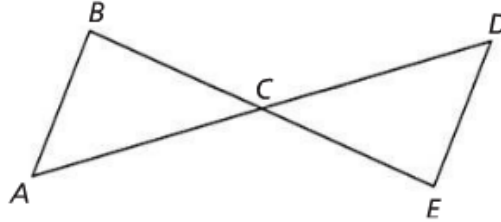


2.06

On Your Own

3. **Standardized Test Prep** \overline{BE} bisects \overline{AD} at C . Point C is the midpoint of \overline{BE} . Choose the correct reason for step 4 in the following proof.



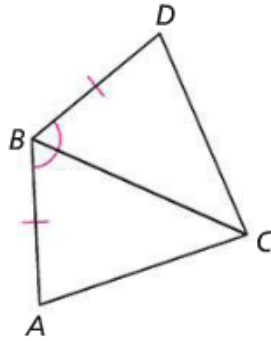
Statements

1. \overline{BE} bisects \overline{AD} at C . Point C is the midpoint of \overline{BE} .
 2. $\overline{AC} \cong \overline{DC}$
 3. $\overline{BC} \cong \overline{EC}$
 4. $\angle BCA \cong \angle ECD$
 5. $\triangle ABC \cong \triangle DEC$
- A. Straight angles are congruent.
 B. Corresponding angles are congruent.
 C. Opposite angles are congruent.
 D. Vertical angles are congruent.

Reasons

1. Given
 2. Definition of bisects
 3. Definition of midpoint
 4. ?
 5. SAS triangle congruence postulate
-

4. Use the figure below. $\overline{AB} \cong \overline{DB}$ and $m\angle ABC = m\angle DBC$.

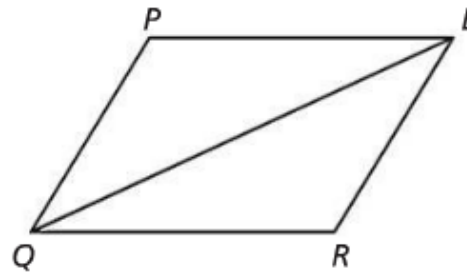


Provide the missing reasons in the proof to show that $\overline{AC} \cong \overline{DC}$.

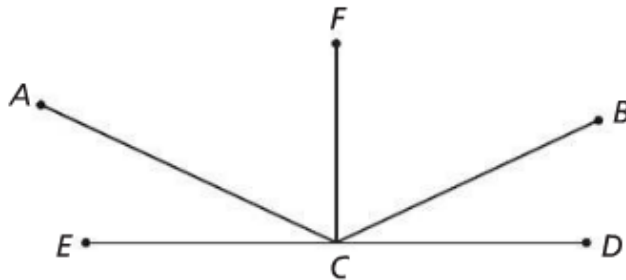
Statements	Reasons
a. $\overline{AB} \cong \overline{DB}$	Given
b. $m\angle ABC = m\angle DBC$	<u>?</u>
c. $\overline{BC} \cong \overline{BC}$	<u>?</u>
d. $\triangle ABC \cong \triangle DBC$	<u>?</u>
e. $\overline{AC} \cong \overline{DC}$	<u>?</u>

5. In this figure, $\overline{PL} \cong \overline{RQ}$ and $\overline{PQ} \cong \overline{RL}$.
Prove each of the following.

- a. $\triangle QPL \cong \triangle LRQ$
b. $\angle P \cong \angle R$



6. Use the figure below.
 $m\angle DCB = m\angle ECA$. Points E, C, and D are collinear. $\overline{FC} \perp \overline{ED}$.



- a. Based on the given information, what can you prove?
b. Prove your conjecture from part (a).

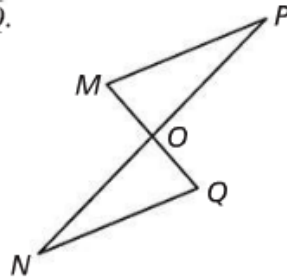
2.07

On Your Own

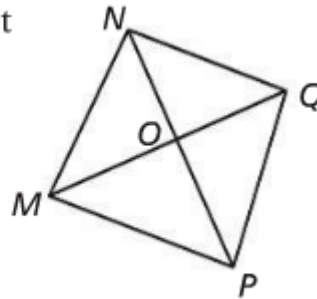
- Suppose two lines are perpendicular to the same line. Are the two lines parallel? Explain.
- Two lines in the same plane either intersect or are parallel. Explain. Is the statement true of two lines in space? Explain.

In Exercises 7 and 8, use the given information to determine which segments in each figure must be parallel. For each exercise, provide a proof to support your answer.

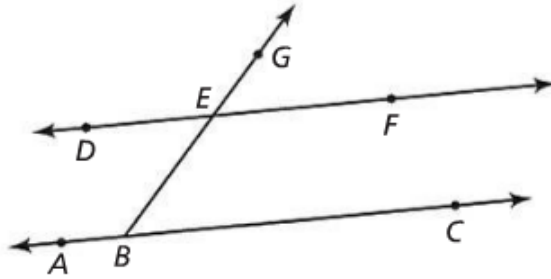
- Point O is the midpoint of both \overline{NP} and \overline{MQ} .



- The diagonals of quadrilateral $MPQN$ intersect at point O . $MO = PO$ and $NO = QO$.



9. **Standardized Test Prep** In the figure at the right, \overrightarrow{BG} intersects \overline{AC} at point B . \overrightarrow{BG} intersects \overline{DF} at point E . Angle ABG and $\angle GEF$ are supplementary.



Choose the correct reason for step number 8 in the following proof that $\overline{AC} \parallel \overline{DF}$.

Statements

Reasons

1. \overrightarrow{BG} intersects \overline{AC} and \overline{DF} at points B and E , respectively.
2. $\angle ABG$ and $\angle GEF$ are supplementary.
3. $m\angle ABG + m\angle GEF = 180^\circ$
4. $\angle GEF \cong \angle DEB$
5. $m\angle GEF = m\angle DEB$
6. $m\angle ABG + m\angle DEB = 180^\circ$
7. $\angle ABG$ and $\angle DEB$ are supplementary angles.

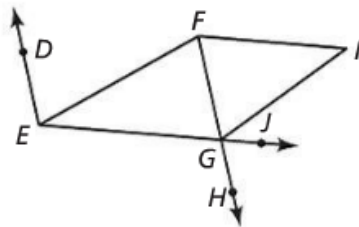
1. Given
2. Given
3. definition of supplementary angles
4. Vertical angles are congruent.
5. definition of congruent angles
6. substitution property of equality
7. definition of supplementary angles

8. $\overline{AC} \parallel \overline{DF}$

8. ?

- A. If corresponding angles are congruent, then the lines are parallel.
- B. If consecutive angles are supplementary, then the lines are parallel.
- C. If alternate interior angles are congruent, then the lines are parallel.
- D. If alternate exterior angles are supplementary, then the lines are parallel.

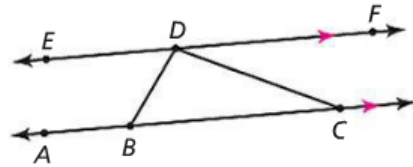
10. In the figure below, $m\angle DEG + m\angle HFI = 180^\circ$, and $m\angle FGE = m\angle HFI$. Find the lines in the figure that must be parallel, if there are any. Prove what you find.



2.08

On Your Own

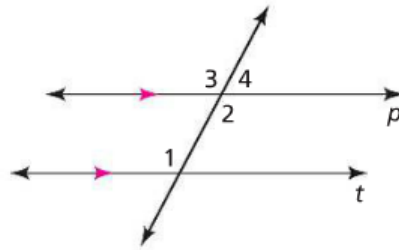
8. **Standardized Test Prep** In the figure at the right, $\overleftrightarrow{AB} \parallel \overleftrightarrow{EF}$. The measure of $\angle BCD$ is 25° . The measure of $\angle ABD$ is 125° . What is the measure of $\angle BDC$?



- A. 55°
- B. 80°
- C. 100°
- D. 125°

9. In the figure at the right, lines p and t are parallel.

- a. Why is $\angle 1 \cong \angle 2$?
- b. Why is $\angle 2 \cong \angle 3$?
- c. Why is $\angle 1 \cong \angle 3$?



10. **Take It Further** Prove that, in a plane, two lines that are both parallel to a third line are parallel to each other.

11. Prove that the AAS triplet guarantees triangle congruence. Use the triangle congruence postulates and the Triangle Angle-Sum Theorem in your proof.

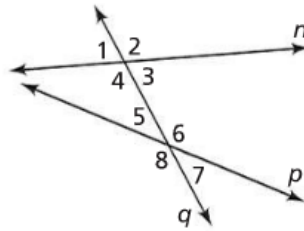
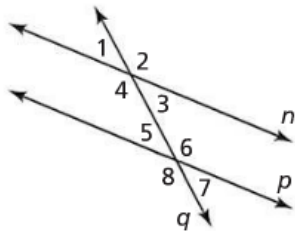
12. The Exterior Angle Theorem says that the measure of an exterior angle of a triangle is greater than the measure of either of the two remote interior angles. You can take this one step further. Prove that the measure of an exterior angle of a triangle is equal to the sum of the measures of the two remote interior angles.

Why do you think we did not prove this originally?

13. For each polygon listed below, prove that the sum of the measures of its angles is invariant. Then find the sum of the measures of the angles for each polygon. Justify your answers.

- a. pentagon (five-sided polygon)
- b. hexagon (six-sided polygon)

14. **Take It Further** Use your knowledge of parallel lines. Decide whether each of the constructions (a)–(d) is possible. Explain.



- a. Lines n and p are not parallel and $m\angle 3 + m\angle 6 = 180^\circ$.
- b. Line n is parallel to line p and $m\angle 4 = m\angle 6$.
- c. Line n is parallel to line p and $m\angle 2 = m\angle 5$.
- d. $m\angle 4 + m\angle 5 > m\angle 2 + m\angle 7$