

Parallel Lines and Transversals

Name: _____

Date: _____

Score: _____ / 24

Q Quick Review

When a **transversal** (a line) crosses two **parallel lines**, it creates eight angles with neat relationships. **Corresponding angles** (same position at each crossing) are *equal*. **Alternate interior angles** (between the lines, opposite sides of the transversal) are *equal*. **Alternate exterior angles** (outside the lines, opposite sides) are *equal*. **Co-interior angles** (between the lines, same side) are *supplementary* — they add to 180° . Once you know one angle, you can find all the others.

◇ **Example:** Two parallel lines are cut by a transversal. One angle measures 70° . Find its co-interior (same-side interior) angle.

⇒ Co-interior angles sit between the two parallel lines, on the *same side* of the transversal. The rule is that they are *supplementary* — they add up to 180° . So if one is 70° , the other must be $180^\circ - 70^\circ = 110^\circ$. Check: $70 + 110 = 180$. That's the straight line they form together.

Answer: 110°

PRACTICE

Find the requested angle. Lines are parallel, cut by a transversal.

- | | | | |
|--|-------|--|-------|
| 1. Corresponding angle to 50° | _____ | 11. Linear pair with 115° | _____ |
| 2. Corresponding angle to 125° | _____ | 12. Corresponding angle: $3x$ equals 75° . Find x . | _____ |
| 3. Alternate interior angle to 65° | _____ | 13. Alternate interior: $2x$ equals 100° . Find x . | _____ |
| 4. Alternate interior angle to 140° | _____ | 14. Co-interior: x and $4x$. Find x . | _____ |
| 5. Alternate exterior angle to 38° | _____ | 15. Co-interior: x and $x + 60$. Find x . | _____ |
| 6. Alternate exterior angle to 152° | _____ | 16. Corresponding: $x + 10$ equals 85° . Find x . | _____ |
| 7. Co-interior angle to 80° | _____ | 17. Alternate exterior: $5x$ equals 145° . Find x . | _____ |
| 8. Co-interior angle to 110° | _____ | 18. Two angles, one 130° , on a line. Other? | _____ |
| 9. Co-interior angle to 90° | _____ | 19. Co-interior: $2x$ and $3x$. Find x . | _____ |
| 10. Vertical angle to 47° | _____ | 20. Corresponding angles equal? (parallel lines) | _____ |

◆ Word Problems

21. A straight crosswalk cuts across two parallel street curbs. It makes a 68° angle with the first curb. What is the corresponding angle it makes with the second curb? _____
22. Two parallel shelves are joined by a diagonal brace. The brace makes a 115° co-interior angle on the top shelf. What is the co-interior angle it makes on the bottom shelf? _____
23. A transversal crosses two parallel lines. One alternate interior angle is labeled $4x$ and the other is 96° . Solve for x . _____
24. A road sign post crosses two parallel guide wires. The co-interior angles it forms are $2x$ and $7x$. Find x and both angle measures. _____



Answer Keys

- | | |
|--------------------------------------|---|
| 1. <input type="text" value="50°"/> | 13. <input type="text" value="50°"/> |
| 2. <input type="text" value="125°"/> | 14. <input type="text" value="36°"/> |
| 3. <input type="text" value="65°"/> | 15. <input type="text" value="60°"/> |
| 4. <input type="text" value="140°"/> | 16. <input type="text" value="75°"/> |
| 5. <input type="text" value="38°"/> | 17. <input type="text" value="29°"/> |
| 6. <input type="text" value="152°"/> | 18. <input type="text" value="50°"/> |
| 7. <input type="text" value="100°"/> | 19. <input type="text" value="36°"/> |
| 8. <input type="text" value="70°"/> | 20. <input type="text" value="yes"/> |
| 9. <input type="text" value="90°"/> | 21. <input type="text" value="68°"/> |
| 10. <input type="text" value="47°"/> | 22. <input type="text" value="65°"/> |
| 11. <input type="text" value="65°"/> | 23. <input type="text" value="x = 24°"/> |
| 12. <input type="text" value="25°"/> | 24. <input type="text" value="x = 20°; angles are 40° and 140°"/> |

Step-by-Step Explanations

- | | |
|---|--|
| 1. Corresponding angles are equal. | 14. $x + 4x = 5x = 180$, so $x = 36^\circ$. |
| 2. Corresponding angles are equal. | 15. $x + x + 60 = 180$, so $2x = 120$ and $x = 60^\circ$. |
| 3. Alternate interior angles are equal. | 16. $x + 10 = 85$, so $x = 75^\circ$. |
| 4. Alternate interior angles are equal. | 17. $5x = 145$, so $x = 29^\circ$. |
| 5. Alternate exterior angles are equal. | 18. Angles on a line are supplementary: $180 - 130 = 50^\circ$. |
| 6. Alternate exterior angles are equal. | 19. $2x + 3x = 5x = 180$, so $x = 36^\circ$. |
| 7. Co-interior angles are supplementary: $180 - 80 = 100^\circ$. | 20. Yes — corresponding angles are always equal between parallel lines. |
| 8. $180 - 110 = 70^\circ$. | 21. Corresponding angles between parallel lines are equal, so the angle is also 68° . |
| 9. $180 - 90 = 90^\circ$. | 22. Co-interior angles are supplementary, so the angle is $180 - 115 = 65^\circ$. |
| 10. Vertical angles are equal. | 23. Alternate interior angles are equal, so $4x = 96$, giving $x = 24^\circ$. |
| 11. A linear pair is supplementary: $180 - 115 = 65^\circ$. | 24. Co-interior angles add to 180° : $2x + 7x = 9x = 180$, so $x = 20^\circ$. The angles are $2(20) = 40^\circ$ and $7(20) = 140^\circ$. |
| 12. $3x = 75$, so $x = 25^\circ$. | |
| 13. $2x = 100$, so $x = 50^\circ$. | |



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