Name _____ Date _____ Class _____
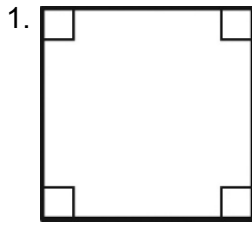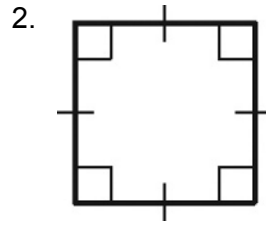
Properties of Rectangles, Rhombuses, and Squares
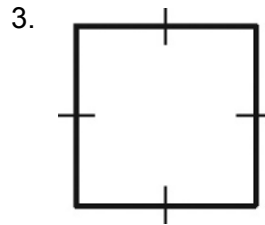### *Practice and Problem Solving: A/B*

Tell whether each figure is a parallelogram, rectangle, rhombus, or square based on the information given. Use the most specific name possible.
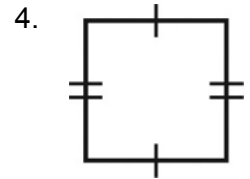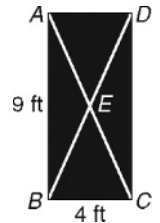
1.

2.

3.

4.

_____ _____ _____ _____

A modern artist's sculpture has rectangular faces. The face shown here is 9 feet long and 4 feet wide. Find each measure in simplest radical form. (*Hint:* Use the Pythagorean Theorem.)

5. $DC =$ _____

6. $AD =$ _____

7. $DB =$ _____

8. $AE =$ _____

VWXY **is a rhombus. Find each measure.**

9. $XY =$ _____

10. $m\angle YVW =$ _____

11. $m\angle VYX =$ _____

12. $m\angle XYZ =$ _____

The rhombus figure shows: $6m - 12$ on top VW, $(9n + 4)°$ at V, $4m + 4$ on the right side, $(3n^2 - 0.75)°$ near X, with center Z.
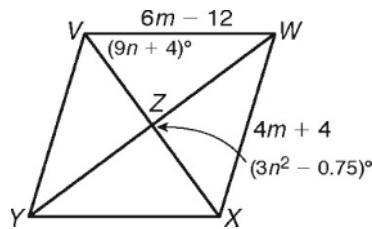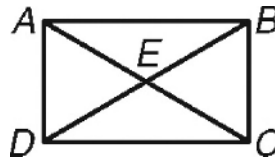
Write a paragraph proof.

13. **Given:** *ABCD* is a rectangle.
    Prove: $\angle EDC \cong \angle ECD$

_____

_____

_____

_____

_____

_____

5.

Statements	Reasons
1. *ABCD* is a parallelogram. $\overline{AC} \perp \overline{BD}$ and $\overline{AC} \cong \overline{BD}$	1. Given
2. $\overline{AE} \cong \overline{CE} \cong \overline{BE} \cong \overline{DE}$	2. The diagonals of a parallelogram bisect each other, and $\overline{AC} \cong \overline{BD}$.
3. $\angle AED \cong \angle BEA \cong \angle CEB \cong \angle DEC = 90°$	3. $\overline{AC} \perp \overline{BD}$
4. $\triangle AED \cong \triangle BEA \cong \triangle CEB \cong \triangle DEC$	4. SAS
5. $\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{DA}$	5. CPCTC
6. $\angle DAB \cong \angle ABC \cong \angle BCD \cong \angle CDA = 90°$	6. Each angle is the sum of two 45° angles.
7. *ABCD* is a square.	7. Definition of a square

Practice and Problem Solving: Modified

1. $\angle W \cong \angle Y$ and $\angle X \cong \angle Z$

2. $\overline{WX} \parallel \overline{ZY}$ and $\overline{WZ} \parallel \overline{XY}$

3. Possible answer: $\angle W$ is supplementary to $\angle X$ and to $\angle Z$.

4. Possible answer: $\overline{WX} \parallel \overline{ZY}$ and $\overline{WX} \parallel \overline{ZY}$

5. $\overline{WY}$ and $\overline{XZ}$ bisect each other.

6. $\overline{WX} \cong \overline{ZY}$ and $\overline{WZ} \cong \overline{XY}$

7. $\overline{BC}$

8. $\overline{BC}$ moves up or down but stays vertical.

9. As the lamp is raised, the size of $\angle A$ increases.

10. Angle *C* also increases in size when the lamp is raised.

Reading Strategies

1. parallelogram; quadrilateral with 2 pairs of opposite angles congruent

2. not a parallelogram; parallelograms have 2 pairs of opposite sides congruent. This figure has 2 pairs of consecutive sides congruent.

3. parallelogram; quadrilateral with diagonals bisecting each other

4. parallelogram; quadrilateral with 1 pair of opposite sides parallel and congruent

5. parallelogram; quadrilateral with 2 pairs of opposite sides congruent

Success for English Learners

1. one

2. No; Possible answer: Parallelograms have 2 pairs of opposite sides congruent. The parallel sides in this quadrilateral are opposite, but they may not be congruent.

LESSON 9-3

Practice and Problem Solving: A/B

1. rectangle

2. square

3. rhombus

4. parallelogram

5. 9 ft

6. 4 ft

7. $\sqrt{97}$ ft

8. $\dfrac{\sqrt{97}}{2}$ ft

9. 36

10. 107°

11. 73°

12. 36.5°

13. Possible answer: *ABCD* is a rectangle, so $\overline{AC}$ is congruent to $\overline{BD}$. Because *ABCD* is a rectangle, it is also a parallelogram. Because *ABCD* is a parallelogram, its diagonals bisect each other. By the definition of bisector, $EC = \dfrac{1}{2}AC$ and $ED = \dfrac{1}{2}BD$. By the definition of congruent segments, $AC = BD$. So substitution and the Transitive Property of Equality show that $EC = ED$. Because

$\overline{EC} \cong \overline{ED}$, $\triangle ECD$ is an isosceles triangle. The base angles of an isosceles triangle are congruent, so $\angle EDC \cong \angle ECD$.

Practice and Problem Solving: C

1. $\sqrt{a^2 + b^2}$

2. $\sqrt{2}s$

3. $\dfrac{\sqrt{2}}{2}d$

4. $\dfrac{\sqrt{f^2 + g^2}}{2}$

5. $\sqrt{3}w$

6. 30°-60°-90°. The triangle formed by a diagonal shares an angle with the equilateral triangle (three sides of length *w*) formed by the side of the rectangle and half of each diagonal. Therefore, one angle of the triangle is 60°, another is the vertex of the rectangle (90°), and the third angle must be 30°.

7. $2\sqrt{13}$; $2\sqrt{13}$; $-\dfrac{3}{2}$; $\dfrac{2}{3}$; (0, 1); (0, 1)

8. 25.3 ft

9. The diagonal forms two isosceles triangles whose corresponding base angles are all congruent (each is half the measure of the bisected angles). The diagonal is a shared side, so the triangles are congruent by ASA. Therefore all four sides of the quadrilateral are congruent, and by SSS the other diagonal also forms two congruent isosceles triangles. Their base angles are all congruent, so each one measures half of the opposite angles of the quadrilateral, which means that the second diagonal bisects both of the other opposite angles.

Practice and Problem Solving: Modified

1. B
2. C
3. A
4. perpendicular
5. congruent
6. parallelogram
7. bisects

8. 3 in.

9. $3\dfrac{1}{4}$ in.

10. $1\dfrac{5}{8}$ in.

11. a. Given

   b. parallel

   c. Alternate Interior Angles Theorem

   d. $\angle 2 \cong \angle 3$

   e. Transitive Property of $\cong$

Reading Strategies

1. no
2. yes
3. yes
4. no
5 no
6. All quadrilaterals are polygons with 4 sides.
7. All 4 angles have to be right angles.
8. All 4 sides have to be congruent.
9. All 4 angles have to be right angles.

Success for English Learners

1. Yes; A square has 4 congruent sides.

2. All sides of a rhombus are congruent, so the length of one side of a rhombus can be substituted for the length of another side.

LESSON 9-4

Practice and Problem Solving: A/B

1. rhombus
2. perpendicular
3. diagonals
4. rhombus
5. rectangle
6. Not valid; Possible explanation: You need to know that $\overline{AC} \perp \overline{BD}$.
7. Not valid; Possible explanation: You need to know that $\overline{AC}$ and $\overline{BD}$ bisect each other.
8. parallelogram
9. rectangle