Flying High

You need

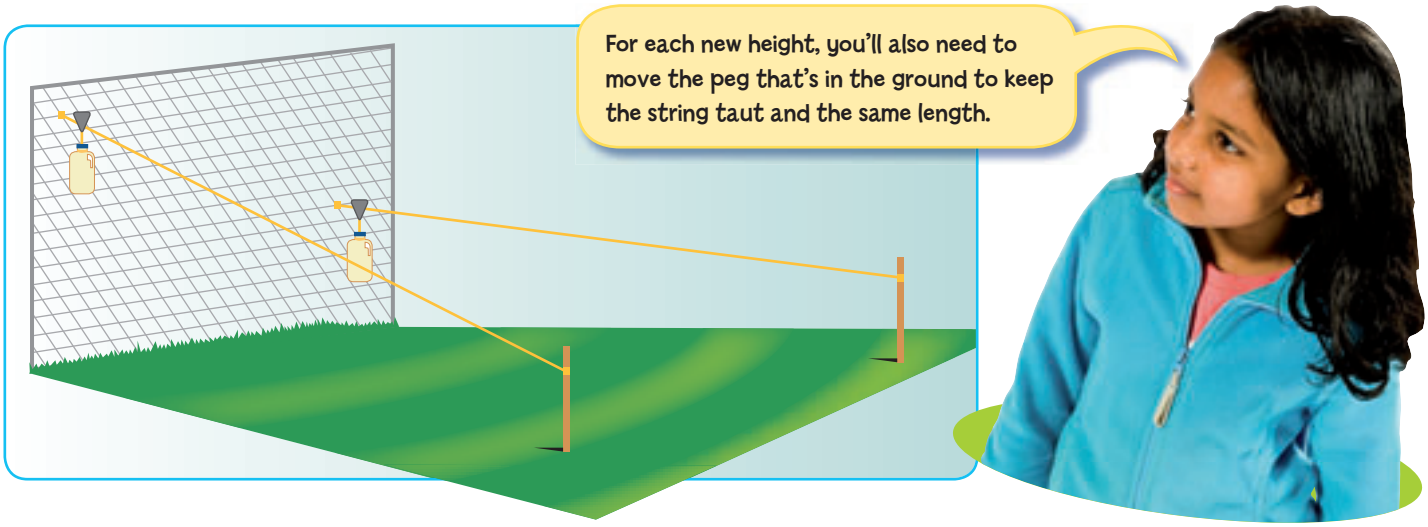
- a computer spreadsheet/graphing program
- strong string or cord
- pulleys
- a 2 litre plastic milk bottle
- water (or sand)
- pegs (sticks)
- a stopwatch
- a 1 kg weight (for **Activity Three**)
- classmates

Sarah's class is going on an outdoor education camp next week. She and her friends Matthew and Gaytri are looking forward to using the flying fox. They are talking about how to make a flying fox go faster.

Activity One

The three friends decide to investigate. They start with Matthew's idea about height.

1. a. With two classmates, make a model of a flying fox using a pulley and a 2 litre bottle half full of water, as shown below. Use your model to run some trials at different heights. For each height, do 3 trials and record in a table or spreadsheet (see question 2) how long each run takes.

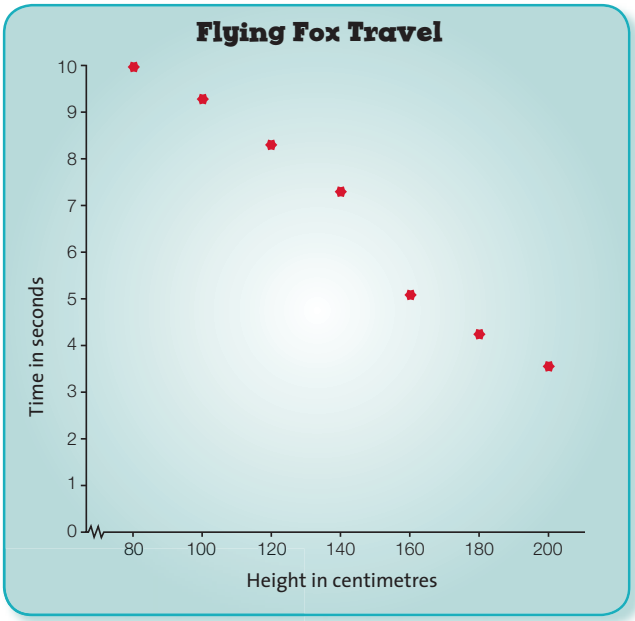


b. For each height, calculate the average time. Graph the averages. Discuss what you have learnt.

2. Sarah put the times for each height into a spreadsheet, found the average times, and made a graph:

Flying Fox Speed

	A	B	C	D	E
1	Height of string	Trial 1	Trial 2	Trial 3	Average
2	80 cm				
3	100 cm				



The average time is the sum of the times divided by the number of trials.

a. What does Sarah's graph tell you?

b. Matthew mentioned the effect of gravity. What did he mean?

3. a. How does your graph compare with Sarah's? Discuss any differences. Compare your graph with that of another group of students.

b. Combine your averages with those of other groups and graph them. Does the combined data give you a more reliable result?

Activity Two

To investigate Gaytri's question about weight, keep the height of the string the same and change the mass. The effect of gravity on the flying fox's weight depends on the amount of mass.

1. a. Before you start, predict what will happen to the time and explain why.

b. For each set of trials, add 200 millilitres of water to your bottle. Do 3 trials for each new mass. Record your results in a table similar to that in **Activity One**.

c. Discuss any differences between your results and your predictions.

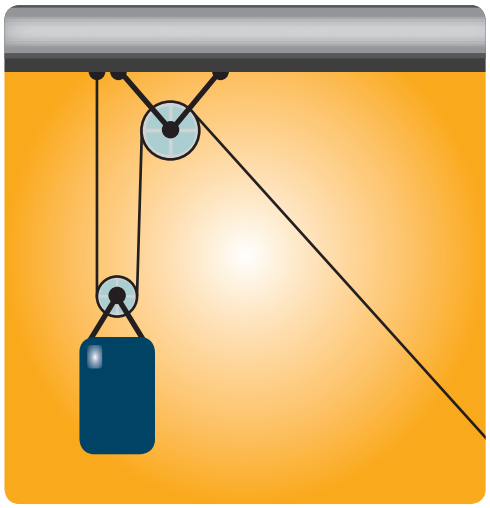
2. Graph your results. Compare this graph with your group's graph from **Activity One** and with Sarah's. What have you discovered?

Activity Three

1. How would a person's weight affect the cable of a real flying fox?
2. What would a person in charge of the design and maintenance of a flying fox have to be aware of?
3. When Matthew was reading about flying foxes, he found this information about pulleys:

> Variations on flying foxes have been used in the past (and are still used) to carry equipment and people across land, rivers, and so on. Some of these variations are horizontal and need a two-way pulley system.

A two-way pulley system allows you to change the direction of a force or reduce the amount of force needed.



a. Design and make a two-way pulley system that you can use to move a 1 kilogram object the length of the classroom and back again.

b. i. How can you arrange your pulleys to use less force?

ii. How can you arrange your pulleys to use less string?

iii. Why is your cable likely to be longer than twice the length of the classroom?

Focus Measuring the effect of different variables