

# Ink spots

Student booklet



# 4

## Science

Queensland Comparable  
Assessment Tasks  
(QCATs) 2011

Given name: .....

Family name: .....

School: .....

# Setting the scene: Group discussion

Different materials have different properties.

Some properties are **more useful** for a particular purpose than other properties. These are **important** properties.

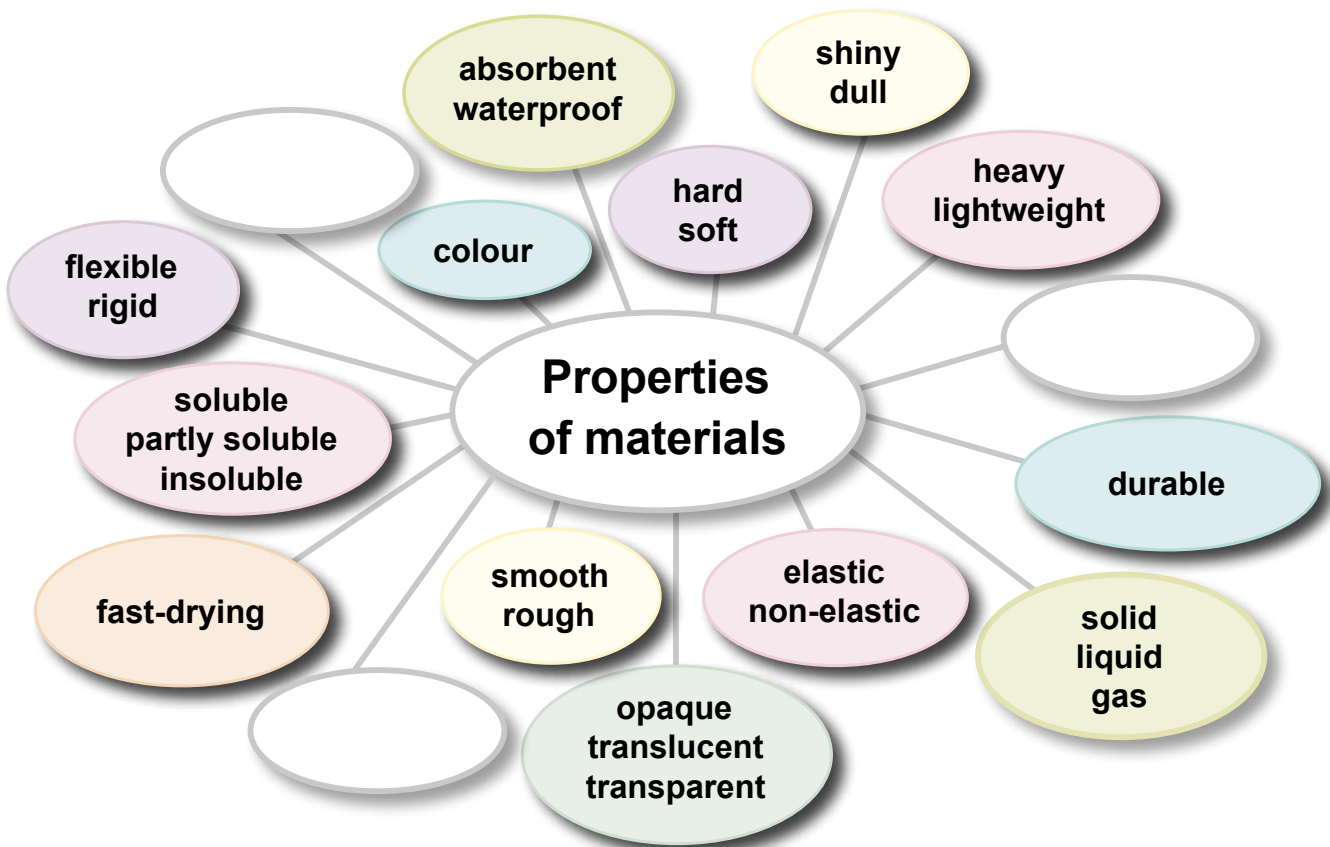
For example, art paint is often **non-toxic** and **water-soluble**.

Discuss why these two properties are important for children's art paint.

Discuss some other important properties of art paint.

Use the **Properties word bank** below.

## Properties word bank



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**Images** p. 3 Highlighter pen: 4061552 <[www.123rf.com/photo\\_4061552\\_highlighter-and-word-idea--concept-business-background.html](http://www.123rf.com/photo_4061552_highlighter-and-word-idea--concept-business-background.html)>; Face painting: used with permission — © John Miles/Survival — Survival International supports the rights of tribal peoples worldwide, helping to defend their lives, protect their lands and determine their own futures. For more information, films and photographs log onto <[www.survivalinternational.org](http://www.survivalinternational.org)>; p. 15 Garden hose: 6207941, <[www.123rf.com/photo\\_6207941\\_coiled-rubber-garden-hose-on-grass--horizontally-framed-shot.html](http://www.123rf.com/photo_6207941_coiled-rubber-garden-hose-on-grass--horizontally-framed-shot.html)>; Toothpaste tube: <[www.123rf.com/photo\\_2505332\\_partially-empty-tube-of-tooth-paste-over-red-background.html](http://www.123rf.com/photo_2505332_partially-empty-tube-of-tooth-paste-over-red-background.html)>; Blue chair: procsilas' photostream, "happy to serve" <[www.flickr.com/photos/procsilas/3869782763/](http://www.flickr.com/photos/procsilas/3869782763/)> Creative Commons Attribution 2.0 Generic licensed photo <<http://creativecommons.org/licenses/by/2.0/>> accessed 10 Mar 2011. All other images © QSA.

## In this assessment, you will:

- identify some important properties of materials
- investigate the best ink to label a hat
- investigate the best ink to write in a journal
- reflect on the property of flexibility in different materials.

## Identifying properties

1. Tick (✓) the properties that are important in the materials listed.

	Material and purpose		
	<b>red nail polish (dry)</b> to make nails colourful 	<b>highlighter ink</b> to make some words stand out on the page 	<b>face paint</b> to decorate a face 
<b>hard</b>			
<b>water-soluble</b> dissolves in water			
<b>durable</b> hard-wearing			
<b>opaque</b>			
<b>transparent</b>			



Stop here: Wait for your teacher's directions.

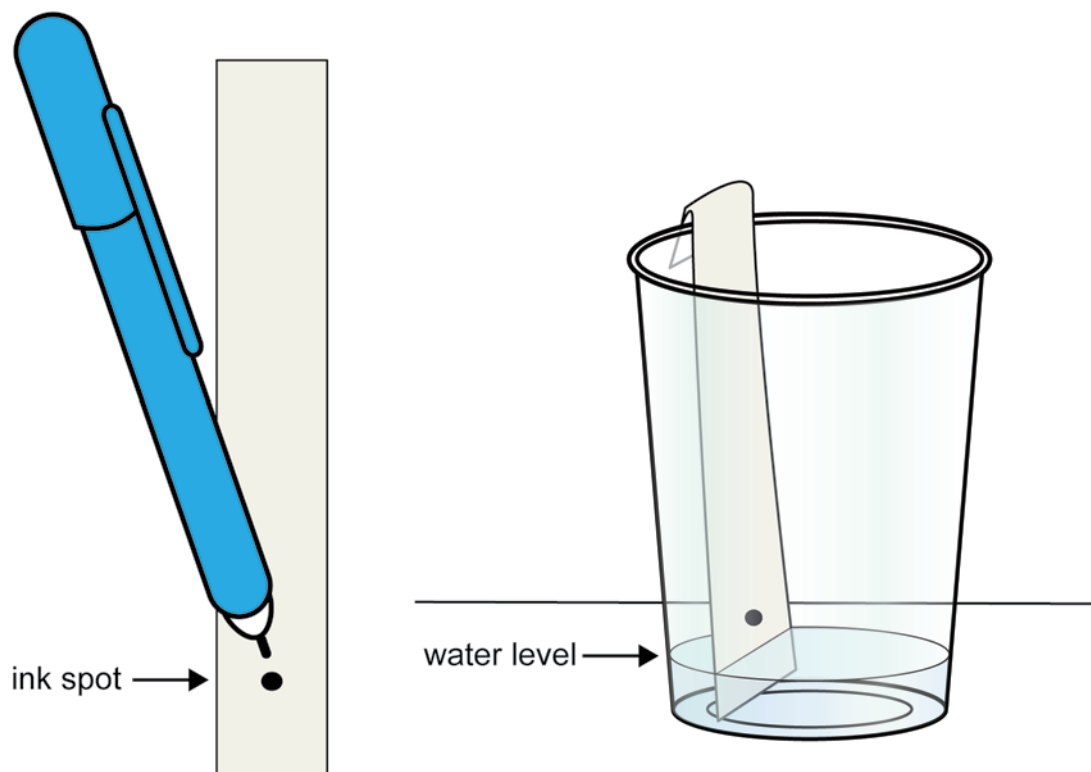
# Investigating properties: Solubility

The property **solubility** describes how well a material dissolves.

## Set up a paper strip test

Use the materials provided by your teacher to test a property of ink.

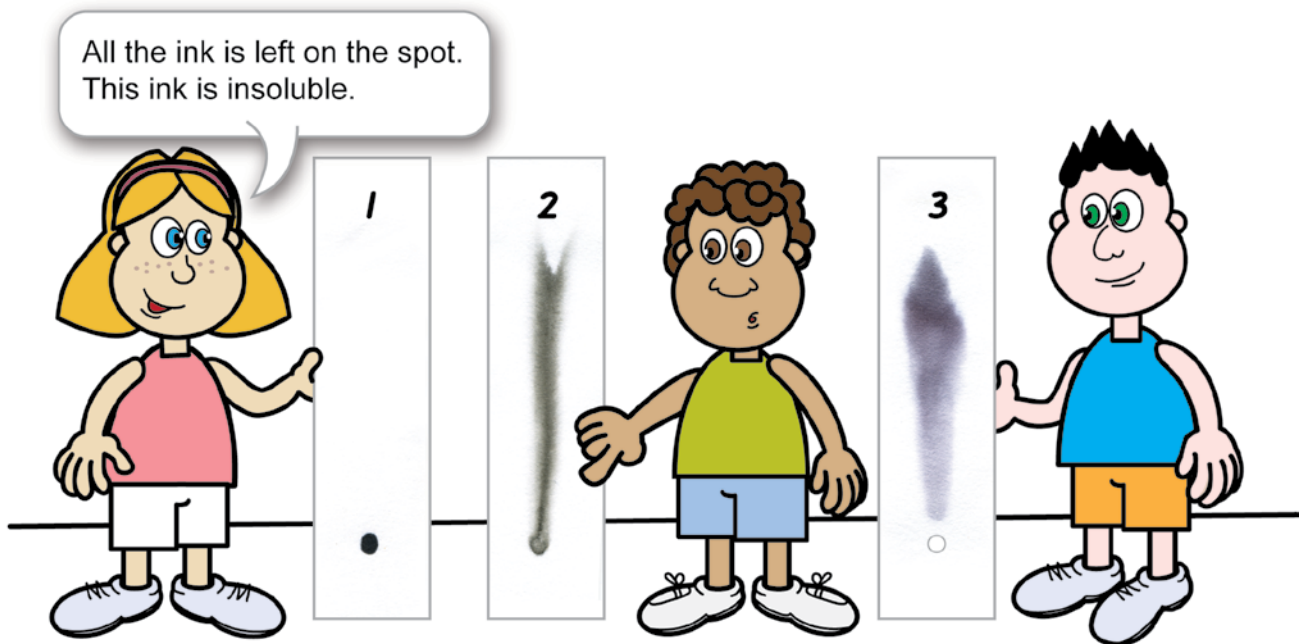
- Choose a black pen from around the room.
- Write your name on the top of the paper strip.
- Colour a small spot near the bottom of the strip.
- Fold the strip over the cup so that it sits in the water as shown in the diagram.
- Set your test aside.



Stop here: Wait for your teacher's directions.

## Observe a paper strip test

Three students tested the solubility of some black pens from around their classroom. They used a paper strip test like the one you have just set up.



Ink **1** is insoluble. Look at its position on the scale below.

<b>1</b>		
<b>insoluble</b> All of the ink is left on the spot.	<b>partly soluble</b> Some of the ink is left on the spot.	<b>soluble</b> None of the ink is left on the spot.

Write the numbers **2** and **3** on the scale above to show the solubility of each ink.

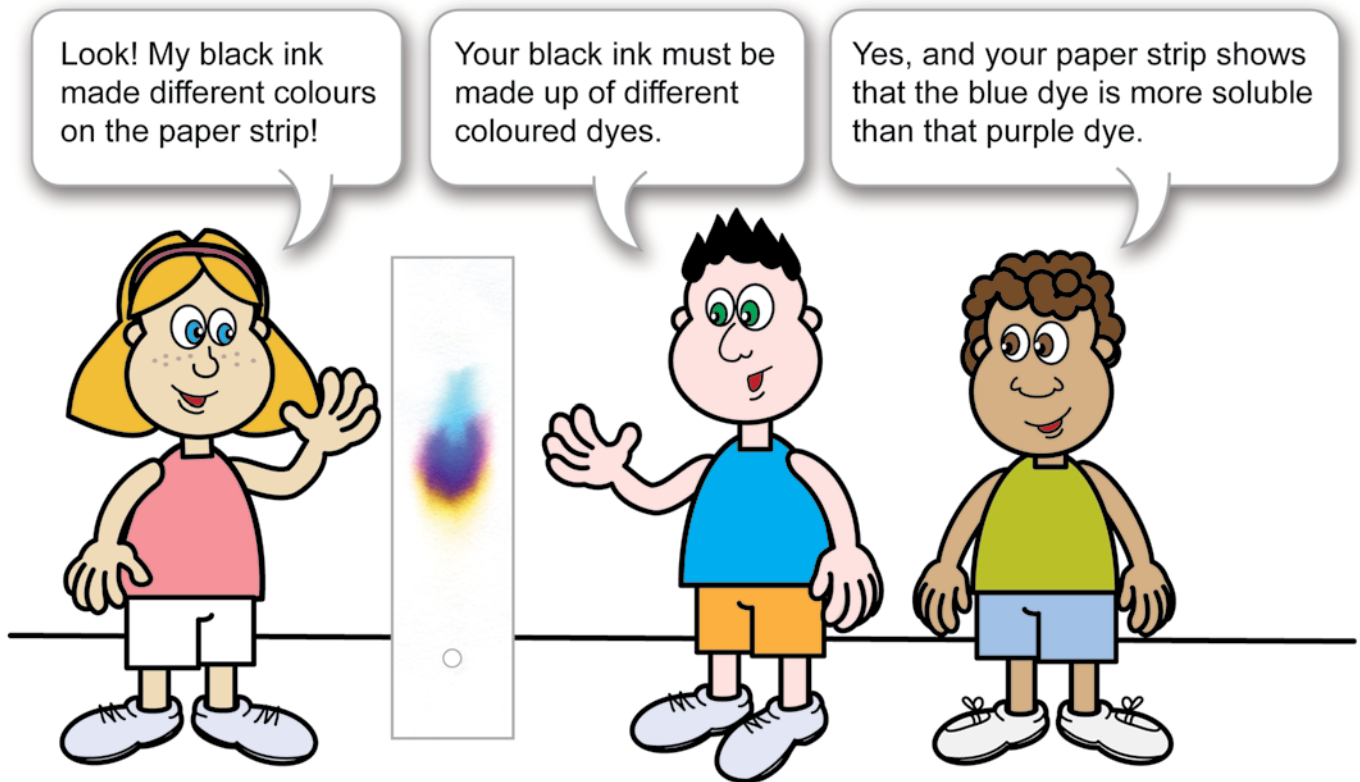
## Observe your paper strip test

- Observe your paper strip to see the amount of ink left on the spot.
- Compare and discuss your paper strip with your classmates.
- Draw a cross (x) on the scale above to show the solubility of the ink you tested.

## A surprising result!

One student observed the result below on her paper strip.

Compare and discuss with your class any paper strips that show coloured patterns.



Some black inks are made up of different coloured dyes.

# Choosing an ink to label my hat

I want to label my school hat. When my hat is labelled with my name, it can be returned to me if lost.



2. a) Why is pen ink better than a pencil to label a hat?

.....

.....

b) List some important properties of an ink you would use to label a hat.

**Hint**

The **Properties word bank** on page 2 may be useful.

- .....
- .....
- .....



Stop here: Discuss how a paper strip test could help you choose an ink.

# Investigate the solubility of three inks



Question to investigate:

Which pen has the best ink to label my hat?

## Planning for a fair test

To be a fair test:

- one thing is **changed** (the ink)
- one thing is **measured** or **observed** (the amount of ink left on the spot)
- all other things are kept the **same**.

## Materials

- 3 paper strips
- 1 cup with 2 cm water
- 1 pencil
- 3 different black pens (labelled **A**, **B** and **C**)

I am testing the ink in pen **A** **B** **C**  
(circle one)

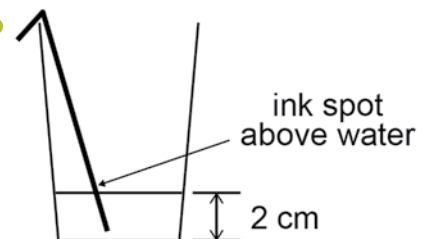
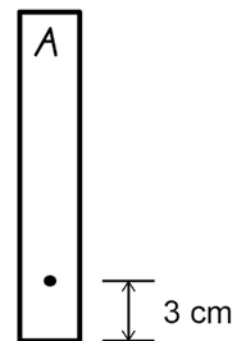
## Method for each strip

**Step 1** Label the strip **A**, **B** or **C** using a pencil.

**Step 2** Colour a small spot with the pen, 3 cm from the bottom of the strip.

**Step 3** Fold the strip over the cup so that the paper rests in the water.

**Step 4** Observe the amount of ink on the spot. Show your paper strip to your group members. Complete the **Observations table** on page 9.





Circle the word in the table that matches your observations for each pen.

### Observations table

Ink	Amount of ink left on the spot			
Pen A	all	most	some	none
Pen B	all	most	some	none
Pen C	all	most	some	none



Work by yourself to answer the rest of the questions.

3. The ink in pen **A** **B** **C** is the best to label my hat.  
(circle one)

This is because: .....

.....

.....

4. Write **A**, **B** and **C** on the scale below to show the solubility of each ink tested.

insoluble

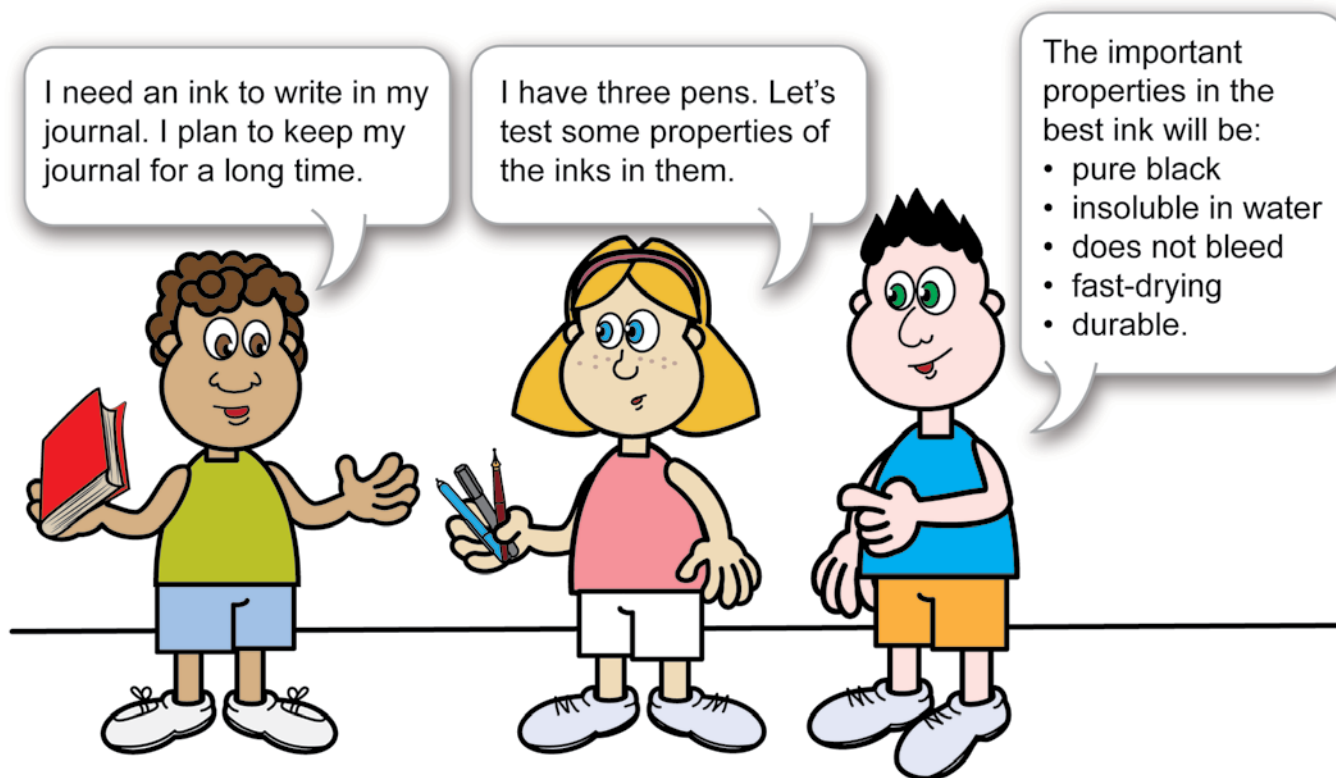
partly soluble

soluble



Stop here: Wait for your teacher's directions.

# Choosing an ink to write in a journal



The property **bleed** describes how much ink will soak through the paper.

**5. Explain why the properties below are important when choosing an ink to write in a journal.**

- does not bleed (does not soak through the paper to the other side)

.....

.....

- fast-drying

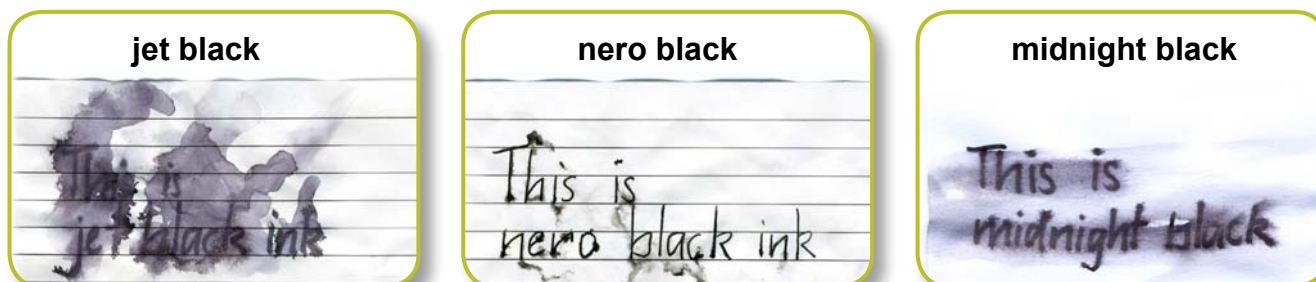
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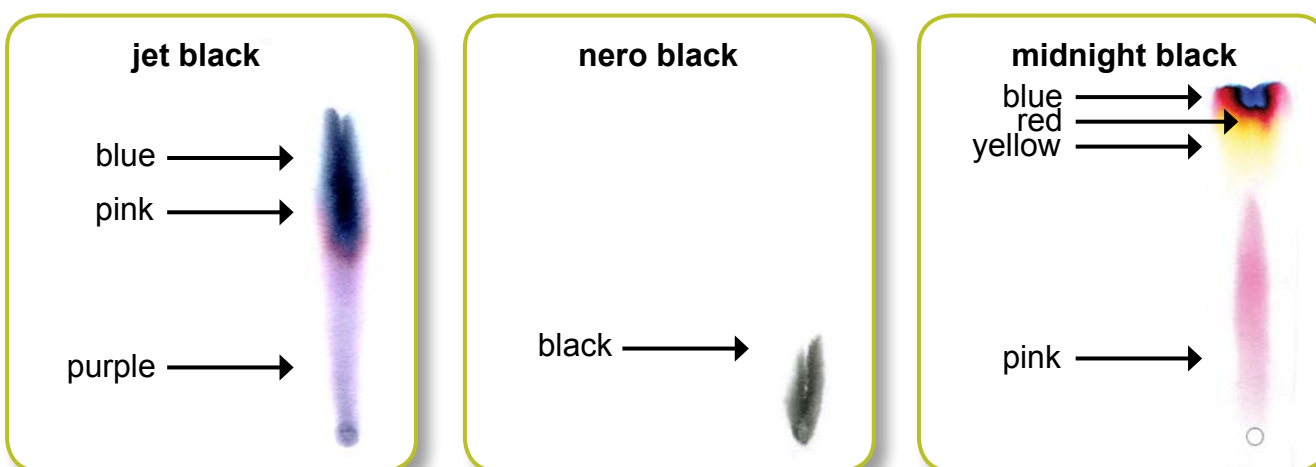


Three tests were performed to compare some properties of the black inks.  
The results of each test are shown below.

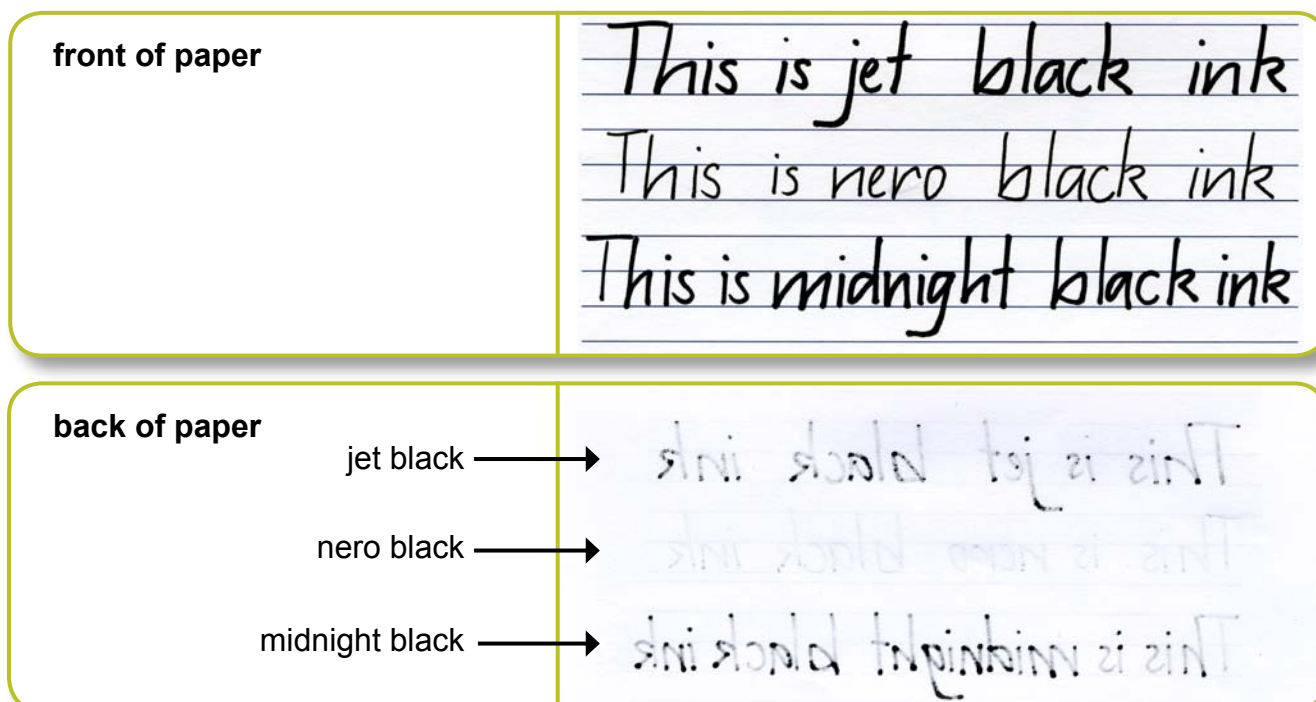
**Test 1. We poured water across the paper after the ink dried.**



**Test 2. We did a paper strip test in water.**



**Test 3. We wrote on paper and compared the front and back.**



6. Complete the **Observations table** below.

- Choose the properties tested from the **Properties list**.
- Record your observations.

Properties list		
colour	drying time	bleed
solubility	hardness	durability

**Observations table**

	Property tested	Observations
<b>Test 1</b>	<ul style="list-style-type: none"> <li>solubility</li> </ul>	<i>All three inks were affected by water.            Jet ran the most and was hardest to read.            Nero ran the least and was the easiest to read.</i>
<b>Test 2</b>	<ul style="list-style-type: none"> <li></li> <li></li> </ul>	
<b>Test 3</b>	<ul style="list-style-type: none"> <li></li> </ul>	

7. The best ink to write in a journal is **jet black** **nero black** **midnight black** because:  
 (circle one)

.....

.....

.....

Look at Test 1 on page 12.

8. Test 1 **is** a fair test.  
**is not**  
(circle one)

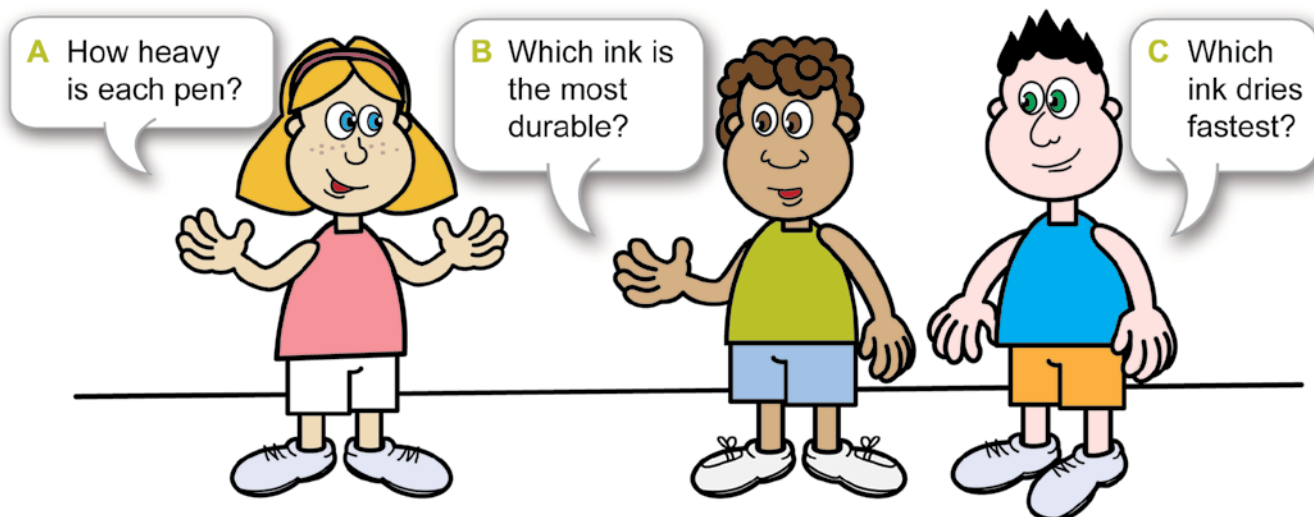
This is because: .....

.....

.....

Look at the important properties for the best ink to write in a journal listed on page 10. Not all of these properties were tested.

Each student posed another question to investigate in a lesson.



9. Question **C** is better than **A** because: .....

.....

.....

Question **C** is better than **B** because: .....

.....

.....

# Reflecting

The property **flexibility** describes how well a material bends.

10. a) Write **A**, **B** and **C** on the scale below to show the flexibility of each material.



**A** garden hose



**B** toothpaste tube



**C** outdoor chair

**rigid**

**flexible**

- b) Explain the **position** of each material on the scale.

**Hint**

Think about:

- the **purpose** of the object
- the **flexibility** of the material.

garden hose: .....

.....

toothpaste tube: .....

.....

outdoor chair: .....

.....

# Guide to making judgments — Year 4 Science

Name .....

**Focus:** Use evidence to draw conclusions about the properties and purpose of inks.

Knowledge and understanding Reflecting	Investigating	Communicating
<p>Identifies properties of given materials important for a specific purpose. Reflects on learning and applies understandings of the link between properties and purpose to a new context, flexibility.</p> <p>Questions 1, 2, 5, 10</p>	<p>Uses evidence to draw conclusions that relate properties of materials to their purposes. Records and organises observations. Identifies variables to judge the fairness of a test. Demonstrates understanding of scientific investigation questions.</p> <p>Questions 3, 4, 6–9</p>	<p>Uses scientific terminology to communicate properties of materials, observations, conclusions and explanations. Organises observations to communicate results in an appropriate format.</p> <p>Questions 1–10</p>
<p>◀ Positions all materials accurately on the flexibility scale and relates properties to purpose in the explanations.</p> <p>◀ States the importance of both given properties to journal ink.</p> <p>◀ Identifies important properties of given materials. Explains the positions of materials on the flexibility scale. States the importance of one given property to journal ink.</p> <p>◀ Identifies properties of given materials.</p>	<p>◀ Draws conclusions that relate properties to purpose. Uses a range of observations to judge the fairness of Test 1. States why Question C is better than B.</p> <p>◀ Positions inks on the solubility scale consistent with evidence. Identifies the properties observed in Tests 2 and 3. Uses an observation to judge the fairness of Test 1.</p> <p>◀ Draws conclusions about hat ink and journal ink referring to evidence. Records relevant observations for Tests 2 and 3. Identifies elements of a fair test. States why Question C is better than A.</p> <p>◀ Records an observation from Test 2 or 3, or draws a conclusion.</p>	<p><b>A</b> ◀ Consistently uses scientific terminology to refer to properties of materials, describe observations and communicate ideas.</p> <p><b>B</b> ◀ Organises observations.</p> <p><b>C</b> ◀ Uses scientific terminology to record observations or communicate ideas.</p> <p><b>D</b> ◀ Communicates ideas.</p> <p><b>E</b></p>

Feedback .....

.....