



## The Egg Drop Challenge

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

**Objective:** Consider Newton's Laws of Motion and momentum/impulse momentum to create a device that will allow an egg to survive the force it will experience from a ceiling height-fall and a two-story drop off a balcony. **\*Limitation:** Construct a device within your budget and a design that enables the egg to be removed or checked easily to determine whether it has sustained any damage.

TEAM MEMBERS: \_\_\_\_\_

TEAM NAME: \_\_\_\_\_

Team Budget: \$ \_\_\_\_\_

### **Procedure:**

1. Consider elements of that should be incorporated in the design:
  - Should your container be made rigid; or is it better if it collapses?
  - Should the egg be able to move, or should it be held immobile?
  - What types of materials or structures will absorb the shock of an impact?
  - How can it be designed to withstand multiple drops from successively greater heights?
  - What types of materials will contain the egg if it breaks?
2. As an individual, sketch your design and describe how the device will protect the egg in the Prototype Planning section.
3. As a group following the 6 steps of the Design Process to create a device.
  - Provide a rough sketch and rationale for your device at each stage of the challenge.
4. Gather your materials after completing the order form in the Materials section.
5. Construct your group prototype.
6. Ceiling drop day will be on \_\_\_\_\_.
7. Modify your device
8. Foyer drop day will be on \_\_\_\_\_.
9. Record all data during the challenge in the Data section.





**Materials:**

Fill out the material order form with the Quantity (number of each item) and total cost for that item (Cost \* Quantity). Add the totals to ensure you do not exceed your budget.

**YOU HAVE \$ \_\_\_\_\_ TO SPEND. NO BONUS POINTS FOR SAVING \$**

*Use the materials carefully, as they will not be replaced if you damage them (including drop/testing).*

Material	Cost (\$)	Quantity	Cost x Quantity
Toothpicks	25		
String (10 cm)	25		
Paperclip	25		
Plastic Straw	50		
Cotton ball	50		
Popsicle Stick	50		
Rubber Band	50		
Paper	100		
Masking tape (10 cm)	20		
5 oz Dixie Cup	20		
<b>Total Cost =</b>			

\*Remember to keep funds for the modifications required between after the ceiling drop.



**Prototype Planning:**

Individual Design	Rationale for Initial Design:
Group Ceiling Design	Rationale for Anticipated Egg Protection:
Group Foyer Design	Rationale for Modifications:



**Data:**

<b><u>Formulas Used in Data Calculations</u></b>
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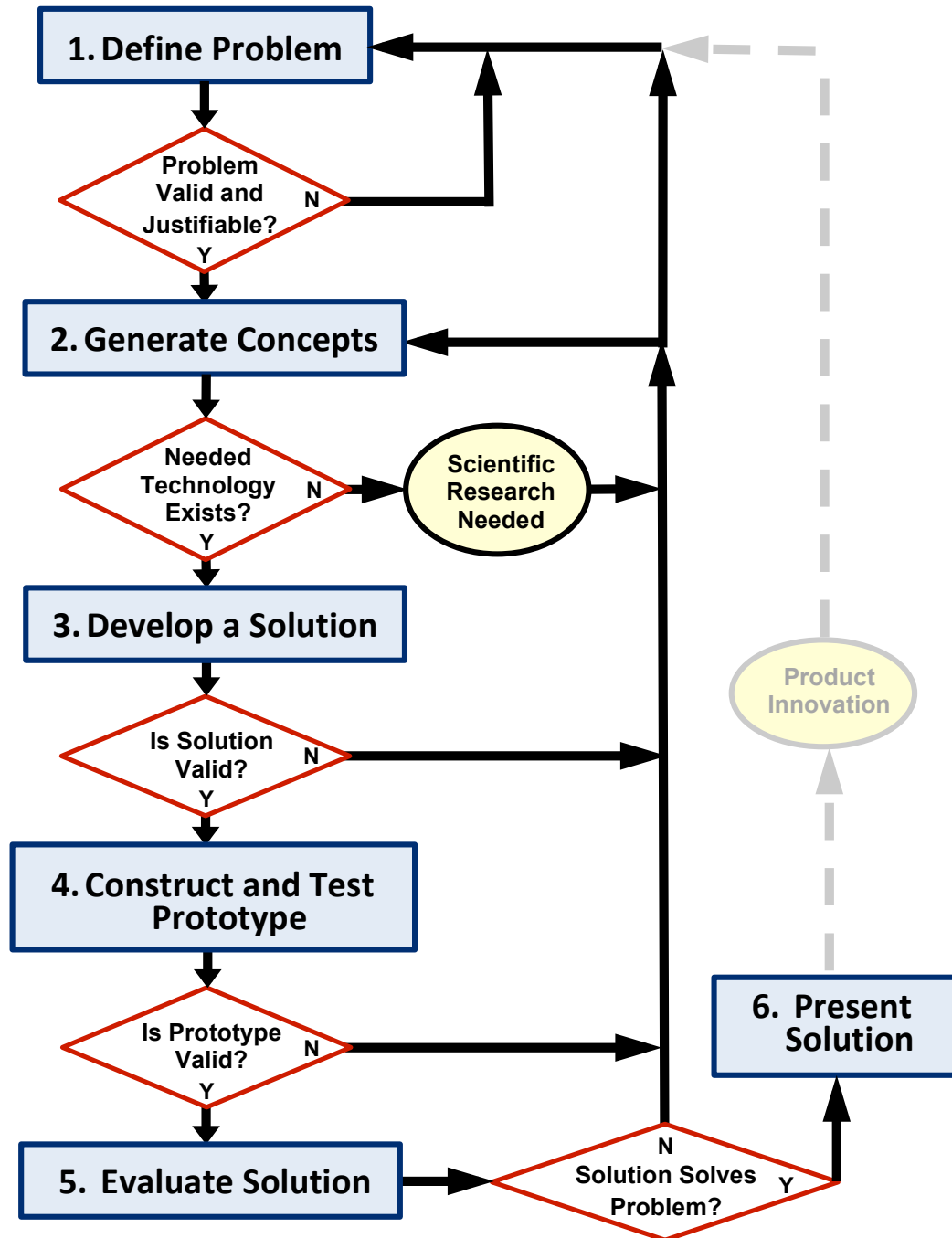
**Ceiling Drop**

Mass of container plus egg	_____ kg
Time of fall	_____ s
Height of fall	_____ m
Final velocity of the container immediately before impact	_____ m/s
Acceleration of container during its fall	_____ m/s <sup>2</sup>
Force of impact	_____ N
Momentum of the container plus the egg upon impact	_____ Kg m/s

**Foyer Drop**

Mass of container plus egg	_____ kg
Time of fall	_____ s
Height of fall	_____ m
Final velocity of the container immediately before impact	_____ m/s
Acceleration of container during its fall	_____ m/s <sup>2</sup>
Force of impact	_____ N
Momentum of the container plus the egg upon impact	_____ Kg m/s

## A Design Process





#### EXTENSION QUESTIONS:

- 1 - Describe how your device protected the egg from cracking. What material was most important in your design? What material that you used was least effective?
- 2 - Knowing what you know now, how would you improve upon your design to make it work better on the next try? Draw a picture if it helps!
- 3 - What material would you use in another design that you did not use today, and WHY? It can be a material that was not offered.
- 4 – What things in nature are similar to this egg drop experiment? What things that humans use are similar to the egg drop experiment? How do these things work? For example, the helicopter seeds that some trees use to disperse their seeds with the wind. What else is there?

