**Tools and Equipment, Part I Activity –**

**Inclined Plane Worksheet**

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| **Instructions/Questions** |
| 1. **Measure the length and height of Inclined Plane A (1st station):**   Length: **30** (c*m*)  Height: **20** (c*m*)   1. What is the mechanical advantage based on these measurements? **1.5** 2. What was the required force to raise the object?   Without the inclined plane: (Output force) \_\_\_\_\_\_\_\_\_ (*g*)  With the inclined plane: (Input force) \_\_\_\_\_\_\_\_\_ *(g)*   1. What is the mechanical advantage based on these measurements? \_\_\_\_\_\_\_\_\_\_\_\_ 2. **Measure the length and height of Inclined Plane B (2nd station):**   Length: **60** (c*m*)  Height: **20** (c*m*)   1. What is the mechanical advantage based on these measurements? **3** 2. What was the required force to raise the object?   Without the inclined plane: (Output force) \_\_\_\_\_\_\_\_\_ (*g*)  With the inclined plane: (Input force) \_\_\_\_\_\_\_\_\_ *(g)*   1. What is the mechanical advantage based on these measurements? \_\_\_\_\_\_\_\_\_\_\_\_ 2. **Measure the length and height of Inclined Plane C (3rd station):**   Length: **90** (c*m*)  Height: **20** (c*m*)   1. What is the mechanical advantage based on these measurements? **4.5** 2. What was the required force to raise the object?   Without the inclined plane: (Output force) \_\_\_\_\_\_\_\_\_ (*g*)  With the inclined plane: (Input force) \_\_\_\_\_\_\_\_\_ *(g)*   1. What is the mechanical advantage based on these measurements? \_\_\_\_\_\_\_\_\_\_\_\_ 2. **Measure the length and height of Inclined Plane D (4th station):**   Length: **120** (c*m*)  Height: **20** (c*m*)   1. What is the mechanical advantage based on these measurements? **6** 2. What was the required force to raise the object?   Without the inclined plane: (Output force) \_\_\_\_\_\_\_\_\_ (*g*)  With the inclined plane: (Input force) \_\_\_\_\_\_\_\_\_ *(g)*   1. What is the mechanical advantage based on these measurements? \_\_\_\_\_\_\_\_\_\_\_\_ |

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| **Results** |
| 1. Did you obtain different mechanical advantages for the different methods of measuring? If so, was the difference large?   **Answers may vary.**   1. Which inclined plane had the greatest mechanical advantage?   **The longest inclined plane, Plane D, had the greatest mechanical advantage.** |

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| **Conclusions** |
| 1. Does calculating mechanical advantage just with the dimensions of the inclined plane really work? That is, does the calculation describe what really happens? Write a short paragraph explaining your answer.   **Answers may vary.**   1. If you are the engineer designing a ramp for a construction site to move a wheelbarrow a height of 100 feet, which inclined plane would you use? Why?   **Answers may vary. Students may answer: the ramp with the greatest mechanical advantage. Whichever ramp they choose, their explanation of why they chose the ramps should be well thought out and explained.**   1. What are some possible sources of error in this experiment?  * **The needle on the spring scale was not steady and we had to estimate a number.** * **Friction between the rotating axle and the cart increased the amount of force required to draw the cart up the plane** * **Our measured distances may be off by a few millimeters, give or take.** |