

# Investigating a Twirling Toy Worksheet

**Data Table A. Short Rotors**

Twirling Toy Variables	Time of Descent (s)	Target Hit (yes/no)	Spin (starting point, direction)	Path (straight, wavy, erratic)	Stability (vertical or not)	Other Observations
Short rotors 0 paper clips						
Short rotors 1 paper clip						
Short rotors 2 paper clips						

**Data Table B. Long Rotors**

Twirling Toy Variables	Time of Descent (s)	Target Hit (yes/no)	Spin (starting point, direction)	Path (straight, wavy, erratic)	Stability (vertical or not)	Other Observations
Long rotors 0 paper clips						
Long rotors 1 paper clip						
Long rotors 2 paper clips						

**Data Table C. Rounded Rotors**

Twirling Toy Variables	Time of Descent (s)	Target Hit (yes/no)	Spin (starting point, direction)	Path (straight, wavy, erratic)	Stability (vertical or not)	Other Observations
Rounded rotors 0 paper clips						
Rounded rotors 1 paper clip						
Rounded rotors 2 paper clips						

## Post-Lab Questions

1. Did the twirling toy design from the template with the slowest descent also have the straightest path and best stability?
2. Since the surface area of each individual design remained the same without paper clips as with one or two paper clips, give a possible explanation for the difference in time of descent without and with paper clips.
3. The design challenge was to design a twirling toy capable of landing on a target with the longest flight time.
  - a. Which characteristic of the twirling toy—time of descent, spin, path, or stability—do you consider most important in meeting the challenge?
  - b. If you were limited to the designs from the templates, what combinations of variables that were tested seem to be the best design solution?
4. Describe the twirling toy your team first designed. Draw and label it on a separate sheet of paper and attach to the worksheet.
5. List each modification your team performed on the twirling toy. Explain the reasoning behind each change (what was the purpose of each design change?).
6. What trade-offs did you need to make in deciding upon the best design solution to the challenge?
7. Describe the success of your twirling toy compared to other groups in your class. Explain the results.
8. After observing other twirling toys in your class, what other improvements might make your twirling toy better at landing on the target with the longest flight time?