**Team Member Names: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_**

**PORTABLE FLOTATION DEVICE CHALLENGE**

**(Time: 60 minutes)**



**Background:** In 2017, Hurricane Harvey slammed into Texas, causing drastic flooding in many areas; some areas received over 40 inches of rain! People affected by storms like this are often put in grave danger because they do not know how or are too injured to swim in the flood waters. Situations like this is when effective personal flotation devices are vital and can save lives.

**Objective:** In teams, you will explore this concept on a smaller scale, and design and create a personal flotation device (PFD) that can keep a can of soup (representing a person) afloat for as long as possible and can be attached as quickly as possible. You also must try to keep your design as inexpensive as possible.

**Constraints:**

* Device must be created using only the materials provided
* Device must allow part of the can to be in contact with the water

**Procedure:**

1. Consider your materials and their cost and begin brainstorming ideas for your design
2. With your team, narrow in on a single idea and begin sketching it in the space provided
3. Use your materials to create an initial prototype of your design
4. Test how quickly it can be attached to Can
5. Test your device in a small tub of water
6. Document the results and the faults in your design
7. Redesign and improve your design for final testing
8. Participate in the final testing!

**Materials:**

Use this space to plan out your materials:

|  |  |
| --- | --- |
| **MATERIAL** | **COST** |
| 1 Cork | $5 |
| 1 Foam Block | $8 |
| 1 Rubber Band | $10 |
| 1 Length of String | $6 |
| 1 Piece of Duct Tape | $8 |
| 1 Sandwich Bag | $12 |

**Brainstorming/Designing**

|  |
| --- |
|  |

**Initial Test:**

*How long did it take to attach the PFD: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Did your device float as well as you expected? How long did it float?*

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
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*What were the faults in the design and what will you do to improve them?*

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**Final Test:** Your device will be put to the test and scored based on three aspects: how long it stays afloat, how quickly it can be attached to the can, and how much it costs.

(NOTE: If a team’s PFD stays afloat for 5 minutes or more, “time afloat” score will max out at 300 seconds)

**Cost of your PFD:**

|  |  |  |  |
| --- | --- | --- | --- |
| **MATERIAL** | **QTY** | **PRICE** | **QTY\*PRICE** |
| 1 Cork |  | $5 |  |
| 1 Foam Block |  | $8 |  |
| 1 Rubber Band |  | $10 |  |
| 1 Length of String |  | $6 |  |
| 1 Piece of Duct Tape |  | $8 |  |
| 1 Sandwich Bag |  | $12 |  |
| **TOTAL COST** | **------** | **------>** | $\_\_\_\_\_\_\_\_ |

**Time PFD stayed afloat: \_\_\_\_\_\_\_\_\_**

**Points for time taken to attach PFD:**

|  |  |
| --- | --- |
| Time to affix device (In Seconds) | Points |
| 0 - 5 | +500 |
| 5 - 10 | +400 |
| 10 - 15 | +300 |
| 15 - 20 | +200 |
| >20 | +100 |

**Final Score:**

*800 - Time Afloat (in seconds) - Affixing Points + 2\*Cost*

**Calculate Your Score:**

**800 - \_\_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_\_ + 2\*\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_\_\_\_**

***Time afloat Affixing Points Cost FINAL SCORE***

**Follow-up Questions:**

*Did your device perform as well as you expected? Why or why not?*

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*Did your re-design after the first test improve your results? Why or why not?*

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*If you could go back in time and do something differently in the design process, what would you change and why?*

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*How did working in a team help improve the design process and your design? If it did not help, what could your team have done differently to change this?*

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