Moving air

Student booklet

6

Science

Queensland Comparable
Assessment Tasks
(QCATs) 2011

Given name: .....

Family name: .....

School: .....

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Setting the scene: Group discussion

Talk about the role of **moving air** in each of the pictures below.

Is moving air pushing the object, or is the object pushing the air?

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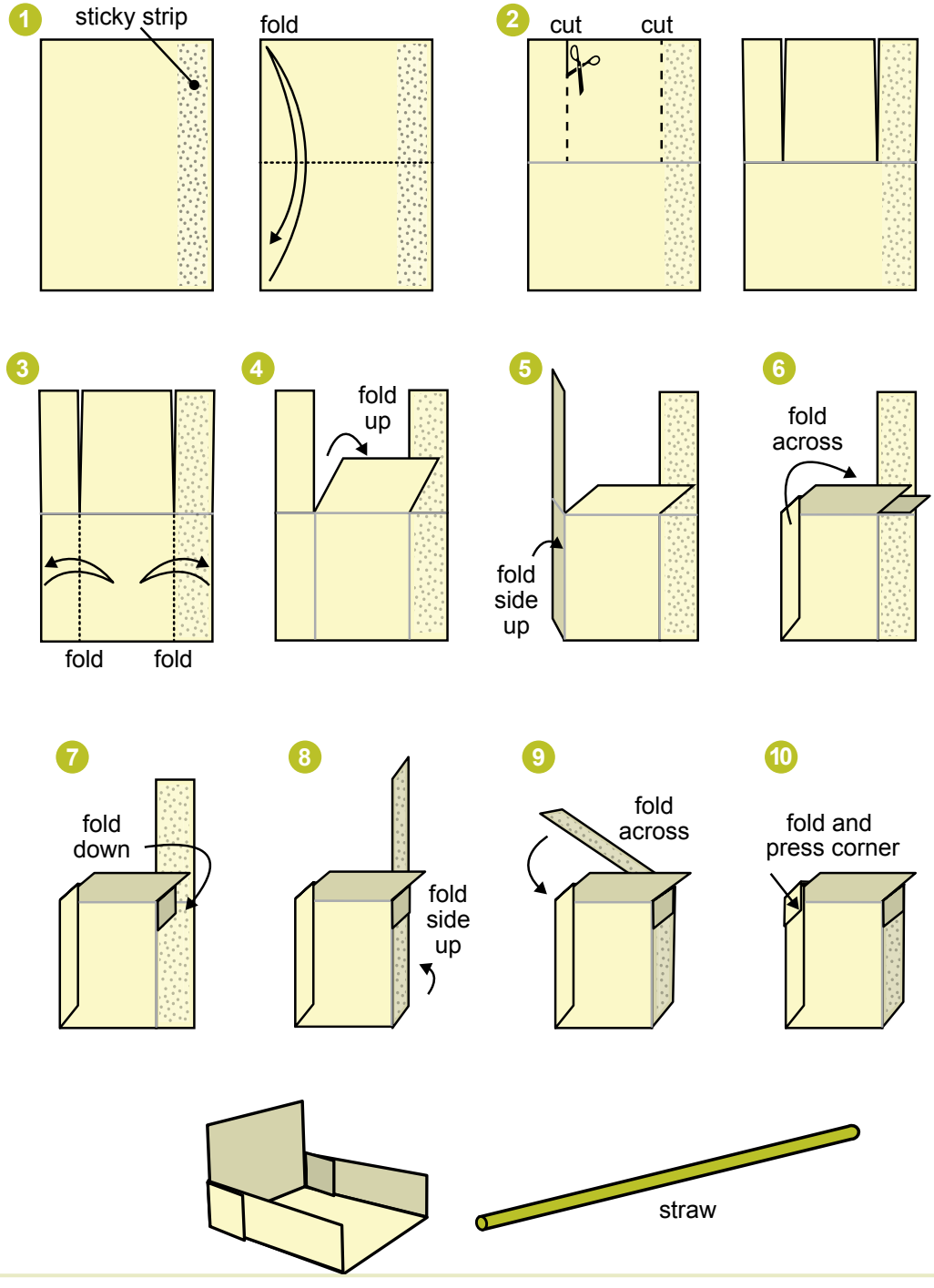
Make an air buggy

Instructions

Materials

- Sticky note — about 12 cm x 8 cm
- Scissors
- Drinking straw

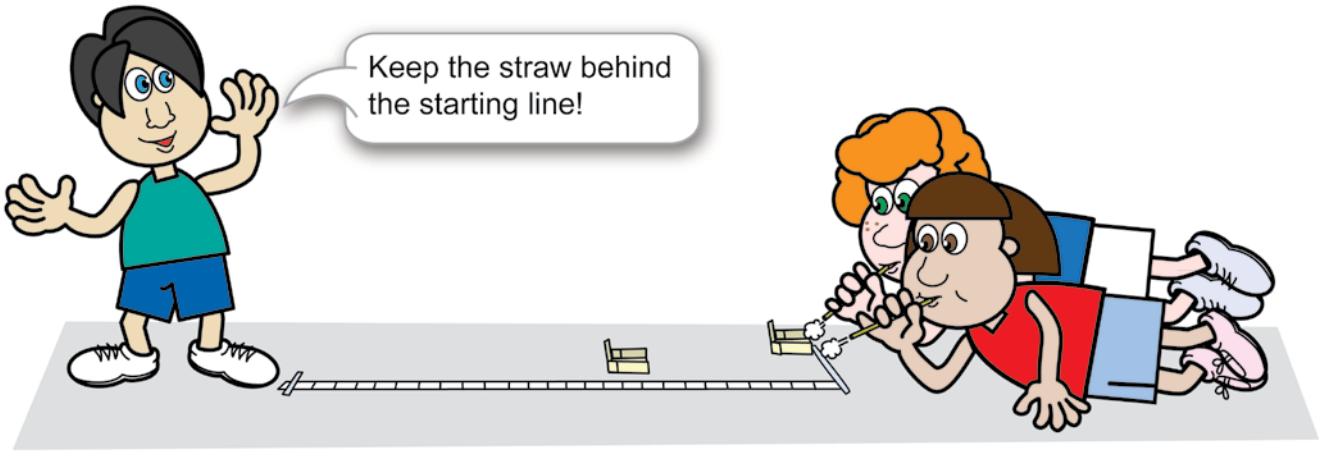
Method



Air buggy competition

In groups of two or three, carry out these two challenges.

- **Challenge 1:** Who can make it go furthest?
- **Challenge 2:** Can you make it go exactly 30 centimetres?



Discussion

Talk about the way the air buggies moved, and answer this question:

How can forces affect the motion of your air buggy?

Discuss the questions below and add some of your own.

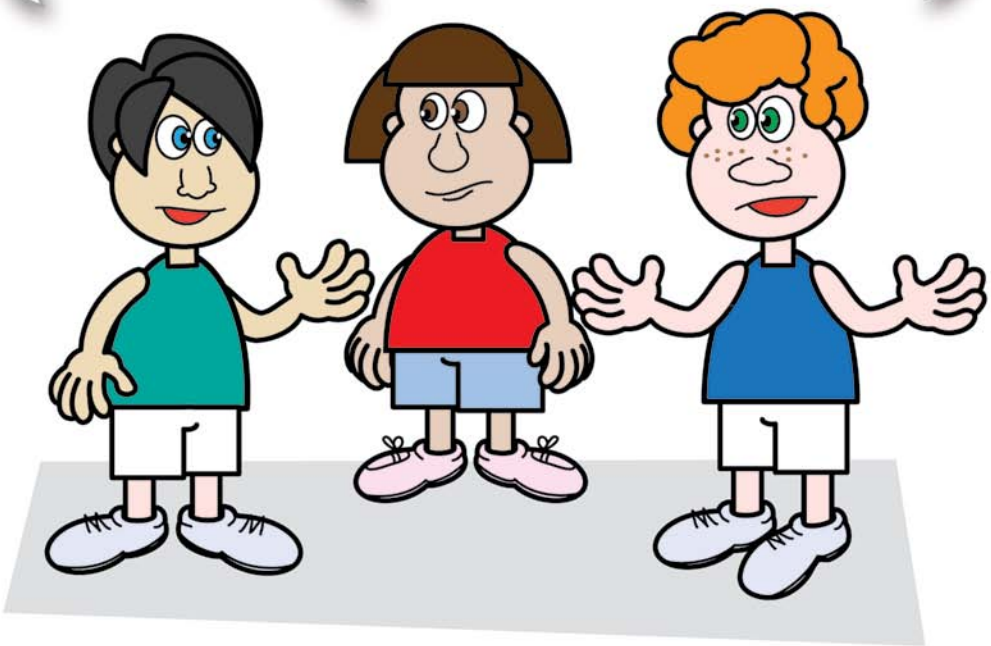
Forces and motion

- What are some different types of force?
- Can there be more than one force acting on an object at the same time?

Your questions

Science investigations

- When we tested our air buggies, why did the distance vary?
- Was it a fair test?
- What variables did we keep the same?

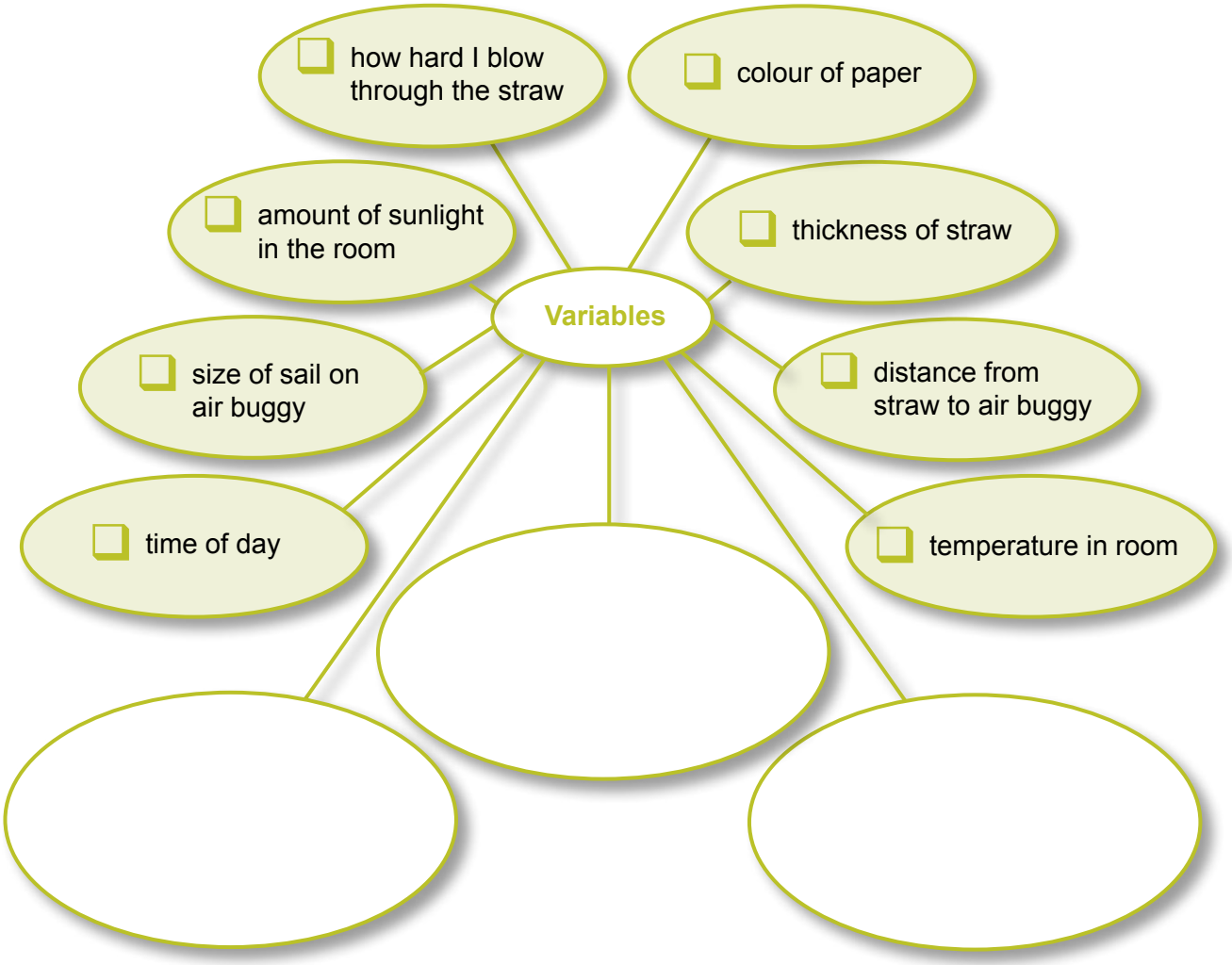


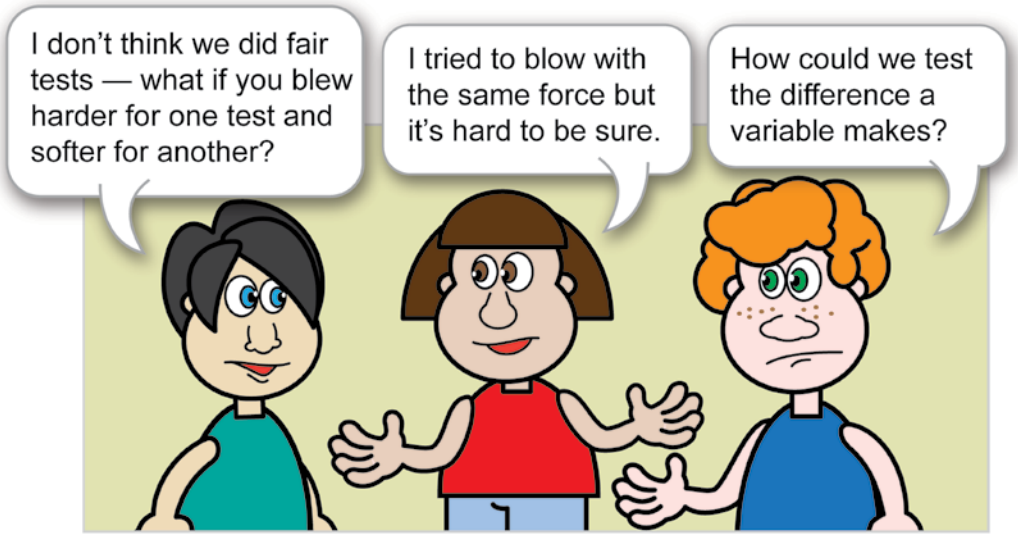
Variables

The distance your air buggy travels is a bit different each time you test it.

1. a) Tick the variables that would change the distance travelled.

b) Add some variables that you predict would affect the distance.





Testing variables

2. Select two variables that you predict will have a big effect on the distance travelled.

Write them in the **Predict** column of the table below.
Find out how these variables affect the distance your air buggy travels.

Method		
Step 1. Blow through the straw to move the air buggy. **Step 2.** Check the distance it travels (you don't have to write down results). **Step 3.** Change Variable 1 and then blow again. **Step 4.** Compare the distance travelled, then complete the **Observe** and **Explain** column **Step 5.** Repeat Steps 1 to 4 with Variable 2.		
Predict Name two variables that will affect the distance travelled.	**Observe** Describe the effect of the change on distance travelled.	**Explain** Use science ideas to explain your observation.
Example *How hard I blow through the straw.*	*The distance increased when I blew harder.*	*A larger force causes the object to move further.*
Variable 1		
Variable 2		

3. How did you control other variables in your investigations?

List some variables and explain your control methods.

Variable	Control method — how was it kept the same for each test?
•	•

Explaining forces

4. a) In the diagrams below, name the forces at work on the air buggy.

Use force arrows to show their strength and direction.

e.g. small force 

large force 

Before the air is blown

While the air is blowing

b) Explain how forces made your air buggy move.

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c) How do forces make a moving buggy slow down and stop?

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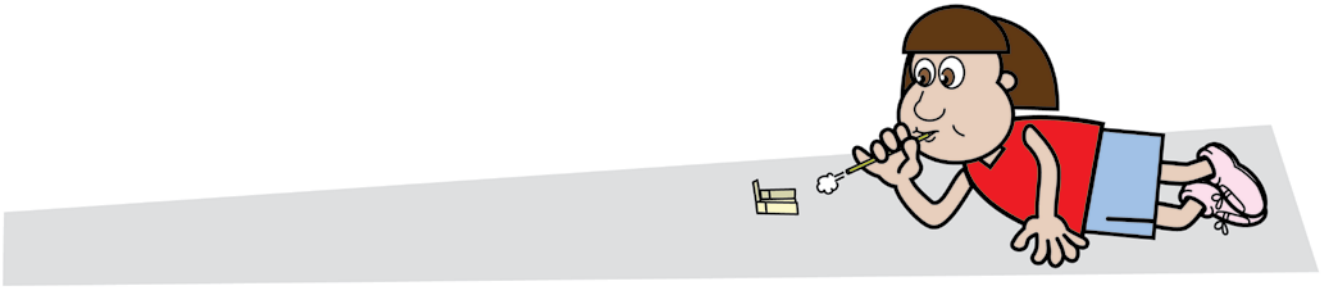
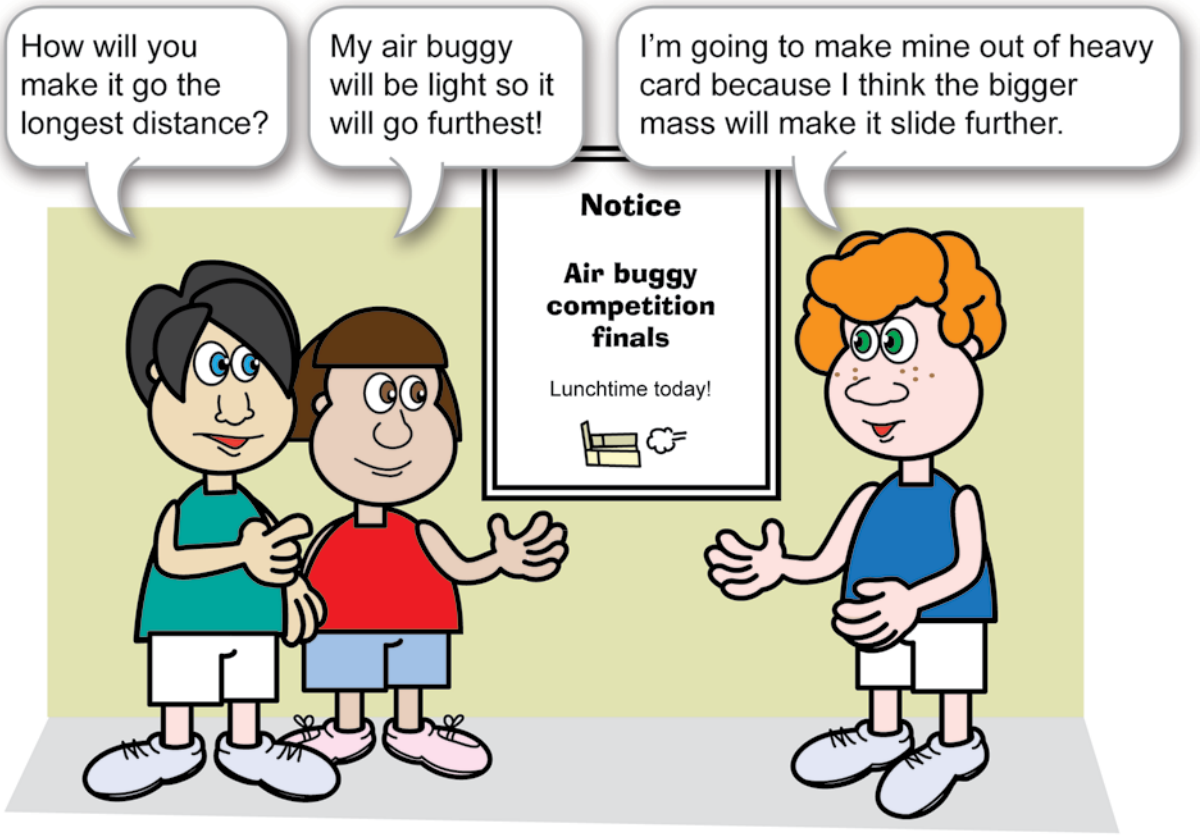
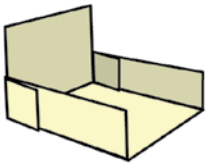
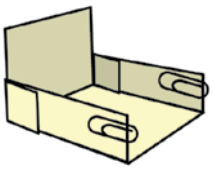
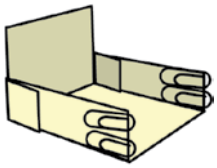


Investigating



5. Carry out the investigation below and record your results in the table on page 11.

How does the mass of the air buggy affect the distance it travels?
Materials • air buggy • 4 paperclips • straw • ruler or tape measure
Method **Step 1.** Place the buggy on a flat surface. Mark the starting position. **Step 2.** Blow through the straw to move the air buggy (don't move the straw). **Step 3.** Measure the **distance** the buggy travelled and record your results. Do this 3 times. **Step 4.** Increase the mass of your air buggy by adding two paperclips. Repeat steps 1 to 3. **Step 5.** Add two more paperclips. Repeat steps 1 to 3. **Step 6.** Calculate the **total** and **average** for each data set.

Investigation results				
Variable changed: mass of air buggy		**Paperclips: 0** 	**Paperclips: 2** 	**Paperclips: 4** 
Distance travelled (cm)	**Trial 1**			
	Trial 2			
	Trial 3			
Total (add three results)				
Average (total ÷ 3)				

6. The question for investigation was:

"How does the mass of the air buggy affect the distance it travels?"

a) Use your data to explain what you observed.

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b) Use your knowledge of forces to explain *why* that happened.

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c) How could you improve the investigation?

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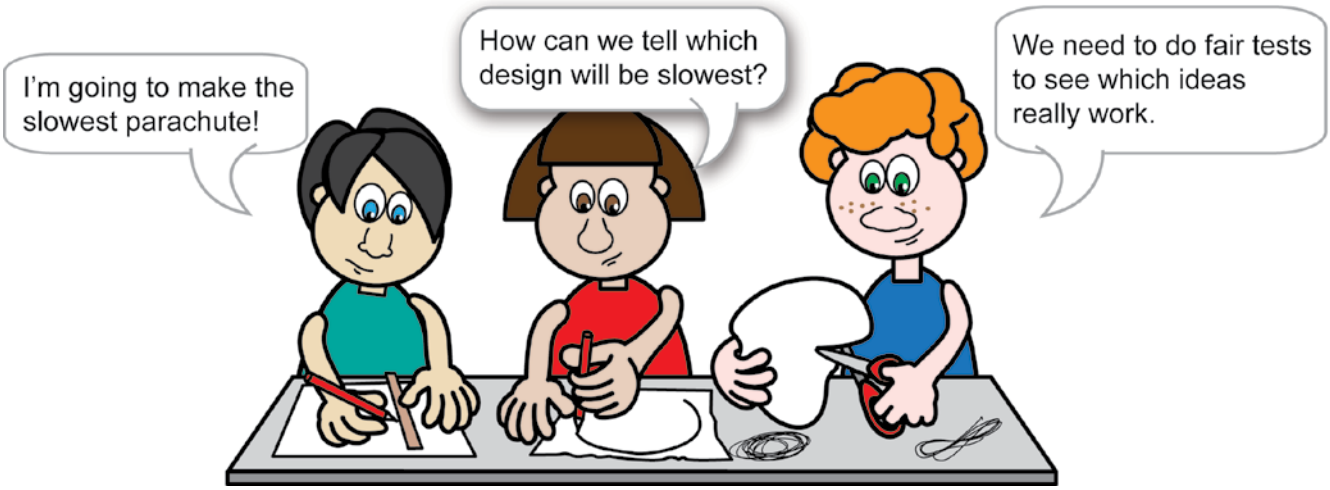
Applying your learning

These students are designing their model parachutes.



7. **Use your knowledge of forces and motion to describe how to design the slowest parachute.**

How to make a parachute that falls slowly
a) Explanation
b) Diagram showing forces

Designing an investigation

- Think about the variables that would affect the speed of a parachute.
- Select **one** variable that you could test to see how much difference it made.

8. Design an investigation to test the effect of your selected variable.

Investigation plan
a) Complete the question for investigation: **How will changing the** ..... **change the speed of my parachute?**
b) Hypothesis:
c) What will you change in your investigation?
d) What will you measure or observe?
e) What things will you keep the same to make it a fair test?
f) List the materials and equipment you will need.

g) List the steps for carrying out the investigation and collecting data.

Step 1.

Reflecting

In this assessment, you have:

- carried out **fair tests** with your air buggy
- planned a **fair test** to investigate parachute design.

9. a) What is a fair test?

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b) When investigating the effect of changing a variable, why would a scientist use a fair test?

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Guide to making judgments — Year 6 Science

Name .....

Focus: Design, carry out and interpret scientific investigations relating to forces and motion.

Knowledge and understanding	Investigating	Communicating	Reflecting	
Demonstrates understanding of how forces affect the motion of objects. Questions 2 (Explain), 4, 6b, 7	Collects and interprets data to draw scientific conclusions. Identifies elements of a fair test, including variables to be changed or controlled, when planning and analysing investigations. Questions 1–3, 5, 6, 8, 9a	Uses scientific terminology and annotated diagrams to communicate ideas, data, and evidence. All questions, but specifically — Scientific terminology: Questions 2, 4, 6, 7 Diagrams: Questions 4a, 7b	Reflects on learning to apply understanding to new contexts. Questions 6c, 7, 9	
◀ Explains the role of opposing or supporting forces in changing the motion of objects.	◀ Uses data and scientific concepts to justify conclusions. Explains how variables are controlled. Designs a scientifically valid investigation.	◀ Clearly conveys meaning and uses precise scientific terminology in annotated diagrams, conclusions and explanations.	◀ Provide a justified explanation of the importance of fair tests in science.	**A**
◀ Makes detailed, accurate descriptions of the action and direction of forces on objects.	◀ Accurately collects and records data. Links findings to relevant scientific concepts.		◀ Explains how new learning about forces, motion and fair tests applies to a new context.	**B**
◀ Links forces to different contexts.	◀ Links findings to evidence. Identifies relevant variables. Designs an investigation with elements of a fair test.	◀ Uses scientific terminology appropriately in explanations and conclusions. ◀ Clearly and accurately presents information in diagrams and tables.	◀ Refines procedure by applying learning from investigation. ◀ Identifies science learning relevant to new contexts.	**C**
◀ Describes the action of forces.	◀ Plans an investigation.			**D**
◀ Identifies forces.	◀ Records data.	◀ Uses everyday language and rudimentary diagrams.	◀ Recounts procedures followed.	**E**

Feedback .....

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