Meal Picking - Elementary School
Student Worksheet

Name: ___________________________ Date: ____________________

Part I: Introduction

1. What is a distribution center? ____________________________
   ____________________________
   ____________________________

2. Give an example of a distribution center. __________________

3. Give two examples of where distribution centers for meal picking might be used?
   ____________________________
   ____________________________

4. What is the benefit of having a distribution center for meal picking? __________________
   ____________________________

Part II: Simulation—“Tables”

1. What is a systems design? ________________________________
   ____________________________

2. Why do engineers use simulations to study systems design? ______________________________
   ____________________________
3. What do you notice when comparing the Total Times of each Meal Order? ________________

4. Calculate the Average Total Time needed to pick a Meal Order. Round to the nearest whole number.

\[ \text{Average Picking Time} = \frac{\text{Overall Total Time}}{\text{Number of Meal Orders}} \]

\[ \text{Average Picking Time} = \frac{\text{Overall Total Time}}{\text{Number of Meal Orders}} \]

\[ \text{Average Picking Time} = \frac{268.1}{12} \]

\[ \text{Average Picking Time} = 22.3 \]

5. Is it better to have a faster or slower Average Total Time? ______ Why? ________________

6. What is the dependent variable? ________________Independent variable? ________________

7. What are possible changes that can be made to this meal picking design to decrease the time it takes to pick meals? ________________
Part III: Simulation—“Random Pick-to-Light”

1. What changes in the systems design are shown in this simulation?

The information in the table below represents the data collected in the “Random Pick-to-Light” simulation.

### Scenario 2: Random Pick-to-Light

<table>
<thead>
<tr>
<th>Meal Order #</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>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>Overall Time (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picking Time (sec)</td>
<td>26.0</td>
<td>25.2</td>
<td>24.4</td>
<td>20.4</td>
<td>21.1</td>
<td>18.7</td>
<td>18.0</td>
<td>26.6</td>
<td>22.3</td>
<td>18.9</td>
<td>24.1</td>
<td>22.4</td>
<td>268.1</td>
</tr>
<tr>
<td>Walking Time (sec)</td>
<td>30.8</td>
<td>27.8</td>
<td>33.0</td>
<td>29.6</td>
<td>34.9</td>
<td>23.1</td>
<td>33.4</td>
<td>32.3</td>
<td>37.4</td>
<td>38.2</td>
<td>40.9</td>
<td>30.3</td>
<td>391.7</td>
</tr>
<tr>
<td>Total Time (sec)</td>
<td>56.8</td>
<td>53.0</td>
<td>57.4</td>
<td>50.0</td>
<td>56.0</td>
<td>41.8</td>
<td>51.4</td>
<td>58.9</td>
<td>59.7</td>
<td>57.1</td>
<td>65.0</td>
<td>52.7</td>
<td>659.8</td>
</tr>
</tbody>
</table>

2. Which Time (Picking or Walking) shows the bigger change compared to the first simulation? Why?

3. Calculate the Average Total Time needed to pick a Meal Order using this systems design. Round to the nearest whole number.

\[
Average \ Picking \ Time = \frac{Overall \ Total \ Time}{Number \ of \ Meal \ Orders}
\]

\[
Average \ Picking \ Time = \frac{659.8}{12} \approx 54.97
\]

4. How does this Average Total Time compare to the Average Total Time from the “Tables” Simulation in Part II?

5. Brainstorm methods to improve this simulation’s design in order to produce an even faster Average Picking Time.
Part IV: Conclusions

1. Watch the “Ordered Pick-to-Light” Simulation. What makes this design the better system of the two which use the Pick-to-Light System?

2. The Average Total Time in this simulation is 35.84 seconds. How much faster is it compared to the “Tables” simulation? (Note: This improved time is for picking only 12 Meal Orders. Although the difference may seem trivial it is significant throughout the course of a day, month, etc.)

3. List factors other than the systems design that can affect the Average Total Time.

4. When would a faster Average Total Time not be better?

Fun Fact

Emirates Flight Catering, which provides in-flight meals for over 100 airlines, produces and packages up to 175,000 meals per day!