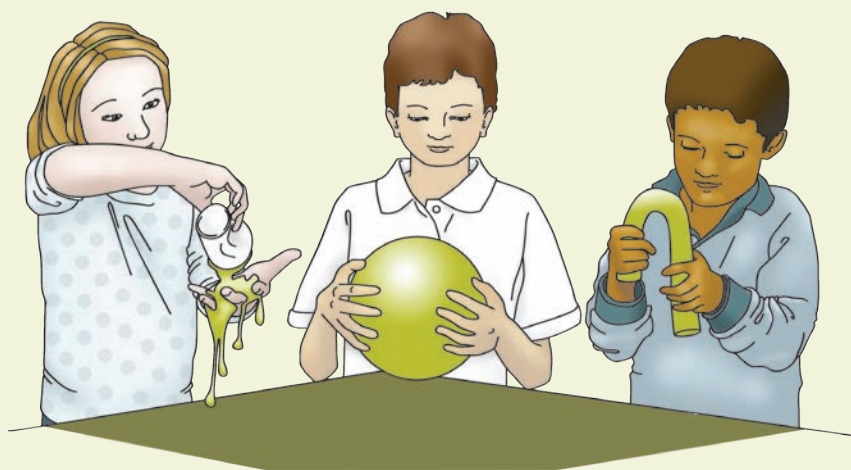


Our material world

Student booklet



4

Science

Queensland Comparable
Assessment Tasks (QCATs)
2010

Given name:

Family name:

School:

Setting the scene: Group discussion

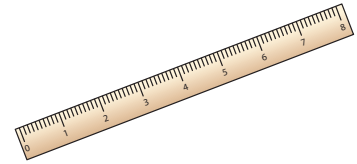
Every object in your classroom has a purpose.



Desks have a purpose.
They provide a place to
work on.



Drink bottles have a
purpose. They are
used to hold water.



Rulers have a purpose.
They are used for
measuring distances
and drawing straight
lines.

Objects are made from different types of materials. Talk about the useful properties of each material.

Properties word bank

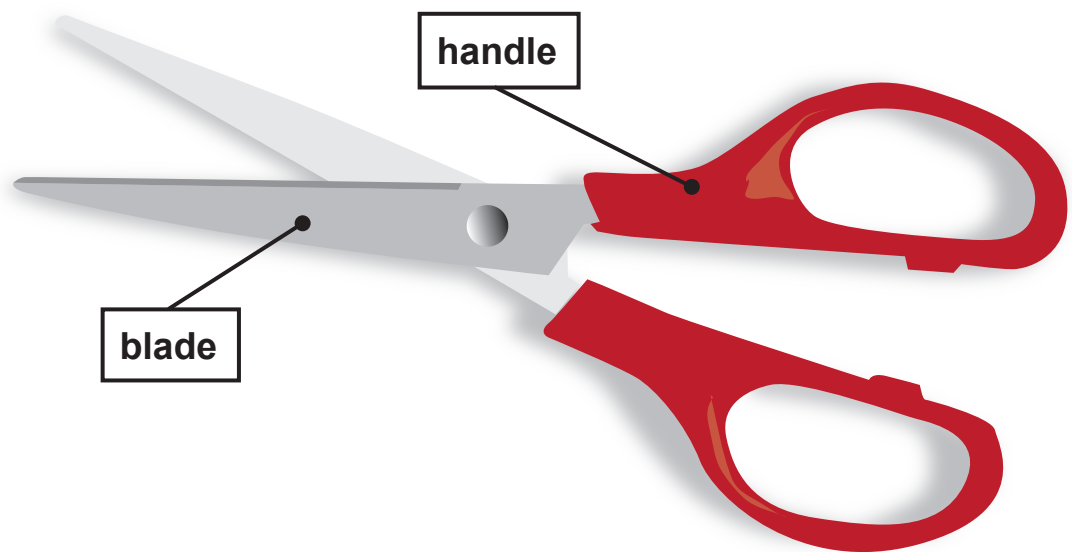


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Ngadjonji information source (pp.12–13) from: *Ngadjonji - History & Culture of a Rainforest Tribe*, accessed Mar 1 2010, <www.ngadjonji.bigpondhosting.com>.

Queensland Studies Authority PO Box 307 Spring Hill Qld 4004
Phone: (07) 3864 0299 Fax: (07) 3221 2553 Email: office@qsa.qld.edu.au Website: www.qsa.qld.edu.au

Think about the materials used to make a pair of scissors.



These scissors have two parts, a handle and a blade. Each part is made from a different material.

In the table below:

- write the purpose of each part
- use the **Properties word bank** on page 2 to list the properties of each part.

Properties of materials in a pair of scissors

Part of object	Purpose	Material	Properties of material
handle		plastic	smooth,
blade		metal	can be sharpened,

Other scissors, like scissors for small children, use different materials. Talk about the properties of a material chosen to make children’s scissors.

Investigate materials

Scientific idea 1:
I wonder why an object is made from a specific material.

To investigate this idea, we use a focus question.

Focus question 1:
Are some properties more important than others?

There are several objects in your work area for you to observe and test. Each object is made from a different material.

1. Examine all objects. Choose one object.

a) Complete the table below.



Hint: The **Properties word bank** on page 2 might be useful.

Object	Purpose	Material	Properties of material

b) Why is the material used to make your object a good choice?

.....

.....

2. We can make a toy plane that can fly.

a) List some **properties** that are important in the materials used to make a toy plane that flies.

.....

.....

- b) We can use paper to make a toy plane that flies. List some other **materials** that could be used.

.....

.....

Scientific idea 2:

I wonder if toy planes that fly can be made from other materials.



Focus question 2:

Will a toy plane made from card fly further than a toy plane made from baking paper?

Identify properties

3. Observe and test the card and the baking paper.

- a) List the **properties** of the card and the baking paper.



Hint: The **Properties word bank** on page 2 might be useful.

Properties of card	Properties of baking paper

- b) Circle **properties** important for making toy planes that fly.

Make a prediction

4. a) Tick the box that matches what you predict will happen.

- ☐ The **card** plane will fly further.
- ☐ The **baking paper** plane will fly further.
- ☐ Both planes will fly the **same** distance.

b) Explain why you chose this option.

.....

.....



Stop here: Wait for your teacher's directions.

Investigate

Planning for a fair test

To be a fair test:

- one thing is **changed** (the material used to make the plane)
- one thing is **measured or observed** (distance of the flight)
- all other things are kept the **same**.

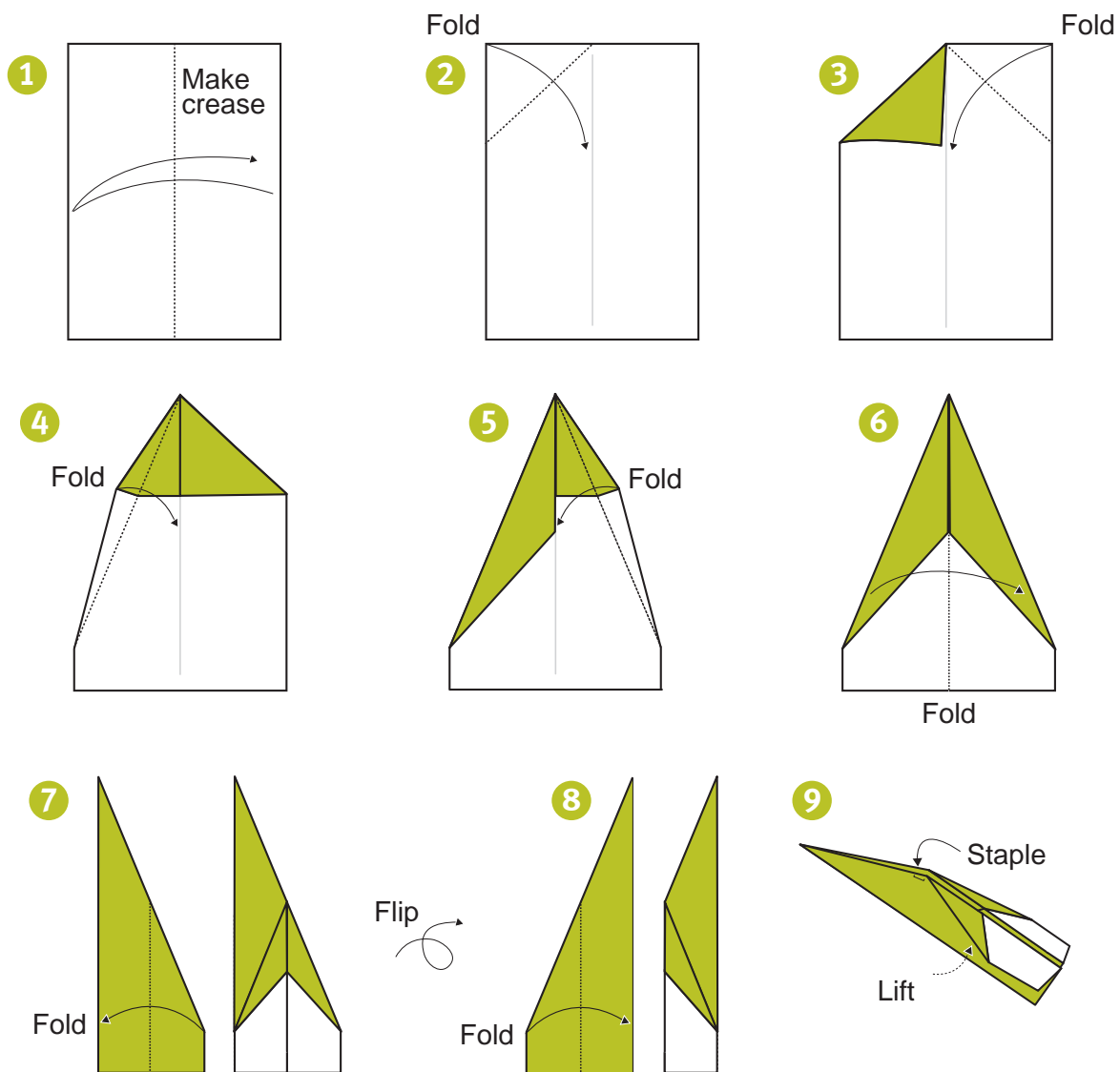
Materials

- card
- baking paper
- pencil

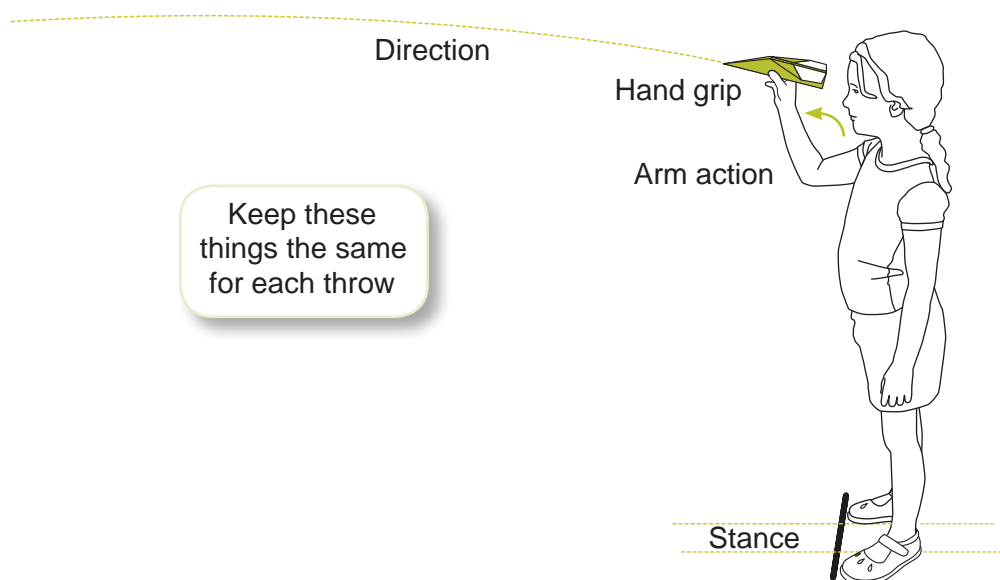
Method

- Step 1** Follow the **Instructions** on page 7 to make a plane from each material. Make each plane the same way.
- Step 2** Throw each of your planes once. Throw them the same way, using the **Plane-throwing technique** on page 7. (Your teacher will demonstrate.)
- Step 3** Record your results in the **Data table** on page 8.
- Step 4** Repeat Steps 2 and 3 until you have filled your data table.
- Step 5** Record your observations about the planes, the throws and the environment in the **Observations table** on page 8.

Instructions



Plane-throwing technique



Collect data

5. Use a tick (✓) to indicate which plane flew further for each trial.

Data table

Trial #	Card	Baking paper
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
Total number of ticks		

6. What did you observe that may have affected your data?

Observations table

Environmental conditions	
Throws	e.g. sometimes my feet were over the line so the plane went further
Planes	

Check the investigation is fair

7. Use a tick (✓) to show the things you **changed**, **measured or observed**, and kept the **same** in the investigation.



Hint: Use evidence from Question 6.

Fair test table

Feature of the investigation	What I did		
	Changed	Measured / observed	Kept the same
• the shape of the plane			
• the type of material			
• how to throw the plane			
• where to throw the plane			
• environmental conditions			
• the distance of the flight			

8. This investigation was **fair**
unfair because:
(circle one)



Hint: Use evidence from Questions 6 and 7.

.....

.....

.....

.....

Look at the evidence and draw conclusions

Conclusion

9. a) Tick the box that matches your results from the data table.

- ☐ The **card** plane flew further.
- ☐ The **baking paper** plane flew further.
- ☐ Both planes flew the **same** distance.

b) How does the data show this?

.....

.....

c) Explain your conclusion by referring to the properties of the **card** and **baking paper**.

.....

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Reflection

10. Does your conclusion match your prediction in Question 4?

- ☐ Yes ☐ No

My prediction **was** the same as my conclusion because:

was not
(circle one)

.....

.....

.....



Stop here: Wait for your teacher's directions.

New ideas, new questions

Wood is used by Aboriginal peoples and Torres Strait Islander peoples to make many things, including boomerangs, shields, bowls and clubs.

Wood can have many properties. Wood may be:

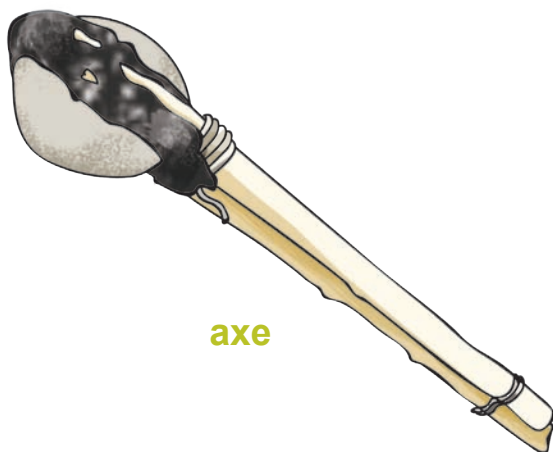
- soft or hard
- light or dark in colour
- smooth or rough
- flexible or rigid
- lightweight or heavy.

The Ngadjonji people

The Ngadjonji people are an Aboriginal people whose traditional lands are in rainforest country in Far Northern Queensland. They use wood from local plants to make tools and shelters. Different types of wood are used for different objects.

Tools

Wood chosen for shields and axe has to be very hard and rigid.



axe



shield

Ngadjonji name: bigan

Shelters

Wood used to build a shelter like the one in this picture has to be very flexible.



Shelter

Ngadjonji name: mija

The Ngadjonji people might consider bamboo and yellow lawyercane when building a shelter because they bend easily.



Bamboo



Yellow lawyercane

Ngadjonji name: jungganju

Images are Creative Commons: Attribution 2.0 Generic licensed photos
<<http://creativecommons.org/licenses/by/2.0/>> accessed 31 Mar 2010.
Bamboo: annieo76's photostream, "Bamboo forest, natural light",
<www.flickr.com/photos/annieh76/381421012/>;
Yellow lawyercane: Sweet One's photostream, "DSCN4196",
<www.flickr.com/photos/sweetone/3342906226/>.

Investigate

Scientific idea 3:

I wonder if some woods have properties that make them better for building shelters.

11. Write a focus question to investigate this idea.

Focus question 3:

.....

.....

12. Plan an investigation to collect data that answers your focus question.

a) Planning for a fair test

What will be **changed**?

.....

What will be **measured or observed**?

.....

What will be kept the **same**?

.....

.....

.....

.....

b) Materials

.....

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c) Method

Step 1

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Reflection

New materials are being made by scientists all over the world.

Three examples are described below.



Aerogel

One of the lightest materials ever developed. It is a glass-like mixture that is 96% air.

Properties

- lightweight
- strong
- can be recycled
- good insulator



Spider silk (manufactured)

A rubber mixture with nano-crystals of clay in it to make it extremely stretchy.

Properties

- elastic
- strong
- lightweight
- waterproof



Sugru

A soft plasticine-like material.

Properties

- sticks to many surfaces
- can be moulded
- sets hard
- waterproof
- non-slip

13. Choose one new **material** by ticking the box next to its name.

a) A **purpose** for this **material** could be:

.....

b) State how its **properties** are useful for this purpose.

.....

.....

.....

.....

Guide to making judgments — Year 4 Science

Name

Focus: Use fair tests to relate the properties of materials to their purpose.

Knowledge and understanding	Investigating	Investigating	Communicating	Reflecting
Identifies properties of materials and understands that materials are chosen for a purpose because of their properties. Questions 1–3	Poses a simple question, makes a prediction to be tested, identifies elements of and plans a fair investigation. Questions 4, 7, 8, 11, 12	Collects and organises data and observations. Draws a conclusion supported by the data and the identified properties of materials. Questions 5, 6, 9	Uses scientific terminology and appropriate formats to communicate properties of materials, observations, explanations and a method in investigations. Questions 6, 12 and throughout	Reflects on learning to evaluate a prediction and to identify a future application of a new material. Questions 10, 13
<p>Identifies properties and materials appropriate for making toy planes. Relates properties to purpose.</p> <p>Identifies properties of given materials and the purpose of the object.</p> <p>Identifies properties.</p>	<p>Writes a method that controls variables.</p> <p>Comments on the fairness of the test using evidence from tables. Writes a method that measures/ observes the flexibility of woods.</p> <p>Makes a prediction based on the properties of the materials. Poses a relevant focus question and identifies elements to be changed, measured/observed and controlled.</p> <p>Writes a statement or open focus question. Makes a prediction.</p>	<p>Explains conclusion with reference to a scientific idea or states a cause and effect.</p> <p>Records observations that affect the data. Links the conclusion to a property of the material.</p> <p>Accurately calculates the totals in the data table and uses them to draw a conclusion.</p> <p>Records data and relevant observations.</p>	<p>Consistently uses scientific terminology. Communicates a method using a logical and concise procedural format.</p> <p>Uses scientific terminology to communicate properties, observations, explanation or method.</p> <p>Communicates a sequenced method.</p> <p>Communicates properties, observations, explanations or method.</p>	<p>Explains how all of the listed properties are useful for the suggested purpose. Evaluates the prediction with reference to thinking, learning or evidence.</p> <p>Provides a relevant reason for why the prediction is/is not correct. Links at least one property of the new material to the suggested purpose.</p> <p>Suggests a purpose for a new material and restates the relevant properties.</p>
				<p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>E</p>

Feedback

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