Honors Geometry Chapter 3 – Proofs Involving Parallel and Perpendicular Lines

Practice – Proofs Involving Parallel and Perpendicular Lines

Name ________________________   Date ________________   Period _______

Choose the word(s) that best completes the statements.

1. If two lines are cut by a transversal so that alternate interior angles are (congruent, supplementary, complementary), then the lines are parallel.

2. If two lines are cut by a transversal so that same-side interior angles are (congruent, supplementary, complementary), then the lines are parallel.

3. If two lines are cut by a transversal so that (alternate interior, alternate exterior, corresponding) angles are congruent, then the lines are parallel.

4. If two coplanar lines are perpendicular to the same line, then the two lines are (perpendicular, parallel, skew) to each other.

a || b. State the postulate or theorem that justifies each conclusion.

Example: \( \angle 4 \cong \angle 8 \) because \( \parallel \text{ lines} \rightarrow \text{ corresponding } \angle \text{ s } \cong \)

5. \( \angle 1 \cong \angle 8 \)

6. \( \angle 3 \cong \angle 7 \)

7. \( \angle 4 \) supplementary to \( \angle 6 \)

8. \( \angle 3 \) supplementary to \( \angle 4 \)

9. \( \angle 7 \cong \angle 6 \)

State the postulate or theorem (shorthand) that allows you to conclude that \( j \parallel k \).

Example: corr. \( \angle \text{ s } \cong \rightarrow \parallel \text{ lines} \)

10. 

11. 

12. 

13. 

Use the figure and the given information to determine which lines, if any, are parallel. Justify using a theorem or postulate.

14. \( \angle 9 \cong \angle 16 \rightarrow ____ \parallel ____ \) because ____________________________

15. \( \angle 5 \cong \angle 7 \rightarrow ____ \parallel ____ \) because ____________________________

16. \( \angle 14 \cong \angle 16 \rightarrow ____ \parallel ____ \) because ____________________________

17. \( \angle 1 \cong \angle 16 \rightarrow ____ \parallel ____ \) because ____________________________

18. \( \angle 5 \cong \angle 10 \rightarrow ____ \parallel ____ \) because ____________________________
Honors Geometry: Chapter 3 – Proofs Involving Parallel and Perpendicular Lines

Fill in the missing statements and reasons in each proof shown below. You must mark the diagram for credit.

19. Given: \(a\parallel b\)
    \(c\parallel d\)

Prove: \(\angle 1 \cong \angle 16\)

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<thead>
<tr>
<th>Statements</th>
<th>Reasons</th>
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<tbody>
<tr>
<td>1)</td>
<td>1) given</td>
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<tr>
<td>2) (\angle 1 \cong \angle 8)</td>
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<tr>
<td>3)</td>
<td>3) given</td>
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<tr>
<td>4) (\angle 8 \cong \angle 16)</td>
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<td>5)</td>
<td>5) Transitive prop. (\cong)</td>
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20. Given: \(a\parallel b\)
    \(c\parallel d\)

Prove: \(\angle 9 \cong \angle 8\)

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<tr>
<td>1)</td>
<td>1) given (be careful)</td>
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<tr>
<td>2) (\angle 9 \cong \angle 6)</td>
<td>2)</td>
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<td>3)</td>
<td>3) given</td>
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<td>4)</td>
<td>4)</td>
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<tr>
<td>5) (\angle 9 \cong \angle 8)</td>
<td>5)</td>
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21. Given: \(a\parallel b\)
    \(c\parallel d\)

Prove: \(m\angle 2 + m\angle 11 = 180^\circ\)

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<tbody>
<tr>
<td>1)</td>
<td>1) given</td>
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<tr>
<td>2) (\angle 2 &amp; \angle 3) are supplementary</td>
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<td>7)</td>
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22. Given: \( \parallel \parallel m \)
\[ \angle 1 \equiv \angle 7 \]
Prove: \( a \parallel b \)

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<tr>
<td>1) ( \parallel \parallel m )</td>
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23. Given: \( a \parallel b \)
\[ \angle 5 \text{ is supplementary to } \angle 2 \]
Prove: \( \parallel \parallel m \)

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<tbody>
<tr>
<td>1) ( \angle 5 \text{ supplementary to } \angle 2 )</td>
<td>1)</td>
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<td>2)</td>
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<td>3) ( a \parallel b )</td>
<td>3)</td>
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<td>4) ( \angle 1 \equiv \angle 5 )</td>
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<tr>
<td>6) ( m\angle 1 + m\angle 2 = 180^\circ )</td>
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<td>8) ( \parallel \parallel m )</td>
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24. Given: \( \angle 1 \equiv \angle 2 \)
\[ p \parallel q \]
Prove: \( q \perp a \)

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25. Given: $\angle 1 \& \angle 2$ are Complementary
Prove: $\overline{SX} \perp \overline{WX}$

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<td>1) $\angle 1 &amp; \angle 2$ are Complementary</td>
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<td>2) $m\angle 1 + m\angle 2 = 90$</td>
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<td>3) $m\angle WXS = m\angle 1 + m\angle 2$</td>
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<td>4) $m\angle WXS = 90$</td>
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<td>5) $\angle WXS$ is right</td>
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<td>6) $\overline{SX} \perp \overline{WX}$</td>
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26. Prove the statement: If two parallel lines are cut by a transversal, then the same-side exterior angles are supplementary.

Given: ________________
Prove: ________________

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27. Prove the statement: If two coplanar lines are perpendicular, then they form a pair of congruent, supplementary angles.
First write the given(hypothesis) and the prove(conclusion) using the diagram.

Given: ________________
Prove: ________________ and ________________

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