

Chapter 9 Angle Relationships

Teacher Guide and Diagnostic Answer Key

Teacher Guide

Teacher Chapter-at-a-Glance

None required
Pacing
Talk Prompt

Mastery Decision Guide

A missed Tripwire does not automatically mean “redo the chapter.” Confirm the likely misconception, reteach the smallest prerequisite or representation that addresses it, and then use a fresh item before moving on.

Missed Tripwire #1 → Co-interior angles are being confused with corresponding or alternate angles, which are equal. Next move: Name the relationship before calculating, then write $124^\circ + x = 180^\circ$.

Confirmation and Fresh Recheck

Confirm with: Ask, “Are these angles equal, or do they make a total? What is the relationship called?”

Fresh recheck: Give one corresponding-angle item and one co-interior item side by side; require the relationship name before the number.

Decision rule: Move forward only when the fresh response is secure and the reasoning survives the changed representation or context.

Diagram Production Notes — Chapter 9

Use the diagram master IDs:

Ch09-D01 — Complementary Angles

Ch09-D02 — Supplementary Angles

Ch09-D03 — Angles on a Straight Line

Ch09-D04 — Angles Around a Point

Ch09-D05 — Vertically Opposite Angles

Ch09-D06 — Parallel Lines and Transversal

Ch09-D07 — Co-Interior Trap

The parallel-line diagrams must clearly mark the parallel lines. Use matching arrow marks on the lines. Do not let angle labels crowd the transversal. The co-interior trap diagram must visually separate “equal angle pairs” from “add to 180°” pairs.

Ready to Learn Check

Quick check before starting. A wrong response below points to a prerequisite worth confirming before the chapter builds on it.

1. What do angles on a straight line add to?

Correct answer: 180°

Likely wrong answer: 90° or 360°

Possible misconception: Straight-line total is not secure.

Next move: Use a straight line as a half-turn and label it 180° .

2. What do angles around a point add to?

Correct answer: 360°

Likely wrong answer: 180°

Possible misconception: Full-turn total is not secure.

Next move: Trace one complete turn around a point and connect it to 360° .

3. If one angle is 40° , what angle would make it supplementary?

Correct answer: 140°

Likely wrong answer: 40° or 220°

Possible misconception: Supplementary means sum to 180° is not secure.

Next move: Write $40^\circ + x = 180^\circ$ before subtracting.

Ready-to-Learn item 1

Correct answer: 180°

Likely wrong answer: 90° or 360°

Misconception: Straight-line total is not secure.

Next move: Use a straight line as a half-turn and label it 180° .

Ready-to-Learn item 2

Correct answer: 360°

Likely wrong answer: 180°

Misconception: Full-turn total is not secure.

Next move: Trace one complete turn around a point and connect it to 360° .

Ready-to-Learn item 3

Correct answer: 140°

Likely wrong answer: 40° or 220°

Misconception: Supplementary means sum to 180° is not secure.

Next move: Write $40^\circ + x = 180^\circ$ before subtracting.

Practice

Assign the full set or select items for targeted review. Teacher solutions follow each question.

1. Two angles add to 90° .

Solution: 1. complementary

2. Two angles add to 180° .

Solution: 2. supplementary

3. Angles opposite each other when two lines cross.

Solution: 3. vertically opposite

4. Angles around one point.

Solution: 4. around a point

5. Angles on the same side of a transversal and inside parallel lines.

Solution: 5. co-interior

6. Angles in matching positions when parallel lines are cut by a transversal.

Solution: 6. corresponding

7. Two angles are complementary. One angle is 27° . Find the other angle.

Solution: 7. $90^\circ - 27^\circ = 63^\circ$

8. Two angles are supplementary. One angle is 116° . Find the other angle.

Solution: 8. $180^\circ - 116^\circ = 64^\circ$

9. Two angles lie on a straight line. One angle is 84° . Find the other angle.

Solution: 9. $180^\circ - 84^\circ = 96^\circ$

10. Angles around a point are 90° , 125° , 70° , and x . Find x .

Solution: 10. $90^\circ + 125^\circ + 70^\circ = 285^\circ$ $360^\circ - 285^\circ = 75^\circ$

11. Two vertically opposite angles are shown. One is 63° . Find the other. Assume the lines are parallel.

Solution: 11. 63°

12. A corresponding angle to 58° is x . Find x .

Solution: 12. 58°

13. An alternate interior angle to 72° is x . Find x .

Solution: 13. 72°

14. A co-interior angle to 105° is x . Find x .

Solution: 14. $180^\circ - 105^\circ = 75^\circ$

15. A co-interior angle to 39° is x . Find x .

Solution: 15. $180^\circ - 39^\circ = 141^\circ$

16. A student sees two angles on parallel lines and assumes they are equal. Explain why that is not always enough information.

Solution: 16. Some angle pairs on parallel lines are equal, but co-interior angles are not equal. They add to 180° . The relationship must be named first.

17. A student says vertically opposite angles add to 180° . Explain the mistake.

Solution: 17. Vertically opposite angles are equal. They do not automatically add to 180° .

18. A student says corresponding angles are equal even though the lines are not marked parallel. Explain the problem.

Solution: 18. Corresponding angles are equal when the lines are parallel. If the lines are not marked or stated parallel, the equality is not guaranteed.

Chapter Answer Key

Tripwire Check

The student is not correct.

Co-interior angles are not equal.

They add to 180° .

$$180^\circ - 124^\circ = 56^\circ$$

The other co-interior angle is:

$$56^\circ$$

Worksheet 1: Guided Practice

1.

- a. 90°
- b. 180°
- c. 180°
- d. 360°
- e. equal

2.

- a.
 $90^\circ - 40^\circ = 50^\circ$
- b.
 $180^\circ - 130^\circ = 50^\circ$
- c.

$$180^\circ - 75^\circ = 105^\circ$$

d.

$$100^\circ + 80^\circ + 90^\circ = 270^\circ$$

$$360^\circ - 270^\circ = 90^\circ$$

3.

a. equal

b. equal

c. add to 180°

Worksheet 2: Independent Practice

1.

a. 68°

b. 26°

c. 81°

d. 35°

e. 143°

f. 62°

g.

$$80^\circ + 95^\circ + 110^\circ = 285^\circ$$

$$360^\circ - 285^\circ = 75^\circ$$

h.

$$45^\circ + 90^\circ + 135^\circ = 270^\circ$$

$$360^\circ - 270^\circ = 90^\circ$$

2.

a. 64°

b. 121°

c. 48°

d. 133°

e.

$$180^\circ - 76^\circ = 104^\circ$$

f.

$$180^\circ - 109^\circ = 71^\circ$$

3.

a. False

b. True

c. True

- d. False
- e. True
- f. True

Worksheet 3: Mixed Practice & Application

1.

- a. Straight-line angles.

$$180^\circ - 48^\circ = 132^\circ$$

- b. Complementary angles.

$$90^\circ - 61^\circ = 29^\circ$$

- c. Angles around a point.

$$85^\circ + 140^\circ + 65^\circ = 290^\circ$$

$$360^\circ - 290^\circ = 70^\circ$$

- d. Co-interior angles.

$$180^\circ - 117^\circ = 63^\circ$$

2.

Co-interior angles are not equal. They add to 180° . The student confused co-interior angles with corresponding or alternate interior angles.

3.

- a. corresponding angles

- b. 74°

4.

- a.

$$36^\circ + 89^\circ = 125^\circ$$

- b.

$$180^\circ - 125^\circ = 55^\circ$$

- c. The angles lie on a straight line, so the total is 180° . Angles around a point would total 360° .

5.

Angles around a point make a full turn. A full turn is 360° , not 180° .

6.

Corresponding angles are equal only when the lines are parallel. If the diagram does not mark or state parallel lines, the student cannot assume the angles are equal.

Diagnostic Key — High-Leverage Items

Tripwire Check

Correct answer: No. Co-interior angles sum to 180° , so the other angle is 56° .

Likely wrong answer: 124° .

Misconception: Co-interior angles are being confused with corresponding or alternate angles, which are equal.

Next move: Name the relationship before calculating, then write $124^\circ + x = 180^\circ$.

Tripwire Diagnostic

Correct answer: No. Co-interior angles sum to 180° , so the other angle is 56° .

Likely wrong answer: 124° .

Misconception: Co-interior angles are being confused with corresponding or alternate angles, which are equal.

Next move: Name the relationship before calculating, then write $124^\circ + x = 180^\circ$.

Exit Ticket Diagnostic — High-Leverage Item

Correct answer: 68° because co-interior angles on parallel lines sum to 180° .

Likely wrong answer: 112°

Misconception: Co-interior angles are being treated as equal like corresponding/alternate angles.

Next move: Name the relationship first, then write $112^\circ + x = 180^\circ$.

Variation Lab — Expected Ideas

1. 47° and 133° are supplementary because they total 180° .
2. $120 + 95 + 80 = 295$, so $x = 65^\circ$.
3. Equal-angle relationships and supplementary-angle relationships must be named before calculating.

Transfer Check — Suggested Responses

Familiar: 112° . Altered: 73° . Non-routine: 118° . Repair: co-interior angles sum to 180° , so the partner is 56° .

Exit Ticket — Answers

1. 117°
2. 68°
3. vertically opposite angles