Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour \_\_\_\_\_\_\_\_\_\_\_\_\_

Purple **Airdrop Delivery System (Summative)**

**Task**: You are engineering designing an airdrop delivery system. The application of your system could be used to drop food and/or equipment to remote locations around the world in space. How can we ensure the materials delivered stay on track? You want to build a prototype to reduce the amount of energy transferred in the collision. You can only use the materials provided, you can cut the materials but you do not have to use all of the materials.

**Materials**

-1 paper plate -2 rubber bands -1 Dixie paper cup

-2 balloons -1 small bag -1 egg

-30cm of tape -2 pieces of paper -100 cm of string

- 1 cereal box (team must provide) -2 items of your choosing with teacher approval

**Design:** With your team draw a labeled diagram of your prototype.

**Material list** (list the materials you will be using)

Find the mass of your prototype: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Relative potential energy: **PEgrav = mass • g • height**

PEgrav = potential energy (gravitational)

Mass= mass of your prototype

Height= height of the drop

Testing:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Group | Mass of prototype | Drop Height | Time (s) | Speed (cm/s) | Relative Potential Energy | Damage to prototype  0-5 |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |

**Individual Component:** Each team member must provide a force diagram and summary paragraph.

**Force diagram:** A colored, labeled, picture of your prototype dropping or in action. You must label and include the following

-Potential energy -kinetic energy -impact force

-Time of impact -momentum -gravity

-Your prototype

**Summary paragraph:** Select one of the following, Newton’s First Law of Motion, Newton’s second law of Motion, Newton’s third Law of Motion, The Law of Conservation, Potential Energy, or Kinetic Energy. Describe the topic you selected. Describe how this activity relates or models the topic you selected. Include one piece of textual evidence. (5-7 sentences)