Patterns, Equations, and Graphs  Guide Notes

SOLUTION OF AN EQUATION containing two variables, \(x\) and \(y\), is any ordered pair \((x, y)\) that makes the equation true.

ORDERED PAIR – is a set of numbers or coordinates written in the form \((x, y)\). It can be used to show the position on a graph, where the \(x\) (horizontal) value is first, and the \(y\) (vertical) value is second.

Sample Problem 1: Tell whether the given order pair is a solution of each equation.

A. Is \((30, 3)\) a solution of the equation \(x - 14 = 5y\)?

\[
\begin{align*}
30 - 14 &= 5(3) \\
16 &= 16
\end{align*}
\]

B. Is \((12, 5)\) a solution of the equation \(4x + 2 = 10y\)?

\[
\begin{align*}
4(12) + 2 &= 10(5) \\
50 &= 50
\end{align*}
\]

C. Is \((7, 1)\) a solution of the equation \(8x - 6 = 50y\)?

\[
\begin{align*}
8(7) - 6 &= 50(1) \\
50 &= 50
\end{align*}
\]

There are various ways to show the relationship between two variables:

A. Create a TABLE to show the corresponding values of \(x\) and \(y\),

Example: John is three years younger than his brother Matthew. Construct a table that represents their age.

<table>
<thead>
<tr>
<th>John</th>
<th>Matthew</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

B. Write an EQUATION, or.

Example: John is three years younger than his brother Matthew. Write an equation that represents their age.

Let: \(J = \text{John's age}\) \(\quad\) \(M = \text{Matthew's age}\)

\[J + 3 = M\]
Patterns, Equations, and Graphs Guide Notes

C. Draw a GRAPH.

**COORDINATE SYSTEM** is a two-dimensional number line. This is a typical coordinate system: The horizontal axis is called the \(x\)–axis and the vertical axis is called the \(y\)–axis

\[
\begin{array}{c}
\text{\(y\)-axis} \\
\end{array}
\]
\[
\begin{array}{c}
\text{\(x\)-axis} \\
\end{array}
\]

**Example:** John is three years younger than his brother Matthew. Draw a graph that represents their age.

**Sample Problem 2:** Use a table, an equation, and a graph to represent the relationship of Mary’s and Ann’s age.

<table>
<thead>
<tr>
<th>Mary’s age</th>
<th>Ann’s age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

Let:

\(J = \text{John’s age}\)

\(M = \text{Mary’s age}\)

\(A + 2 = M\)
**Patterns, Equations, and Graphs**

**Guide Notes**

**Inductive Reasoning** is the process of reaching a conclusion based on an observed pattern. It is used to predict values.

**Example 4:** Predict the next figure in the given sequence.

![Image of figures]

**Sample Problem 3:** Predict the next figure in the each sequence.

**A.**

- i.
- ii.
- iii.
- iv.

**B.**

- i.
- ii.
- iii.
- iv.

**C.**

- i.
- ii.
- iii.
- iv.