**Engineering Design with AI Assistants: Answer Sheet**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part I: Explore Design Options**

**Table 1: Design by yourself**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **My Design 1** | | | | |
| **Tilt Angle \_\_\_\_\_ °** | | | [Insert an image of your design by clicking *File* 🡪 *Copy image* then paste here] | |
| **Solar Panel Rows per Rack \_\_\_\_ rows** | | |
| **Inter-Row Spacing** \_\_\_\_ **m** | | |
| **Daily Output** \_\_\_\_ **kWh** | | |
| **Total Number of Panels** \_\_\_\_ | | |
| **Revenue:** Daily Output in kWh x $0.225= \_\_\_\_ | | |
| **Cost:** Total # of Panels x $0.15 = \_\_\_\_ | | |
| **Daily Profit:** Revenue – Cost = $\_\_\_\_ | | |
| **My Design 2** | | | | |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| **My Design 3** | | | | |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | | Daily Profit: Revenue – Cost = $\_\_\_\_ |

**Table 2. Ask Bob for new ideas**

|  |  |  |
| --- | --- | --- |
| **Bob’s Design 1** | | [Insert image of Bob’s design 1 by clicking *File* 🡪 *Copy image* then paste here] |
| Tilt Angle |  |
| Solar Panel Rows |  |
| Inter-Row Spacing |  |
| Daily Profit |  |
| **Bob’s Design 2** | | [Insert image of Bob’s design 2 by clicking *File* 🡪 *Copy image* then paste here] |
| Tilt Angle |  |
| Solar Panel Rows |  |
| Inter-Row Spacing |  |
| Daily Profit |  |
| **Bob’s Design 3** | | [Insert image of Bob’s design 3 by clicking *File* 🡪 *Copy image* then paste here] |
| Tilt Angle |  |
| Solar Panel Rows |  |
| Inter-Row Spacing |  |
| Daily Profit |  |
| **Bob’s Design 4** | | [Insert image of Bob’s design 4 by clicking *File* 🡪 *Copy image* then paste here] |
| Tilt Angle |  |
| Solar Panel Rows |  |
| Inter-Row Spacing |  |
| Daily Profit |  |
| **Bob’s Design 5** | | [Insert image of Bob’s design 5 by clicking *File* 🡪 *Copy image* then paste here] |
| Tilt Angle |  |
| Solar Panel Rows |  |
| Inter-Row Spacing |  |
| Daily Profit |  |

**Table 3. Evaluate designs**

|  |  |
| --- | --- |
| Among the eight candidates, which two are the most different to each other? Please describe what makes them different AND any similarities they may have. | |
| **List the two different designs below.** | |
| Name of file 1: | Name of file 2: |
| **Differences** | **Similarities** |
|  |  |

**Table 4. Your final three promising designs for Part I**

|  |  |
| --- | --- |
| **Please select three designs that you think are promising for later improvement.** | |
| My Design 1 | Bob’s Design 1 |
| My Design 2 | Bob’s Design 2 |
| My Design 3 | Bob’s Design 3 |
|  | Bob’s Design 4 |
|  | Bob’s Design 5 |
| After generating several design ideas (by yourself or with the help of the AI assistant), you may have started to notice that there are many possible solutions. You selected three solutions to improve on the basis that these solutions may be better than other candidates. What motivated you to pick those three designs? | |
|

**Part II: Reach the Final Solution**

**Table 5. Improve by yourself**

|  |  |  |  |
| --- | --- | --- | --- |
| **Your First Improvement - Track Your Iteration** | | | |
| **Try 1** |  |  |  |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| **Try 2** |  |  |  |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| **Try 3** |  |  |  |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| **Try 4 (optional)** |  |  |  |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| Profit before improvement $\_\_\_\_\_\_\_ $ you earned from your improvement \_\_\_\_\_\_\_\_\_ | | | |

**Table 6. Ask Carol for help**

|  |  |  |
| --- | --- | --- |
| **Carol’s First Recommendation** | | |
| Tilt Angle |  | [Insert image of Carol’s design by clicking *File* 🡪 *Copy image* then paste here] |
| Solar Panel Rows |  |
| Inter-Row Spacing |  |
| Daily Profit |  |
| $ Carol earned from her improvement |  |

**Table 7. Your second improvement**

|  |  |  |  |
| --- | --- | --- | --- |
| **Your Second Improvement - Track Your Iteration** | | | |
| **Try 1** |  |  |  |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| **Try 2** |  |  |  |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| **Try 3** |  |  |  |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| **Try 4 (optional)** |  |  |  |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| Profit before improvement $\_\_\_\_\_\_\_ $ you earned from your improvement \_\_\_\_\_\_\_\_\_ | | | |

**Table 8. Carol’s second recommendation**

|  |  |  |
| --- | --- | --- |
| **Carol’s Second Recommendation** | | |
| Tilt Angle |  | [Insert image of Carol’s design by clicking *File* 🡪 *Copy image* then paste here] |
| Solar Panel Rows |  |
| Inter-Row Spacing |  |
| Daily Profit |  |
| $ Carol earned from her improvement |  |

**Table 9. Your third improvement**

|  |  |  |  |
| --- | --- | --- | --- |
| **Your Third Improvement - Track Your Iteration** | | | |
| **Try 1** |  |  |  |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| **Try 2** |  |  |  |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| **Try 3** |  |  |  |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| **Try 4 (optional)** |  |  |  |
| Tilt Angle\_\_\_\_° | Rows per Rack \_\_\_\_rows | Inter-Row Spacing \_\_\_\_m | Daily Output \_\_\_\_ kWh |
| Total Number of Panels \_\_\_\_ | Revenue: Daily Output in kWh x $0.225=\_\_\_\_ | Cost: Total # of Panels x $0.15 = \_\_\_\_ | Daily Profit: Revenue – Cost = $\_\_\_\_ |
| Profit before improvement $\_\_\_\_\_\_\_ $ you earned from your improvement \_\_\_\_\_\_\_\_\_ | | | |

**Table 10. Carol’s third recommendation**

|  |  |  |
| --- | --- | --- |
| **Carol’s Third Recommendation** | | |
| Tilt Angle |  | [Insert image of Carol’s design by clicking *File* 🡪 *Copy image* then paste here] |
| Solar Panel Rows |  |
| Inter-Row Spacing |  |
| Daily Profit |  |
| $ Carol earned from her improvement |  |

**Table 11. The final design with maximum daily profit**

|  |  |
| --- | --- |
| **Tilt Angle \_\_\_\_\_ °** | [Insert image of Carol’s design by clicking *File* 🡪 *Copy image* then paste here] |
| **Solar Panel Rows per Rack \_\_\_\_ rows** |
| **Inter-Row Spacing** \_\_\_\_ **m** |
| **Daily Profit before Improvement $\_\_\_\_\_\_\_\_\_\_\_** |
| **Current Daily Profit $\_\_\_\_\_\_\_\_\_\_\_** |
| **Profit Change $\_\_\_\_\_\_\_\_\_\_\_\_** |
| **Total $ You Earned \_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **Total $ Carol Earned \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |
| **During the process of optimizing your selected design’s performance, what was your:** | |
| Strategy for testing how the variables affected the design? | |
| Way to learn from the results to inform revising your design? | |