1. Describe what the notation $\overline{RS}$ stands for. Illustrate with a sketch.

2. What do $\overline{PQ}$ and $\overline{QP}$ have in common?

3. Draw four points, A, B, C, and D, on a line so that $\overline{CB}$ and $\overline{CA}$ are opposite rays and $\overline{CD}$ and $\overline{DA}$ are the same ray.

4. Draw two planes that intersect at $\overline{JK}$. Draw $\overline{PQ}$ so that it intersects $\overline{JK}$ at point J. Are $\overline{JK}$ and $\overline{PQ}$ coplanar? Explain your answer.

5. If $RS = 44$ and $QS = 68$, find $QR$.

6. R, S, and T are collinear. S is between R and T. $RS = 2w + 1$, $ST = w - 1$, and $RT = 18$. Use the Segment Addition Postulate to solve for $w$. Then determine the length of $RS$.

7. Find $AB$ and $BC$ in the situation shown. $AB = x + 16$, $BC = 5x + 10$, $AC = 56$.

8. Find the distance between the points $(1, 4)$ and $(-2, -1)$.

9. The distance between points A and B is

10. Find the midpoint of the segment with endpoints (9, 8) and (3, 5).

11. Find the circumference of the circle. Use $\pi = 3.14$.

12. Find the area. All lengths are in centimeters.

13. A wooden fence is to be built around a 50 m-by-62 m lot. How many meters of fencing will be needed? If the wood for the fence costs $47.75 per meter, what will the wood for the fence cost?

14. In the figure (not drawn to scale), $MO$ bisects $\angle LMO$. $m\angle LMO = (15x - 21)^\circ$ and $m\angle NMO = (x + 63)^\circ$. Solve for $x$ and find $m\angle LNM$.
15. \( m\angle OMC = (2x + 9)^\circ \) and \( m\angle LMN = (6x - 7)^\circ \) and \( m\angle OML = 66^\circ \). Find \( m\angle OMC \) and \( m\angle LMN \).

\[
\begin{align*}
6x - 7 + 2x + 9 &= 66 \\
8x &= 60 \\
x &= 7.5
\end{align*}
\]

\( m\angle OMC = 2(9.75) + 9 = 36^\circ \)

\( m\angle LMN = 6(7.5) - 7 = 41^\circ \)

16. The first three members of a sequence are shown.

How many dots are in the fourth member of the sequence?

17. If the pattern were continued, what would be the ratio of the number of unshaded squares to the number of shaded squares in the next figure in the pattern?

\[
\begin{array}{c|c|c|c|c}
\text{n} & 1 & 2 & 3 & 4 \\
\hline
\text{unshaded squares} & 1 & 3 & 5 & 7 \\
\text{shaded squares} & 0 & 2 & 4 & 6 \\
\end{array}
\]

18. If \( PQ = 3 \) and \( PQ + RS = 5 \), then \( 3 + RS = 5 \) is an example of the ________

a. Substitution Property of Equality  

b. Multiplication Property of Equality  
c. Transitive Property of Equality  
d. Reflexive Property of Equality

19. Name the property which justifies the following conclusion:

Given: \( b + c - d = e \) and \( d = a \)

Conclusion: \( b + c - a = e \)

Substitution Prop.

20. Name the property which justifies the following conclusion:

Given: \( 18x = 288 \)

Conclusion: \( x = 16 \)

Division Prop.

21. If \( XY = MN \), then \( MN = XY \).

Symmetric Prop.

22. If \( m\angle L = m\angle R \) and \( m\angle R = m\angle T \), then \( m\angle L = m\angle T \).

Transitive Prop.

23. \( \angle 1 \) and \( \angle 2 \) form a linear pair, if \( \angle 2 = 67^\circ \), what is \( m\angle 1 \)?

\[
\begin{align*}
\angle 1 + \angle 2 &= 180^\circ \\
\angle 1 &= 180^\circ - \angle 2 \\
\angle 1 &= 180^\circ - 67^\circ \\
\angle 1 &= 113^\circ
\end{align*}
\]

24. Justify the conclusion.

Given: \( \angle AOC \) and \( \angle COB \) are a linear pair

Conclusion: \( \angle AOC \) and \( \angle COB \) are supplementary

25. Write a two-column proof.

Given: \( \angle AOC \) and \( \angle COB \) are a linear pair

Prove: \( \angle AOC + \angle COB = 180^\circ \)

<table>
<thead>
<tr>
<th>Statements</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \angle AOC ) and ( \angle COB ) are ( \text{L.P.} )</td>
<td>( \text{Given} )</td>
</tr>
<tr>
<td>( \angle AOC ) and ( \angle COB ) are ( \text{Supp.} )</td>
<td>( \text{L.P. Post.} )</td>
</tr>
<tr>
<td>( \text{Def. of Supp. ( \angle )s} )</td>
<td>( \text{Def. of Supp. ( \angle )s} )</td>
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</table>

26. Given: \( \angle 1 \) and \( \angle 2 \) form a linear pair, \( m\angle 2 = 100^\circ \)

Prove: \( m\angle 1 = 80^\circ \)

<table>
<thead>
<tr>
<th>Statements</th>
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<tr>
<td>( \angle 1 ) and ( \angle 2 ) from ( \text{L.P.} ) ( m\angle 2 = 100^\circ )</td>
<td>( \text{Given} )</td>
</tr>
<tr>
<td>( \angle 1 ) and ( \angle 2 ) are ( \text{Supp.} )</td>
<td>( \text{L.P. Post.} )</td>
</tr>
<tr>
<td>( \text{Def. of Supp. ( \angle )s} )</td>
<td>( \text{Def. of Supp. ( \angle )s} )</td>
</tr>
<tr>
<td>( m\angle 1 + m\angle 2 = 180^\circ )</td>
<td>( \text{Substitution Prop.} )</td>
</tr>
<tr>
<td>( m\angle 1 = 80^\circ )</td>
<td>( \text{Substitution Prop.} )</td>
</tr>
</tbody>
</table>

27. Given: \( \angle 3 \equiv \angle 4 \)

Prove: \( \angle 1 \equiv \angle 2 \)

<table>
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<td>( \angle 3 \equiv \angle 4 )</td>
<td>( \text{Given} )</td>
</tr>
<tr>
<td>( \angle 1 \equiv \angle 3 )</td>
<td>( \text{V, A, C.T.} )</td>
</tr>
<tr>
<td>( \angle 2 \equiv \angle 4 )</td>
<td>( \text{Transitive Prop.} )</td>
</tr>
<tr>
<td>( \angle 1 \equiv \angle 2 )</td>
<td>( \text{Transitive Prop.} )</td>
</tr>
</tbody>
</table>
1. \( \angle 1 \) is complementary to \( \angle 2 \); \( \angle 3 \) is complementary to \( \angle 2 \). What theorem, property, or postulate allows you to state that \( \angle 1 \equiv \angle 3 \)?

29. Prove the Alternate Exterior Angles Converse Theorem.

**Given:** \( \angle 1 \equiv \angle 3 \)

**Prove:** \( l \parallel n \)

<table>
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<tbody>
<tr>
<td>1. ( \angle 1 \equiv \angle 7 )</td>
<td>1. Given</td>
</tr>
<tr>
<td>2. ( \angle 5 \equiv \angle 7 )</td>
<td>2. VACT</td>
</tr>
<tr>
<td>3. ( \angle 1 \equiv \angle 5 )</td>
<td>3. Trans.</td>
</tr>
</tbody>
</table>

30. **Given:** \( \angle 1 \) and \( \angle 2 \) are vertical angles; \( \angle 1 \) and \( \angle 3 \) form a linear pair

**Prove:** \( \angle 2 \) and \( \angle 3 \) are supplementary angles

<table>
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<tr>
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<tbody>
<tr>
<td>1. ( \angle 1 ) and ( \angle 2 ) are vert.</td>
<td>1. Given</td>
</tr>
<tr>
<td>angles</td>
<td>2. VACT</td>
</tr>
<tr>
<td>2. ( \angle 1 \equiv \angle 2 )</td>
<td>3. Substitution</td>
</tr>
<tr>
<td>3. ( \angle 2 ) and ( \angle 3 ) form L.P.</td>
<td>4. L.P. Post.</td>
</tr>
<tr>
<td>4. ( \angle 2 ) and ( \angle 3 ) are supp.</td>
<td></td>
</tr>
</tbody>
</table>

31. **Given:** \( BE \) bisects \( \angle AGC \)

**Prove:** \( \angle BGC \equiv \angle DGE \)

<table>
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<tr>
<td>1. ( BE ) bisects ( \angle AGC )</td>
<td>1. Given</td>
</tr>
<tr>
<td>2. ( \angle AGB \equiv \angle BGC )</td>
<td>2. Def. of angle bis.</td>
</tr>
<tr>
<td>3. ( \angle AGB \equiv \angle DGE )</td>
<td>3. VACT</td>
</tr>
<tr>
<td>4. ( \angle BGC \equiv \angle DGE )</td>
<td>4. Trans.</td>
</tr>
</tbody>
</table>

32. In the figure, \( l \parallel n \) and \( r \) is a transversal.
Which of the following is not necessarily true?

\[ \angle 8 \equiv \angle 2 \]
\[ \angle 5 \equiv \angle 3 \]
\[ \angle 2 \equiv \angle 6 \]
\[ \angle 7 \equiv \angle 4 \]

33. A dirt path connects the lanes of a divided highway that runs east-west.
An officer in a police car headed east gets a call that requires crossing over to the westbound lanes using the dirt path. Through what angle must the police car turn at the bend in the dirt path?

\[
46 + x + 38 = 180 \\
84 + x = 180 \\
x = 96^\circ
\]