



# Balloon Rockets

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## Materials

round balloons  
sticky tape  
scissors  
fishing line  
drinking straws  
tape measure (long one)  
stop watches

1. Take a length of fishing line (approximately 15 metres long) and tie it to a secure structure (e.g., the back of a chair, the balcony rail, the door knob).
2. Thread a drinking straw through the fishing line.
3. Blow up a balloon, and insert a 4cm length of straw in the end and fix with sticky tape, holding firmly so that the air does not escape.
4. Tape the balloon to the drinking straw on the fishing line, still holding the end of the balloon to ensure that no air escapes.
5. Whilst holding the balloon, extend the fishing line its full length until it is taut.



6. On the signal (ie, when the stop watch timer says “Go!”), let the balloon go and time it until it stops.
7. Measure the distance the balloon travelled.
8. Construct a table to record your results:

<b>Trial</b>	<b>Description</b>	<b>Distance (m)</b>	<b>Time (sec)</b>	<b>Speed</b>	<b>Thoughts</b>
T1	1 straw exhaust				
T2	2 straw exhaust				
T3	3 straw exhaust				
T4	4 straw exhaust				
T5	5 straw exhaust				

9. Take a new balloon and repeat the exercise, this time taping two 4cm straws into the end. Before you let the balloon go, predict what will happen. Record the distance travelled in the time, and enter into the data table.
10. Repeat three more times, inserting 3, then 4 and then 5 straws into the end of the balloon.
11. As you observe each balloon, write your thoughts about the balloon in the “Thoughts” column of your table.
12. Analyse the data table. What can you say about the number of straws in the balloon and the speed and distance travelled?

### **Rocket modifications**

What modifications could you make to your rocket to alter the speed, or distance? Try using different length exhausts; altering the length of the fishing line; methods of taping the balloon to the straw. Is there an ideal exhaust? Experiment, record, analyse.

### **Sumo Wrestlers**

From your experimentation with balloon rockets, create a balloon that will take part in a sumo wrestling match with another balloon. For the tournament, your sumo wrestler will challenge another sumo wrestler:



1. Construct a tournament line with a piece of fishing line, tying the end to something solid.
2. Place two drinking straws on the line.
3. Tape your sumo wrestler onto one of the straws, and your challenger will tape his/her balloon to the other straw. At the signal, let the balloons go. The balloon that can move the other balloon the longest distance is the winner.

### **The Mathematics of Tournaments**

Explore the mathematics of organising a tournament:

- What is the mathematics involved in organising the tournament?
- What rules will be used for eliminating opponents?
- What is the ideal number of entrants for a tournament?
- What if there are 13 entrants?
- What if there are 16 entrants?
- Will there be finals?

### **The mathematics and science of speed**

This investigation provides rich data to use to promote rich, conceptual understanding of the concept of speed as distance divided by time. By plotting graphs and discussing the slopes of lines, students will develop intuitive notions about gradient. They will be able to predict the types of situations that graphs depict, depending upon the slope of the line.