sections.



- Look at the right triangles. Sort the right triangles into two groups.
 - How did you decide to sort them?
 - Which right triangles are isosceles triangles?
 - Can a right triangle also be an equilateral polygon?
 - Draw and label a section inside the Right Triangle section for the right isosceles triangles. Place the triangles appropriately.

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*Answers and/or discussion are included in the lesson.

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Classifying Shapes (SG pp. 282–289)

Questions 1–25

- * Possible response: A polygon is a two-dimensional closed shape with straight lines.
- * All the shapes on the Shapes Zoo Pieces page are polygons.
- A.*** Shapes AA, B, BB, CC, D, DD, K, N, P, Q, T, Z are triangles.

B. Shapes A, C, E, EE, FF, G, H, II, J, L, O, S, U, W, X, Y are quadrilaterals.

C. Shapes F, I, M, R, V are neither triangles nor quadrilaterals.

D. Answers will vary.
- * See responses to Question 3.
- * right triangles: AA, BB, P, Q, T
 acute triangles: D, K, N, CC
 obtuse triangles: B, Z, DD
 See Figure 1 in the Lesson.
- A.*** Possible response: right triangles that are isosceles and right triangles that are not isosceles; right triangles that have two congruent sides.

B.* right isosceles triangles: Q, T, BB

C.* Possible response: A right triangle cannot be equilateral because all the angles of an equilateral triangle have to be congruent. If one angle is 90 degrees the other two angles have to be less than 90 so the sum of the interior angles is 180 degrees.

D.* See Figure 2 in the lesson.

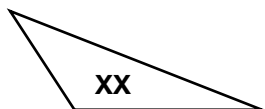
7. **A*** Possible response: isosceles acute triangles, equilateral triangles, and those that are neither.
B* acute isosceles triangles: K and N
C* equilateral triangles: CC
D* The sides of Shape D are all different lengths so the shape is neither isosceles nor equilateral.
E* See Figure 2 in the Lesson.
F* Possible response:



8. **A*** Possible response: obtuse isosceles triangles and those that are not isosceles
B* obtuse isosceles triangles: DD
C* None of the obtuse triangles are equilateral because an obtuse triangle cannot be equilateral. In an equilateral triangle all the angles are the same and therefore are $180 \div 3$ or 60 degrees. An obtuse triangle always has an angle larger than 90 degrees.
D* See Figure 2 in the Lesson.
E* Possible response:



9. Possible response:



The shape has an obtuse angle and none of the sides are congruent. So, the shape is in the obtuse triangle section but outside the isosceles section of the zoo.

10. **A–C.** Shape 1 is an obtuse triangle without any congruent sides. I used a ruler to measure the sides and a right corner to check the size of the angles.
 Shape 2 is an equilateral acute triangle. I measured each side with a ruler and I can see that all the angles are acute.
 Shape 3 is an isosceles right triangle. I checked the largest angle with a right corner and I measured the sides.

7. Look at the acute triangles. Sort these triangles into groups.

- How did you decide to sort them?
- Which acute triangles are isosceles triangles?
- Which acute triangles are equilateral triangles?
- Measure the sides of shape D to the nearest 0.1 cm. Is this shape equilateral or isosceles?
- Draw and label sections inside the Acute Triangle section for the isosceles triangles and equilateral triangles. Place the triangles appropriately.
- Sketch another acute triangle that is neither isosceles nor equilateral. Label it "ZZ." Place the shape in the appropriate section of the shape zoo.

8. Look at the obtuse triangles. Sort these triangles into groups.

- How did you decide to sort them?
- Which obtuse triangles are isosceles triangles?
- Which obtuse triangles are equilateral triangles? Show or tell how you decided.
- Draw and label appropriate sections inside the Obtuse Triangle section. Place the triangles appropriately.
- Sketch another obtuse triangle that is isosceles. Label it "YY." Place it in the appropriate section of the shape zoo.

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✓ Check-In: Questions 9-10

9. Draw a triangle that does not have any congruent sides. Label it "XX." Place this shape in the appropriate section of the shape zoo. How did you decide where to place it?

10. Shapes 1, 2, and 3 are new arrivals to the Flatopia Polygon Zoo.

- Which section of the zoo should Professor Peabody place them in? Draw a sketch of each shape and place them in the appropriate section of the zoo.
- Show or tell how you decided where to place Shape 3.
- Show or tell how you decided where to place Shape 1.

Use the *Triangle Property Sort* pages in the *Student Activity Book* to practice using properties to classify polygons.

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*Answers and/or discussion are included in the lesson.

Quadrilaterals

The zoologist assisting Professor Peabody told him that the quadrilateral polygons should also be sorted into smaller areas.

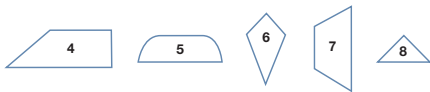
11. Sort the quadrilaterals into groups. What attributes did you use?
12. These are trapezoids.



These are not trapezoids.



- A. Which of these shapes are trapezoids?



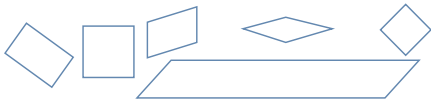
- B. Write a definition for a trapezoid using your own words.

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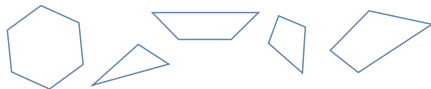
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- 11.* Two possible responses: I placed the shapes into two groups: quadrilaterals with a right angle and those without a right angle; I placed the shapes into two groups: those with only one set of parallel sides and those with two sets of parallel sides.
12. **A.** Shapes 4 and 7 are trapezoids.
B.* Possible response: A trapezoid is a quadrilateral with only one set of parallel sides.
13. **A.** Shapes 9, 12, and 13 are parallelograms.
B.* Possible response: A parallelogram is a four-sided polygon with two sets of parallel sides.
14. See Figure 3 in the lesson.
A.* Trapezoids: O, X, S, U
B.* Parallelograms: L, H, A, EE, Y, W, G, J, E, C
C.* Neither: FF
D. Possible response: I do think this is a good way to sort them because I can see other categories of quadrilaterals; I do not think this is a good way to sort the quadrilaterals. I liked to sort the shapes by right angles though there was overlap with other attributes.

13. These are parallelograms.



These are not parallelograms.



- A. Which of the following are parallelograms?



- B. Write a definition for a parallelogram using your own words.

14. Professor Peabody thinks he should make a section for the parallelograms and a section for the trapezoids. Sort the quadrilaterals into groups: parallelograms, trapezoids, and neither parallelograms nor trapezoids.

- A. Which shapes are trapezoids?
- B. Which shapes are parallelograms?
- C. Which shapes are neither?
- D. Do you think this is a good way to sort the quadrilaterals? Why or why not?

15. Draw and label sections inside the Quadrilateral section of the zoo. Place the shapes in the appropriate section of the shape zoo.

16. Look at the trapezoids. Sort the trapezoids into two groups.

- A. What attribute did you use?
- B. Draw and label a section inside the Trapezoid section. Place the appropriate shapes into this section.

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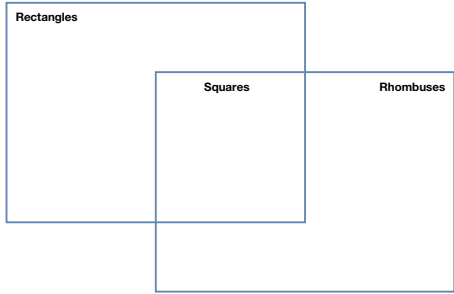
*Answers and/or discussion are included in the lesson.

17. **A.** Possible response: I grouped the rectangles together.
B. Possible response: Yes, because a rectangle has two sets of parallel sides, it is a parallelogram.
C. Possible response: Yes. A rhombus is a regular parallelogram. Since a square is also a parallelogram, it is also a rhombus.
D. Possible response: Yes, but not all. A square is a rhombus because it is regular and the sides are parallel. Since a square has four right corners, it is also a rectangle. This is only true for a square.
- 18.* See Figure 4 in the lesson.
- 19.* See Figure 4 in the lesson.
- 20.* Shape WW is a quadrilateral. See Figure 4 in the lesson.
- 21.* Shape VV is a parallelogram. See Figure 4 in the lesson.
22. Yes, a square is a regular polygon because a regular polygon has congruent sides.
23. Yes, a rhombus has congruent sides, so it is a regular polygon.
24. **A.*** Possible response: I sorted the shapes using the number of sides.
B.* See Figure 5 in the lesson.
25. **A.** Possible response: They all have six sides.
B. Possible response: Some have sides that are not equal, and one has congruent sides.
C. Possible response: Shape I is a regular hexagon.

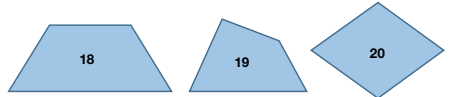
17. Look at the parallelograms. Sort the parallelograms into groups.

- What attributes did you use?
- Can a rectangle also be a parallelogram?
- Can a rectangle also be a rhombus?
- Can a rhombus also be a rectangle?

18. Professor Peabody noticed that a square can be classified as a rectangle but it can also be classified as a rhombus. He asked the zoologist to design a special section of the zoo. Draw a similar section in the Parallelogram section of the zoo. Place the shapes into these sections.



19. Shapes 18, 19, and 20 are new arrivals to the zoo.




Which section of the zoo should Professor Peabody place them in? Draw a sketch of each shape and place them in the appropriate section of the zoo.

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- Sketch a four-sided polygon that has a right corner and no parallel sides. Label the shape "WW." Place the shape in the appropriate section of the shape zoo.
- Sketch a parallelogram that is neither a rectangle nor a rhombus. Label the shape "VV." Place the shape in the appropriate section of the shape zoo.
- Can a rectangle be a regular polygon? Explain.
- Can a parallelogram be a regular polygon? Why or why not?
- Look at the following shapes: F, I, M, R, V. Sort the shapes into groups.
 - What attribute did you use?
 - Draw and label a section for the zoo. Place the appropriate shapes into these sections.
- Look at the hexagons.
 - How are they the same?
 - How are they different?
 - Are any of the hexagons regular hexagons? Which ones?

Use the *Parallelogram Classification Challenge* pages in the *Student Activity Book* to practice describing and classifying polygons.



Polygon Riddles

What shape am I? Use the clues to name the polygon. Draw a sketch of each shape.

- Only two of my sides are congruent. I am a triangle.
- I have four right angles. I am not a square.
- I am a quadrilateral. Only one set of my sides is parallel.
- I have five congruent sides and five congruent angles.
- I am a rectangle and a rhombus.
- I have three sides and one right angle. None of my sides are congruent.
- I have six sides. None of my sides are congruent.

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*Answers and/or discussion are included in the lesson.

20. Sketch a four-sided polygon that has a right corner and no parallel sides. Label the shape "WW." Place the shape in the appropriate section of the shape zoo.
21. Sketch a parallelogram that is neither a rectangle nor a rhombus. Label the shape "VV." Place the shape in the appropriate section of the shape zoo.
22. Can a rectangle be a regular polygon? Explain.
23. Can a parallelogram be a regular polygon? Why or why not?
24. Look at the following shapes: F, I, M, R, V. Sort the shapes into groups.
 - A. What attribute did you use?
 - B. Draw and label a section for the zoo. Place the appropriate shapes into these sections.
25. Look at the hexagons.
 - A. How are they the same?
 - B. How are they different?
 - C. Are any of the hexagons regular hexagons? Which ones?



Use the *Parallelogram Classification Challenge* pages in the *Student Activity Book* to practice describing and classifying polygons.



Polygon Riddles

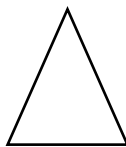
What shape am I? Use the clues to name the polygon. Draw a sketch of each shape.

1. Only two of my sides are congruent. I am a triangle.
2. I have four right angles. I am not a square.
3. I am a quadrilateral. Only one set of my sides is parallel.
4. I have five congruent sides and five congruent angles.
5. I am a rectangle and a rhombus.
6. I have three sides and one right angle. None of my sides are congruent.
7. I have six sides. None of my sides are congruent.

Homework (SG p. 289)

Questions 1–7

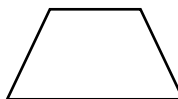
1. isosceles triangle



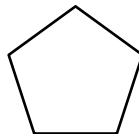
2. rectangle



3. trapezoid



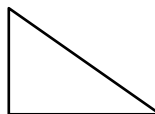
4. regular pentagon



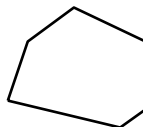
5. square or equilateral rectangle



6. right triangle



7. hexagon



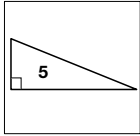
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Triangle Property Sort (SAB pp. 251–253)
Homework

Triangle Sort Board

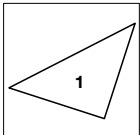
Box A

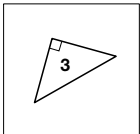
Right Triangles



Box C

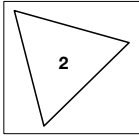
Right Isosceles Triangles

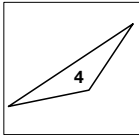


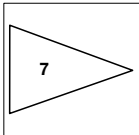


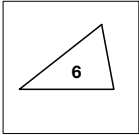
Box B

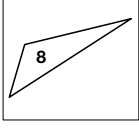
At least 2 equal sides









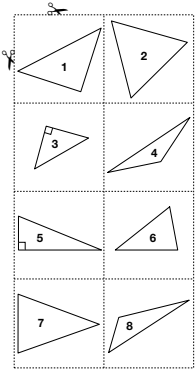


Name _____ Date _____

Triangle Property Sort

Homework

Cut apart the cards. Use the Triangle Sort Board on the next page to sort the triangles.



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Name _____ Date _____

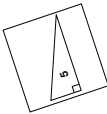
Triangle Sort Board

Box A

Box C

Box B

At least 2 equal sides



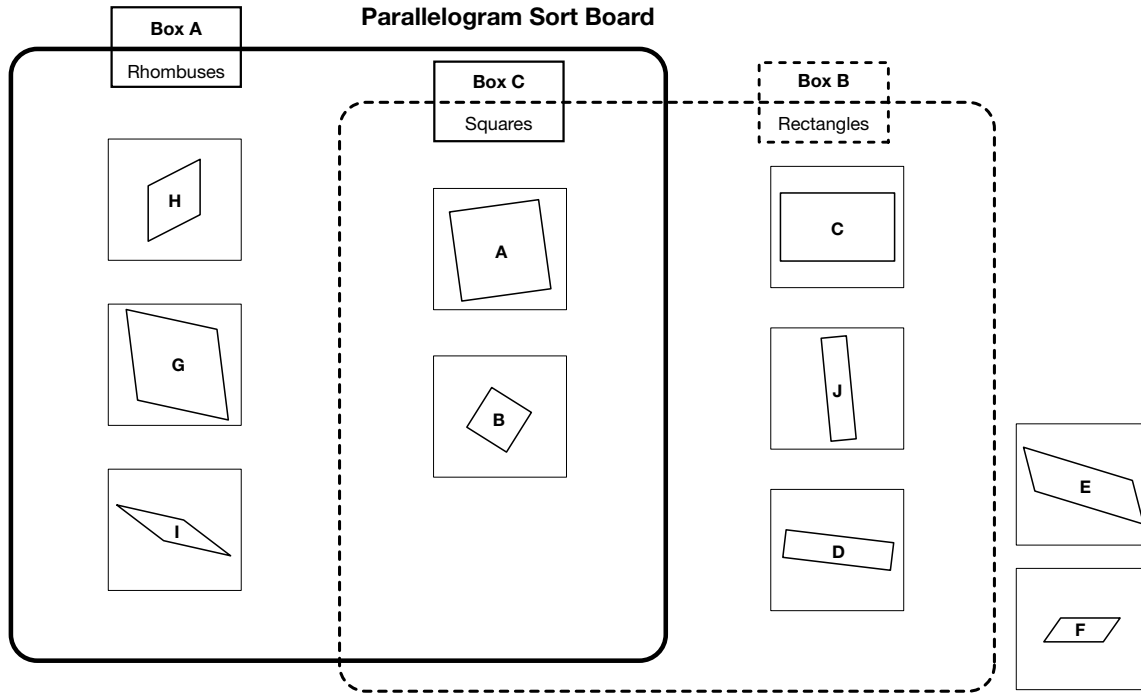
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**Parallelogram Classification Challenge
(SAB pp. 255–259)
Questions 1–3**

I.



Name _____ Date _____

Parallelogram Classification Challenge

- Cut apart the parallelograms. Sort the shapes onto the Parallelogram Sort Board on the next page.
 - All of the parallelograms in Box A share the same property.
 - All of the parallelograms in Box B share the same property.
 - Some parallelograms share both boxes because they have common properties. These parallelograms will go in Box C, where Box A and Box B overlap.
 - Some parallelograms have no properties in common and will go outside both Box A and Box B.

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Name _____ Date _____

Parallelogram Sort Board

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2. A. True
 B. True
 C. True
 D. False
 E. False
 F. Possible responses: A trapezoid has only 1 pair of parallel sides, the rectangle has 2 pairs of parallel sides, so it is not a trapezoid.
 G. Shapes drawn will vary but must have 4 equal sides and opposite angles are congruent. Possible justifications: the shape must have 4 equal sides and opposite angles are equal.
3. A. rectangle
 B. rhombus
 C. square

Name _____ Date _____

2. Look at the shape below:



Which statements are true? Write True or False.

A. I am a quadrilateral. _____ B. I am a parallelogram. _____
 C. I am a rectangle. _____ D. I am a trapezoid. _____
 E. I am a rhombus. _____
 F. Explain your reasoning for Question 2D.

G. Draw a rhombus. Explain how you know it's a rhombus.

3. What shape am I? Use the clues to name and draw a sketch of each polygon:

A. I have four sides and all my angles are 90 degrees. I am not a square.
 B. I am a quadrilateral with parallel sides. I do not have any right angles.
 C. I am a rhombus with right angles.

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Parallelogram Classification Challenge		Expectation	Check In	Comments
Identify and describe two-dimensional shapes. (Q# 2-3)	Yes...	E4		
Classify two-dimensional shapes in a hierarchy based on properties. (Q# 1-2)	Yes, but...	E5		
Justify conclusions using geometric properties. (Q# 2F-G)	No, but...	E7		
MP.5: Show your work. I show my work so someone else can understand my thinking. (Q# 2F-G)	Yes...			
	Yes, but...			
	No, but...			
	No...			

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