**Potential Energy Efficiency Engineering Process Log (49pts)**

Company Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Team members\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Problem: (1 pt)**

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| Design and build a robot that uses the following to do a job using the least amount of power possible:   * Gravity * Height * Mass * Velocity   Examples: Robotic cutter, slicer, switch pusher, keyboard typer, hole puncher, etc., be creative!  Our robot will: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Research (12 pts)**

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| Define the following in your own words, then draw a picture to model the word.   1. Potential Energy:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2. Kinetic Energy: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3. Mass: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 4. Gravity: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 5. Velocity: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Research Continued (6 pts)**

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| The formula for calculating **Potential Energy** is =  **Potential Energy** **= mass(grams) x gravity(m/sec2) x height(meters)**   1. Knowing this, what can you do to increase the potential energy of a system? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   The formula for calculating **Kinetic Energy** is =  **Kinetic Energy** **= mass(grams) x velocity(m/sec2)**  **2**  2. Knowing this, what can you do to increase the kinetic energy of a system? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Building Design Prototype (12 pts)**

1. Draw your first robot design.
2. Label where and write how each of the following works in your design:
   1. Potential Energy
   2. Kinetic Energy
   3. Gravity
   4. Height
   5. Mass
   6. Velocity
3. Describe why you think this design will be efficient (have a lot of energy while using little power).
4. Write how much power (1-100) you will start the robot with. \_\_\_\_\_\_
5. Write what the robot will do if it works perfectly.
6. Both partners need to be working the entire time. List each partner’s jobs.

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**Redesign (8 pts)**

1. After testing your design, describe the strengths and weaknesses of your design.
2. Write the height, mass, and velocity of the **part of the robot that is doing the work.**
   1. Height (write in meters)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Mass (write in grams) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Velocity (write in meters/sec)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Draw and label changes you will make that will improve the robot’s efficiency.
4. Describe how these changes will improve your design.
5. Extra credit: Calculate the potential energy of your robot.

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**Commercialization (Final Product) (10 pts)**

1. After completing the final design, draw your final robot.
2. Graph how efficient (amount of power used) your robot was compared to others.
3. If you had more time, how would you make your design more efficient?

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