The Caterpillar Problem: Two Ways

**Problem:** A caterpillar is trying to crawl up a tree that is 50ft tall. It takes 1 hour to climb 7ft but slides and falls back 4ft during the hour it rests. How long will it take the caterpillar to crawl to the top of the tree?

1. **Using a table:**

<table>
<thead>
<tr>
<th>Hour</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
<td>7</td>
<td>3</td>
<td>10</td>
<td>6</td>
<td>13</td>
<td>9</td>
<td>16</td>
<td>...</td>
</tr>
</tbody>
</table>

   Table 1: Distance traveled by the caterpillar per hour.

   We could write out all the hours but if the distance is large it might take a while. One approach would be to find a pattern among the distance covered at even hours.

   \[3, 6, 9, 16, \ldots, 3n, \text{ for } n \text{ even}\]

   We see \(3 \times 16 = 48\), so it takes \(16 \times 2 = 32\) hours to get to 48 and in the next hour it moves 7ft, so it takes approximately 33 hours.

2. **Using “net” distance:**

   In a similar way we notice that every 2 hours,

   \[7ft - 4ft = 3ft\]

   To climb 48ft (\(3 \times 16\)) it would take \(2 \times 16 = 32\) hours. To cover the remaining distance you would need \(\frac{2}{7}\) of an hour. So the total amount of time needed would be 33 hours.