1. Find the next two numbers in the pattern. Then describe the pattern.
   100, −50, 25, −12.5, ...; 6, 25, −3.125
   Start with 100, then divide previous number by −2
2. Each figure consists of triangles constructed from unit segments connecting each point.
   a. Fill out the rest of the chart

<table>
<thead>
<tr>
<th>Figure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Unit Segments</td>
<td>3</td>
<td>9</td>
<td>18</td>
<td>30</td>
<td>45</td>
<td>63</td>
<td>84</td>
<td>108</td>
</tr>
<tr>
<td>Number of Unit Triangles</td>
<td>1</td>
<td>4</td>
<td>9</td>
<td>16</td>
<td>25</td>
<td>36</td>
<td>49</td>
<td>64</td>
</tr>
</tbody>
</table>
   b. Describe the pattern for the number of unit segments.
      Start with 3. Start by adding 6 to previous number. Add 3 to the amount added each time.
   c. Describe the pattern for the number of unit triangles
      Start with 1. Start by adding 3 to previous number. Add 2 to the amount added each time.
   d. Find the number of unit segments and unit triangles in the 8th figure.

3. Use the following conditional statement: An angle is obtuse if it measures 130°.
   a. Rewrite the statement in if-then form. (Hint: the hypothesis already follows “if”)
      If an angle measures 130°, then it is obtuse.
   b. Underline the hypothesis (condition) and circle the conclusion in your statement above.
   c. Is your if-then statement true or false? If false, then provide a counterexample.
      True

4. Use the following if then statement: If x equals 3, then x is greater than 2.
   a. Write the converse statement.
      If x is greater than 2, then x equals 3.
      Is the converse true or false? If false, then provide a counterexample.
      False. x could be 4, which is greater than 2, but not equal to 3.
   b. Write the inverse statement.
      If x is not equal to 3, then x is not greater than 2.
      Is the inverse true or false? If false, then provide a counterexample.
      False. x could be 4 which is not equal to 3, but is greater than 2.
   c. Write the contrapositive statement.
      If x is not greater than 2, then x is not equal to 3.
      Is the contrapositive true or false? If false, then provide a counterexample.
      True
5. Determine if each could be rewritten as a valid biconditional statement. (Hint: Are both the original and converse true?) If it can be rewritten as a valid biconditional statement, then write it as a biconditional statement.

a. If two angles add up to 90°, then the two angles are complementary. 
   If yes, then rewrite as a biconditional:
   \[ \text{Two angles add up to 90° if and only if they are complementary.} \]
   Yes or No

b. If a polygon is regular, then the polygon is equilateral. 
   If yes, then rewrite as a biconditional:
   False, you don’t know if all sides are equal.
   Yes or No

c. If a number is divisible by 4, then the number is divisible by 2. 
   If yes, then rewrite as a biconditional:
   \[ \text{If } x + 1 = 3, \text{ then } x + 5 = 7. \]
   Yes or No

6. Planes \( P \) and \( Q \) intersect as shown. Points \( W \) and \( D \) lie in Plane \( Q \). Points \( C, H, \) and \( N \) lie in Plane \( P \). True or False

a. \( C, H, \) and \( D \) are coplanar. True or False
b. The intersection of Planes \( P \) and \( Q \) is \( \overrightarrow{GV} \). True or False
c. \( \overline{HN} \) is in Plane \( Q \). True or False
d. \( \overline{WD} \) and \( \overline{HN} \) intersect. True or False
e. \( \overline{CN} \) exists. True or False
f. \( V, G, N, \) and \( W \) are coplanar. True or False
g. \( \overline{HN} \) and \( \overrightarrow{GV} \) intersect. True or False

7. Solve the equation and state a reason for each step.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ( 6x - 4(x - 3) = 18 - x )</td>
<td>Given</td>
</tr>
<tr>
<td>2. ( 6x - 4x + 12 = 18 - x )</td>
<td>Distributive Property</td>
</tr>
<tr>
<td>3. ( 2x + 12 = 18 - x \</td>
<td></td>
</tr>
<tr>
<td>( + x )</td>
<td>Simplify</td>
</tr>
<tr>
<td>( \frac{3x + 12}{12} )</td>
<td>Addition Property of Equality</td>
</tr>
<tr>
<td>4. ( \frac{3x = 6}{3} )</td>
<td>Subtraction Property of Equality</td>
</tr>
<tr>
<td>5. ( x = 2 )</td>
<td>Division Property of Equality</td>
</tr>
</tbody>
</table>
8. Write an equation and solve for the indicated value. Explain your reasoning including any theorems, definitions, or postulates used in **WRITING** the equations.

a. Given \( m\angle EAG = 162^\circ \) solve for \( x \).
   Equation and solution:
   \[
   3x - 4 + 8x + 1 = 162 \\
   11x - 3 = 162 \\
   + 3 + 3 \\
   11x = 165 \\
   x = 15
   \]
   Reason for equation setup: \( \text{Angle Addition Postulate} \)

b. Given the diagram, solve for \( x \) and \( y \).
   Equations and solutions:
   \[
   13x + 50 = 180 \\
   -50 -50 \\
   13x = 130 \\
   \frac{13x}{13} = \frac{130}{13} \\
   x = 10
   \]
   \[
   2y = 50 \\
   \frac{2y}{2} = \frac{50}{2} \\
   y = 25
   \]
   Reason for equation setup: \( \text{Linear Pair Postulate} \), \( \text{Definition of Supplementary} \), \( \text{Vertical Angles Theorem} \)

Complete each proof.

9. Given: \( \angle 1 \) and \( \angle 2 \) are complementary, \( m\angle 1 = 67^\circ \)
   Prove: \( m\angle 2 = 23^\circ \)

   \[
   \begin{array}{|l|l|}
   \hline
   \text{Statements} & \text{Reasons} \\
   \hline
   1) \angle 1 \text{ and } \angle 2 \text{ are complementary} & 1) \text{Given} \\
   2) m\angle 1 = 67^\circ & 2) \text{Given} \\
   3) m\angle 1 + m\angle 2 = 90^\circ & 3) \text{Definition of Complementary} \\
   4) 67^\circ + m\angle 2 = 90^\circ & 4) \text{Substitution P of} = \\
   5) m\angle 2 = 23^\circ & 5) \text{Subtraction P of} = \\
   \hline
   \end{array}
   \]

10. Given: \( ZE \cong RO; RO = 11; ZR = 24 \)
    Prove: \( EO = 24 \)

   See next page for proof
Option 1

<table>
<thead>
<tr>
<th>Statements</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $\overline{ZE} \cong \overline{RO}$</td>
<td>1) Given</td>
</tr>
<tr>
<td>2. $\overline{ZE} = \overline{RO}$</td>
<td>2) Def. of $\cong$ Segments</td>
</tr>
<tr>
<td>3. $\overline{RO} = 11$</td>
<td>3) Given</td>
</tr>
<tr>
<td>4. $\overline{ZE} = 11$</td>
<td>4) Transitive P of =</td>
</tr>
<tr>
<td>5. $\overline{ZE} + \overline{ER} = \overline{ZR}$</td>
<td>5) Segment Addition Postulate</td>
</tr>
<tr>
<td>6. $\overline{ZR} = 24$</td>
<td>6) Given</td>
</tr>
<tr>
<td>7. $11 + \overline{ER} = 24$</td>
<td>7) Substitution P of =</td>
</tr>
<tr>
<td>8. $\overline{ER} = 13$</td>
<td>8) Subtraction P of =</td>
</tr>
<tr>
<td>10. $E_0 = 13 + 11$</td>
<td>10) Substitution P of =</td>
</tr>
<tr>
<td>11. $E_0 = 24$</td>
<td>11) Combine Like Terms</td>
</tr>
</tbody>
</table>

Option 2

<table>
<thead>
<tr>
<th>Statements</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $\overline{ZE} \cong \overline{RO}$</td>
<td>1) Given</td>
</tr>
<tr>
<td>2. $\overline{ZE} = \overline{RO}$</td>
<td>2) Def. of $\cong$ Segments</td>
</tr>
<tr>
<td>3. $E_0 = ER + RO$</td>
<td>3) Segment Addition Postulate</td>
</tr>
<tr>
<td>4. $E_0 = ER + ZE$</td>
<td>4) Substitution P of =</td>
</tr>
<tr>
<td>5. $ER + ZE = \overline{ZR}$</td>
<td>5) Segment Add. Post.</td>
</tr>
<tr>
<td>6. $E_0 = \overline{ZR}$</td>
<td>6) Given</td>
</tr>
<tr>
<td>7. $E_0 = 24$</td>
<td>7) Given</td>
</tr>
<tr>
<td>8. $E_0 = 24$</td>
<td>8) Transitive P of =</td>
</tr>
</tbody>
</table>