Answer Key

Lesson 8.3

Challenge Practice

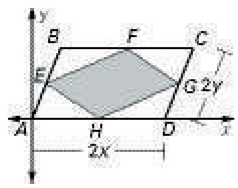
1. *Sample answer:*
First, we know $\overline{AF} \parallel \overline{CD}$, $\overline{AB} \parallel \overline{ED}$, and $\overline{BC} \parallel \overline{FE}$.
Next, draw $\overline{BE}$ parallel to $\overline{CD}$, $\overline{CF}$ parallel to $\overline{AB}$ and $\overline{AD}$ parallel to $\overline{BC}$ and $\overline{FE}$. Label the intersection point G.

Make sure $\overline{BC} \cong \overline{GD}$, $\overline{GD} \cong \overline{FE}$, and $\overline{AB} \cong \overline{FG}$. Because you now have one pair of opposite sides of each quadrilateral congruent and parallel, the quadrilaterals are parallelograms.

2. *PTRU* is a parallelogram. *Sample answer:*
It is given that *PQRS* and *QTSU* are parallelograms. Because the diagonals of a parallelogram bisect each other, $PX = RX$ and $TX = UX$. Because $\overline{PR}$ and $\overline{TU}$ are diagonals of *PTRU* that bisect each other, *PTRU* is a parallelogram.

3. *Sample answer:* Use the compass to measure the length of $\overline{AB}$. With that measure, draw a circle with center C. Use the compass to measure the length of $\overline{BC}$. With that measure, draw a circle with center A. Now label the bottom point of intersection x. Next connect B to x. The point that passes through $\overline{AC}$ should be labeled M so that $\overline{BM}$ is a median.

4. *Sample answer:*

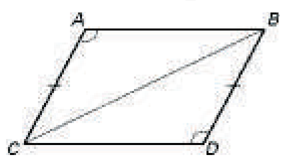


Given: *ABCD* is a parallelogram
Prove: If segments are drawn connecting the midpoints of the adjacent sides of a parallelogram, then another parallelogram is formed that has one-half the area of the original parallelogram.

Step 1: Find the area of *ABCD*.
Area = (base)(height) = $2x(2y) = 4xy$

Step 2:
Area of *EFGH* = Area of $\triangle EFG$ + Area of $\triangle GHE$ $= \frac{1}{2}(2x)(y) + \frac{1}{2}(2y)(y) = xy + xy = 2xy$
Step 3: The area of *EFGH* is $2xy$ which is $\frac{1}{2}$ the area of *ABCD*.

5. *Sample answer:*



You are given a quadrilateral with one pair of congruent opposite sides and one pair of congruent opposite angles. This can be shown in the diagram above. $\overline{AC} \cong \overline{DB}$ and $\overline{CA} \cong \overline{CD}$ by the given infomation and $\overline{CB} \cong \overline{CB}$ by the
Reflexive Property. Although you have two congruent sides and a pair of congruent angles, the congruent angle is not included. Because there is no more information given and you cannot obtain any more, it cannot be shown that
$\triangle ABC \cong \triangle DCB$ because congruence theorems for this situation do not exist. You need
$\triangle ABC \cong \triangle DCB$ to prove the quadrilateral is a parallelogram.

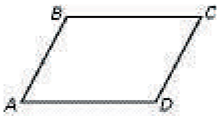
6. You would need to show that on angle is supplementary to both consecutive angles.

Answer Key

Sample answer:

Given: $\angle A$ is supplementary to $\angle B$ and $\angle D$.

Prove: *ABCD* is a parallelogram.



Statements	**Reasons**
1. $\angle A$ is supplementary to $\angle B$ and $\angle D$.	**1.** Given
2. $\overline{BC} \parallel \overline{AD}$ and $\overline{BA} \parallel \overline{CD}$	**2.** Consecutive Interior Angles Converse
3. *ABCD* is a parallelogram	**3.** Definition of a parallelogram.