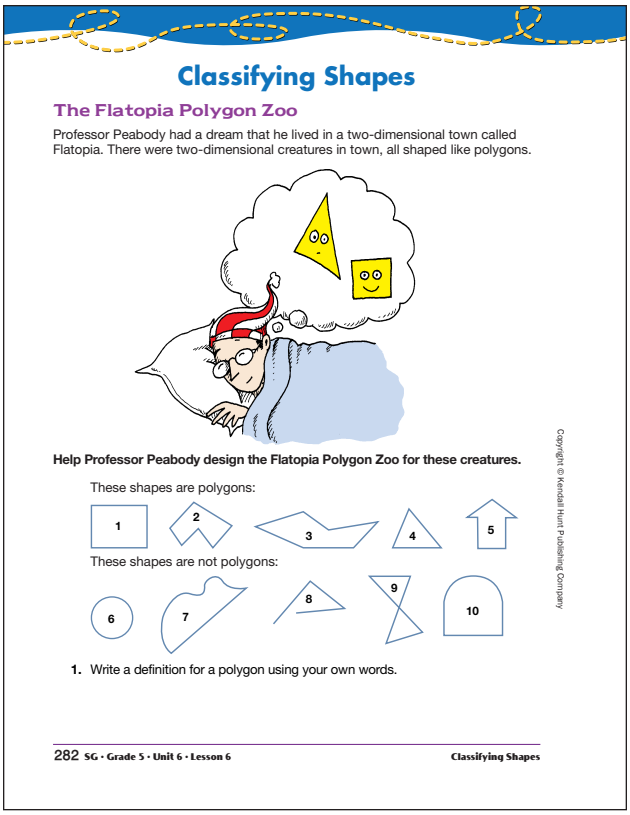

Classifying Shapes

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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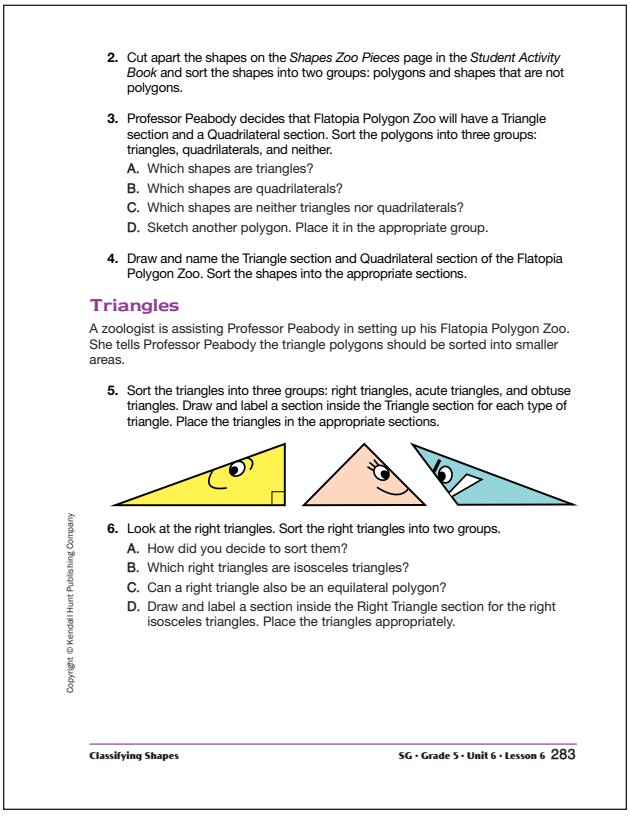
***Student Guide* - Page 282**



2. 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.

3. 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.
   - A. Which shapes are triangles?
   - B. Which shapes are quadrilaterals?
   - C. Which shapes are neither triangles nor quadrilaterals?
   - D. Sketch another polygon. Place it in the appropriate group.

4. 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.

5. 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.

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

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***Student Guide* - Page 283**

Student Guide

Classifying Shapes (SG pp. 282–289)
Questions 1–25

1.* Possible response: A polygon is a two-dimensional closed shape with straight lines.

2.* All the shapes on the Shapes Zoo Pieces page are polygons.

3. 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.

4.* See responses to Question 3.

5.* right triangles: AA, BB, P, Q, T

acute triangles: D, K, N, CC

obtuse triangles: B, Z, DD

See Figure 1 in the Lesson.

6. 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.

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

7. A.* Possible response: isosceles acute triangles, equilateral triangles, and those that are neither.

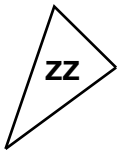
B.* acute isosceles triangles: K and N

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

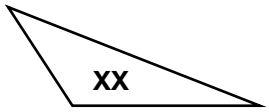
B.* obtuse isosceles triangles: DD

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 ÷ 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:

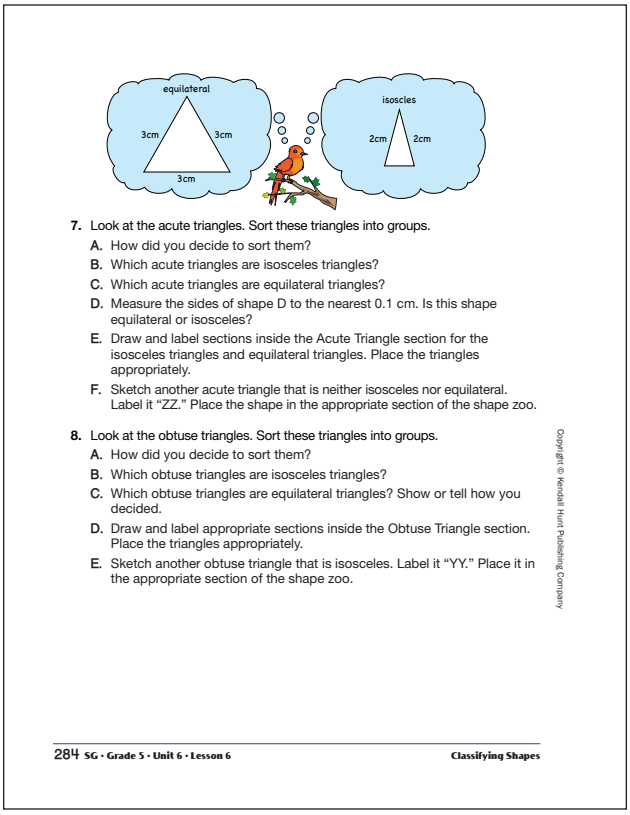


The shape has an obtuse angle and none of the sides are congruent. So, the shape is in the obtuse triangle section but outside the isosceles section of the zoo.

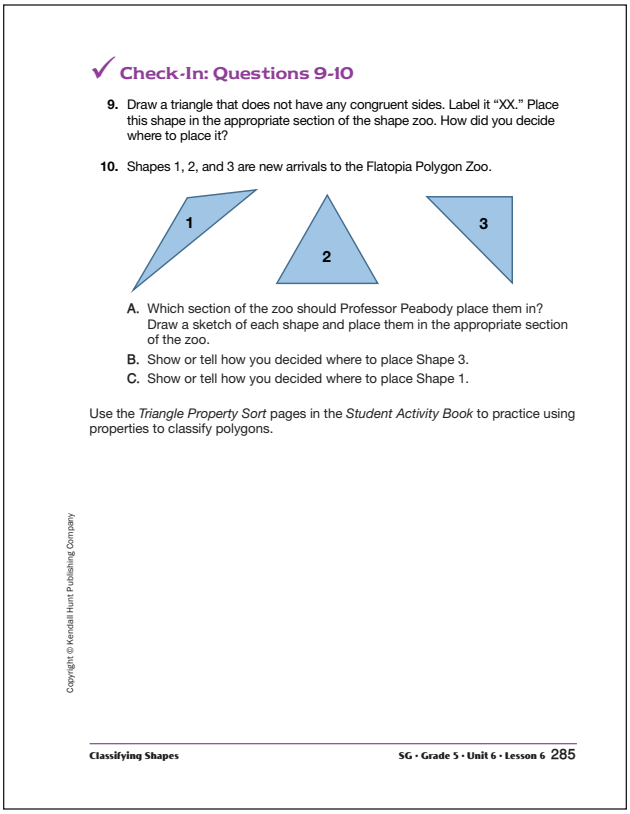
10. A–C. Shape 1 is an obtuse triangle without any congruent sides. I used a ruler to measure the sides and a right corner to check the size of the angles.

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.



***Student Guide* - Page 284**



***Student Guide* - Page 285**

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

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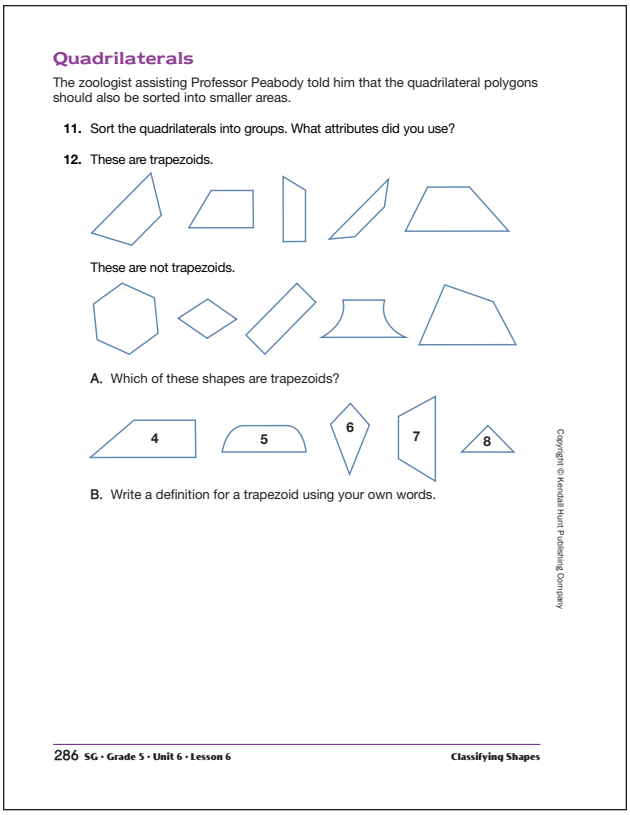

Quadrilaterals

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?

4 5 6 7 8

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

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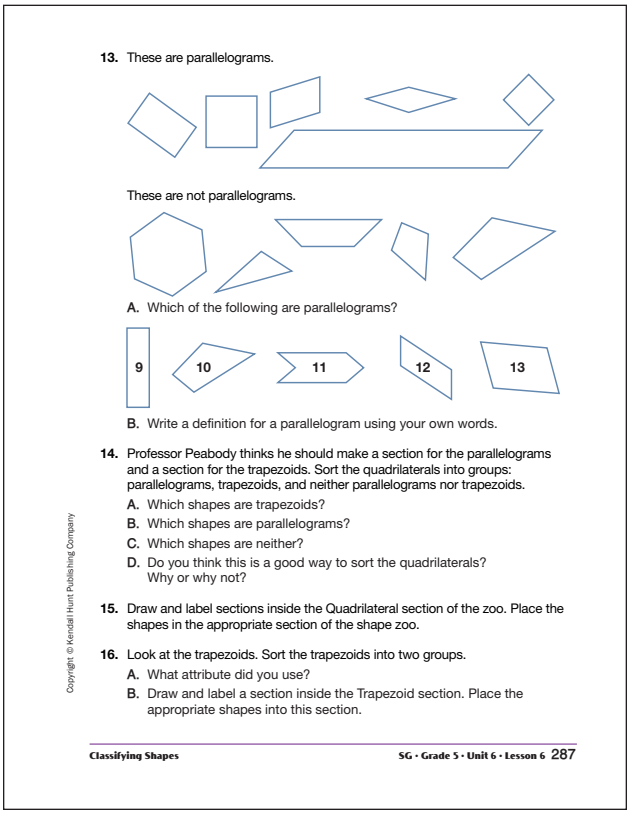
***Student Guide* - Page 286**



13. These are parallelograms.

These are not parallelograms.

A. Which of the following are parallelograms?

9 10 11 12 13

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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***Student Guide* - Page 287**

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.

15.* See Figure 3 in the lesson.

16. A.* Possible response: Trapezoids that are isosceles and those that are not

B.* See Figure 4 in the Lesson.

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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.

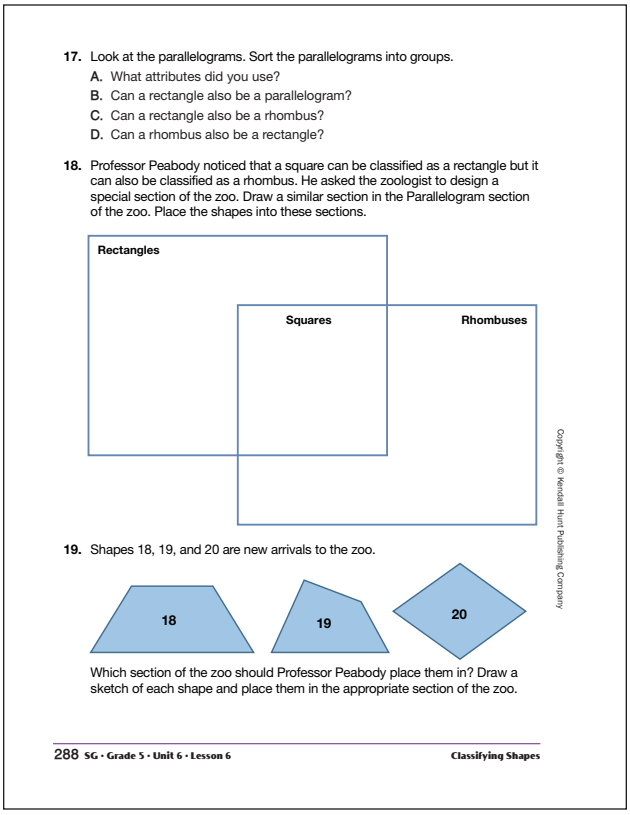
24. **A.*** Possible response: I sorted the shapes using the number of sides.

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.
   - A. What attributes did you use?
   - B. Can a rectangle also be a parallelogram?
   - C. Can a rectangle also be a rhombus?
   - D. 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.

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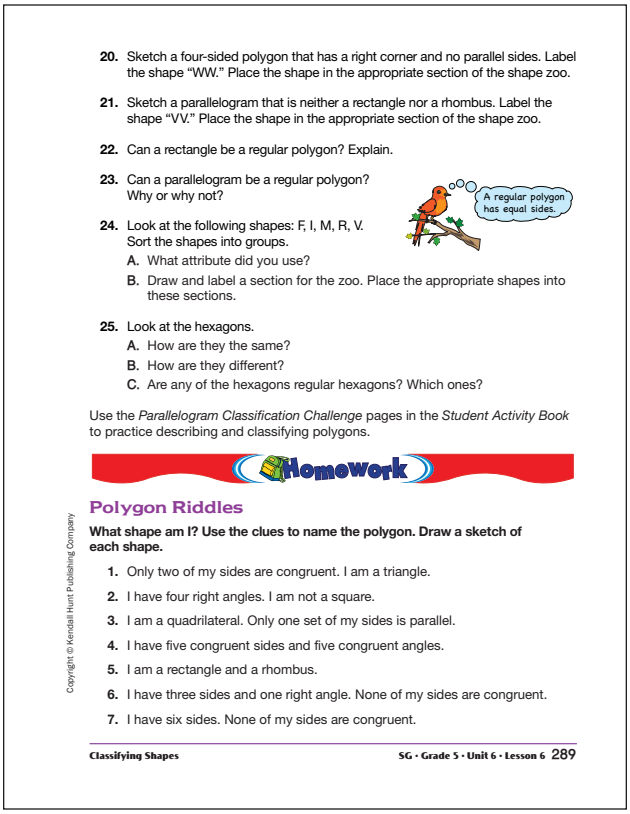
19. Shapes 18, 19, and 20 are new arrivals to the zoo.

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.

***Student Guide* - Page 288**



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.

Homework

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.

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***Student Guide* - Page 289**

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

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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.

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23. Can a parallelogram be a regular polygon? Why or why not?

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25. Look at the hexagons.
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   B. How are they different?
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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.

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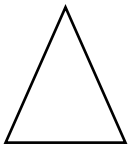
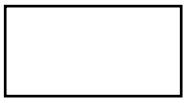
***Student Guide* - Page 289**

Homework (SG p. 289)
Questions 1–7

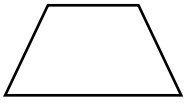
1. isosceles triangle



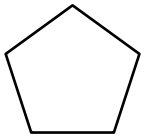
2. rectangle



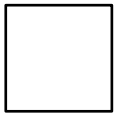
3. trapezoid



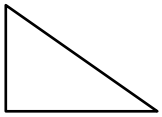
4. regular pentagon



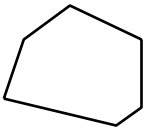
5. square or equilateral rectangle



6. right triangle



7. hexagon



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