**Preliminaries and Objectives**

**Preliminaries**
- Represent data
- Equations of Lines
- Sequences

**Objectives**
- Find values of an arithmetic sequences defined explicitly
- Find values of an arithmetic sequences defined recursively
- Find a recursive formula for an arithmetic sequence
- Find an explicit formula for an arithmetic sequence

**Constant Growth**

<table>
<thead>
<tr>
<th>Day</th>
<th>Boxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>43</td>
</tr>
<tr>
<td>3</td>
<td>46</td>
</tr>
<tr>
<td>4</td>
<td>49</td>
</tr>
<tr>
<td>5</td>
<td></td>
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<tr>
<td>6</td>
<td></td>
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<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

- How many boxes are in the warehouse after Day 9?
- After how many days will the warehouse have 100 boxes?
- Can we find a general formula for the number of boxes after Day \( n \)?

\[ a_n = 3n + 37 \]

**Recursive Definition**

Let \( a_1 = 9 \) and \( a_{n+1} = a_n + 2 \)

| 9   | 11  | 13  | 15  | 17  | 19  | 21  |

**Explicit Definition**

Let \( a_1 = -5n + 13 \)

| 8   | 3   | -2  | -7  | -12 | -17 | -22 |

**Finding the formulas**

Given the arithmetic sequence

\[ 57, 54, 51, 48, 45, 42, 39 \]

find a recursive formula and an explicit formula.

Recursive Formula:

\[ a_0 = 57, a_{n+1} = a_n - 3 \]

Explicit Formula:

\[ a_n = -3n + 57 \]
Example

If an arithmetic sequence contains the terms $a_7 = 52$ and $a_{12} = 82$, find a recursive formula and an explicit formula for $a_n$.

\begin{align*}
10 & \ 16 & \ 22 & \ 28 & \ 34 & \ 40 & \ 46 & \ 52 & \ 58 & \ 64 & \ 70 & \ 76 & \ 82 & \ \cdots \\
\end{align*}

$d = \frac{82 - 52}{12 - 7} = 6$

Recursive definition: $a_1 = 16; a_{n+1} = a_n + d$

Explicit definition: $a_n = dn + 10$

Recap

- Recursive definition: State the value of $a_1$ and the recursion $a_{n+1} = a_n + d$
- Explicit definition: $a_n = d(n) + a_0$