

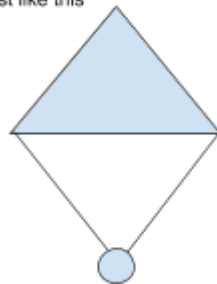
**My Name:**



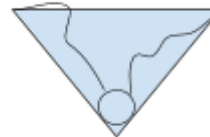
### **Happy Landings Investigation**

In this investigation you are going to make a paper cone and test how long it takes to drop to the floor, first open side downwards and then pointy side downwards

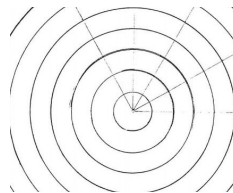
First like this



Then like this



Instructions:



1. Look at the paper cone pattern and decide, with your partner or in your team, how big you will make your cone and whether you will make it more flat or more pointy (ask your teacher how to make the cone if you are not sure)
2. When you have decided, cut out the circle to the size you want; then cut along one of the straight lines to make a slit - slide the paper from one side of the slit over the other to make your cone and then glue or tape it in place
3. Make a small ball of plasticine, cut four cotton threads, tape one end of each thread to the edge of the cone and squeeze the other end into the ball of plasticine
4. Measure a height to drop the cone from

**YOU MUST NOT CLIMB ONTO ANYTHING UNLESS AN ADULT HAS GIVEN YOU PERMISSION AND IS LOOKING AFTER YOU WHILE YOU DO IT**

5. Hold the cone by its POINT at the height you measured and get ready to drop it
6. Your partner, or someone in your team, should be ready with a timer
7. Count down, 3-2-1, drop the cone, start the timer and STOP when it hits the floor
8. Write the time in the table on the next page then...
9. **TURN THE CONE OVER** - stick the plasticine ball inside the pointy end, tuck in all the threads
10. Hold the cone by its EDGE at the height you measured and get ready to drop it
11. Your partner, or someone in your team, should be ready with a timer
12. Count down, 3-2-1, drop the cone, start the timer and STOP when it hits the floor
13. Write the new time in the table below
14. Do the investigation three times to see if you get the same results every time

**My Name:**

### Happy Landings Investigation

**Results**

Test 1

| Which end was downwards? | Time to fall (seconds) |
|--------------------------|------------------------|
| Open end                 |                        |
| Pointy end               |                        |

Test 2

| Which end was downwards? | Time to fall (seconds) |
|--------------------------|------------------------|
| Open end                 |                        |
| Pointy end               |                        |

Test 3

| Which end was downwards? | Time to fall (seconds) |
|--------------------------|------------------------|
| Open end                 |                        |
| Pointy end               |                        |

**What did you find out?**

Which way round did the cone fall fastest? (Was it the same result all three times?)

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Why was this? Explain your results using words like air particles, force and air resistance:

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**What could you do next? Choose some of these ideas to investigate some more:**

- Make a poster or report to tell people what you have found out and how this would help in designing a space rocket or a lander to drop gently onto the surface of another planet. Think about which one needs to be more pointy and which one needs to be more flat.
- Plan your own investigation by changing the sizes and shapes of the cones - remember to change just one thing and to keep things like weight and height the same. Make charts or graphs of your results and see if you can spot any patterns.
- Test some other shapes and see how they change the drop time. Write a report or make a poster to explain how your results could help in designing helmets for fast sports like cycling or ski-ing or to make trucks, buses and other vehicles use less fuel.
- Design and test a system to drop something either
  - Quickly - for example to plant trees from a drone or an aircraft or to drop a probe to dig into the surface of a planet
  - Slowly - to drop supplies into a disaster zone or to return astronauts safely to Earth
- Research the shapes of plant seeds and try a challenge - who can make a shape out of paper that would keep a seed in the air for the longest possible time. You could use a 1p or 2p coin as the seed. Why is it a good thing for seeds to stay in the air longer?