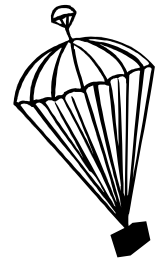


# PARACHUTE DESIGN CHALLENGE



## Challenge

You have been hired by NASA as an engineer to design, construct, and test a parachute. Your challenge is to design and build a parachute that will bring a plastic egg (with three pennies inside) safely down to the ground as slowly as possible without breaking the egg.

## Objectives

1. Predict how a parachute works
2. Sketch a design of a parachute
3. Construct a parachute

## Materials

1. 7 coffee filters
2. 4 paper clip
3. String
4. Glue

## Tools

1. Scissors

## Limitations

1. You may only use the materials provided.
2. You must use at least six filters
3. Egg must land on ground first.
4. Teams cannot wrap anything around their egg to protect it from the impact.
5. You cannot glue anything to the egg, or glue the egg together.

## Design Process

1. Brainstorm and sketch parachute designs.
2. Analyze designs.
3. Construct design
4. Test design.
5. Evaluate design (did it work?)
6. Try a new design
7. Test your best design with the egg.

## Testing

1. Measure and record the height above the floor that you are using for the drops.
2. Report the time of the drop(s).
3. Provide descriptions and diagrams of your parachute that are sufficiently detailed and clear so as to allow others to replicate and test your design.
4. Conduct your tests under teacher supervision and observe proper safety precautions.

# PARACHUTE DESIGN: STUDENT WORKSHEET



## Challenge

You have been hired by NASA as an engineer to design, construct, and test a parachute. Your challenge is to design and build a parachute that will bring a plastic egg (with 3 pennies inside) safely down to the ground as slowly as possible without breaking the egg.

## Questions

1. What is the purpose of a parachute?
  
  
  
  
  
2. What are three variables that will affect the descent rate of a parachute?
  - a.
  
  
  - b.
  
  
  - c.
  
3. Which would fall slower, a parachute with a bigger surface area or smaller surface area?

**Thumbnail Sketches:** Use a pencil to draw the top and side view of three different parachute designs you could make using the materials and tools provided. Remember you must use all six coffee filters. Sketches should be done in pencil.

Idea 1	Idea 2	Idea 3
Top View	Top View	Top View
Side View	Side View	Side View

**Testing & Calculations:** Record your data in the area below. After trials are complete, calculate the descent rate and the area of your parachute.

	Trial #1	Trail #2
Height of Drop		
Time of Descent		
Area of your parachute		
Descent rate		

**Formulas**

\*Area: *Rectangle:* length x width

*Circle:*  $\pi r^2$  (where r= radius and  $\pi =3.14$ )

\*Descent rate:  $\frac{\text{Distance}}{\text{time}}$

**Conclusion:** How do the following variables affect the parachute's descent rate?

1. Weight of object and parachute?
2. Area of parachute?
3. Length of string?
4. Rotation of egg?
5. Shape of parachute?