Activity 3.6 Instant Challenge: Fling Machine

Introduction

There are many ways to solve a problem. Sometimes it is as simple as applying a piece of duct tape. Other times it takes months or years for a product to progress from an idea into full-scale production. In this activity your team will quickly design and build a device that will send a cotton ball as far as possible through the air.

Equipment

- Paper
- Pencil
- Scissors
- timer

Materials (may vary)

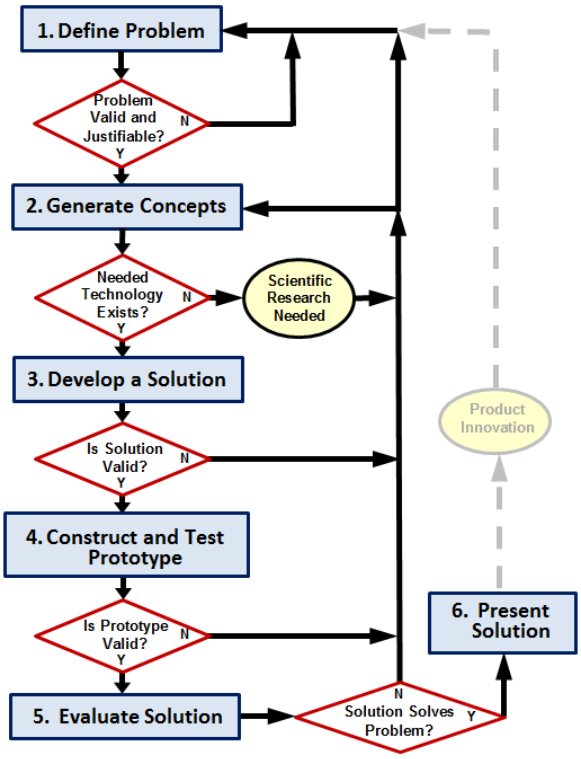
- 2 cotton balls
- 1 balloon
- 2 corks
- 1 rubber band
- 2 paper clip
- 1 piece aluminum foil
- 2 coffee stir sticks
- 2 straws
- 2 pipe cleaners

Procedure

Using only the materials provided, design and build a device to launch a cotton ball and send it as far as possible.

1. Your team will have 15 minutes to devise a solution and document the solution both in writing and in graphical form with a drawing.
2. Your team will have 5 minutes to build your solution.
3. Your team will have 5 minutes to test your solution. Record the distance traveled by the cotton ball (to the nearest quarter inch) for at least ten attempts.
4. Finally, your team will have one attempt to demonstrate your solution.

5. Use the design process learned in Unit 1. Document each step in your engineering notebook as you complete this design challenge.



Scoring

Your team may receive points for the following.

- Creativity: Up to 10 points for creativity in the design and use of materials.
- Teamwork: Up to 10 points for how well your team works together.
- Performance: Using the landing point of the cotton ball that was propelled the furthest from the launch device, 2 points for each inch between the device and the point at which the cotton ball lands.

Conclusion

1. Analyze the cotton ball travel distance data that you collected.
    a. Record the travel distances of the cotton ball that you measured during the testing phase below and create a dot plot of your data.

b. Create a histogram of your data using five class intervals.

c. Is the data normally distributed? Justify your answer.

d. Calculate the mean, median, range and **sample** standard deviation of the travel distances of the cotton ball.

e. Give a range of travel distances within which you would predict that 95% of all cotton balls launched with your device would fall. For example, you might predict that 95% of the cotton balls that you launch would travel between 2.25 ft and 3.00 ft. Justify your answer.

2. Do you feel that the statistical analysis results would be a better measure of performance when comparing alternate devices that the distance traveled by a cotton ball in a single attempt? Why or why not?

3. How would you recommend using the results of your statistical analysis of travel distances to assess device performance (rather than giving points for the distance of the single attempt allowed in the challenge)?

4. If you had the opportunity to optimize your design, how would you increase the distance that the cotton ball moves?

5. If you had the opportunity to optimize your design, how would reduce the amount of materials used?

6. How could you improve the effectiveness of your team?