

## Balloon Drop

### **Class Length:**

1 hour 15 minutes

### **Class Size:**

15-50 Participants

### **Class Location:**

- Levison Lodge
- Picnic Shelter
- Large Room with Tables & Chairs
  - **Need access to a 1-2 story drop**

### **Materials:**

- 1 Water Balloon per group
- Zip Lock Bags
- Coffee Filters
- String
- Scissors – 1 per group
- Packing Tape
- Stuffing
- Egg Shell Foam
- Straws
- Popsicle Craft Sticks
- Pipe Cleaners
- Markers
- Paper Bags
- Card Stock Paper
- Plastic Bags
- Egg Cartons

### **Objective:**

- Given a filled water balloon and supplies, the participants need to build a contraption that allows the balloon to fall 1-2 stories without breaking upon impact.
- Discuss the science of the balloon drop and decide how best to use air resistance to counteract gravity.
  - Drag – something that retards motion, action or advancement.
  - Gravity – the acceleration of the body in free fall under the influence of earth's gravity expressed as the rate of increase of velocity per unit of time.
- Use communication and team work to make decisions and build.

### **Class Set Up:**

- Inventory and check all supplies prior to beginning of class.
- Fill one water balloon per group (2-3 students) and place in a zip lock bag.
- Set Up your "Store" – setting out all of the purchasable material so that it is easily accessible.
- Give each group a list of the optional items to purchase.

**Introduction:** **WELCOME to Balloon Drop!!!** My name is \_\_\_\_\_

**Anticipatory Set (Hook) (5-10 minutes)**

-Break the students up into pairs (or smaller groups) and describe the challenge: "Your balloon is your best friend, but your balloon is not my best friend. SO...I will be dropping your balloon of the balcony. Your job is to build a contraption to keep your friend from breaking."

-Science of the balloon drop:

- When a water balloon is dropped, gravity causes it to accelerate towards the earth at 9.8meters/second.
- As it falls, air molecules are pushed out of the way, slowing it down slightly. This is air resistance or drag.
  - When do people design things to create a LOT of air resistance? (sky diving, kites, parachutes on shuttles, etc)
  - When do engineers NOT want air resistance? (rockets, planes, cars, etc)
  - Which do you want? (a LOT of resistance)
  - The shape of object determines the amount of air resistance.
- Scientifically, the challenge is to overcome gravity using air resistance (or drag) or enough padding of cushion to fall.

### **Activity 1 – Time to Design: (5-10 minutes)**

-Each team should have the following items:

- 1 Scissors
- 1 piece of paper and a marker to draw their design
- A laminated list of the items available in the "store" with prices listed
- \$25 to spend in the store

### **Activity 2 – Time to Build: (40-45 minutes)**

-Once the group has their design ready, they are allowed to send *one* person per team up to buy *one* item at a time.

-Once the group has purchased all of their materials, they can begin construction.

-When all of the groups are finished building, have them explain why they built it the way they did.

\*During the activity, the facilitator should be roaming around helping the groups and giving advice.

\*Chaperones are not to help build each groups' contraption, however, feel free to offer them the job of "Store Keeper."

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### **Activity 3 - The Drop! : (10-15 minutes)**

-All of the contraptions should be placed on the deck with the facilitator.

-The students should position themselves on the ground to watch the drop from below (make sure to have a specific "drop zone" that the students are not allowed near until the drop is complete.

**Activity 4 - Clean Up/Wrap Up! : (5-10 minutes)**

-Have the students explain how their device worked. If it did, why do they think so? If not, why not and how could it have been better?

-Each group is now in charge of dismantling their contraptions. Most materials are reusable and should be gathered back into the store. Items such as tape, paper and coffee filters may not be reusable and should be recycled appropriately.

# BALLOON DROP!

To build your contraption, you have **\$25** dollars to spend at the store.

Spend wisely!

| Store Item            | Unit Sold   | Quantity Required | X | Price Per Unit | = | Total Price |
|-----------------------|-------------|-------------------|---|----------------|---|-------------|
| Zip Lock Bag          | 1           |                   | X | \$3            | = |             |
| Coffee Filters        | 1           |                   | X | \$2            | = |             |
| String                | 2ft Length  |                   | X | \$2            | = |             |
| Egg Shell Foam        | 1 Square    |                   | X | \$6            | = |             |
| Straws                | 2           |                   | X | \$3            | = |             |
| Popsicle Craft Sticks | 2           |                   | X | \$3            | = |             |
| Pipe Cleaners         | 2           |                   | X | \$3            | = |             |
| Paper Bag             | 1           |                   | X | \$2            | = |             |
| Card Stock Paper      | 2           |                   | X | \$3            | = |             |
| Packaging Tape        | 2 ft Length |                   | X | \$2            | = |             |
| Stuffing              | 1 Handful   |                   | X | \$4            | = |             |
| Plastic Grocery Bag   | 1           |                   | X | \$4            | = |             |
| Egg Cartons           | 1 Square    |                   | X | \$2            | = |             |
|                       |             |                   |   |                |   | \$          |