

CRIME LAB CHEMISTRY



SCIENCE - Making Sense of the Living World, Making Sense of the Material World,
The Nature of Science and its relationship to Technology

Learning Intentions:

1. To become familiar with *chromatography* and be able to apply it to 'real life' situations.
2. To perform 'fair tests' in Science identifying substances and fibres.
3. Identify and group fingerprints into 3 main categories: Arch, Loop and Whorl.
4. Set up and carry out Scientific Experiments following the correct process of; Aim, Equipment, Hypothesis, Method, Results and Conclusion.
5. Work collaboratively with peers to solve problems using the skills learnt.

Lesson One - Paper Chromatography

Chromatography is a technique used for separating mixtures. In all of the variations of Chromatography, a substance is placed onto or into a medium and then a solvent passes through the test substance, some of the test substance may be attracted to the solvent and follow it up in the medium. Different types of molecules are transported different distances, causing them to separate. In these activities, filter paper is the medium, solvent is the solvent and black ink is the test substance. Chromatography is used in crime labs to separate the components of 'clue' substances such as blood, ink or other mixtures found at the scene of a crime. Chromatograms of these clue substances are then compared with those of the suspected sources.

Chromatography

date

Today's

L.I I am learning the process of the chromatography and use this to assist with solving the crime.

Aim: To use chromatography to distinguish which pen was used in the ransom note.

Hypothesis: I think thatbecause.....

Equipment - Beaker, felt pens, ransom note, filter paper, water, hand lens, masking tape and straws.

Method:

1. Gather samples of pens.
2. Draw a line across a strip of filter paper, 1-4cm from the bottom.
3. Attach to straw with masking tape.
4. Put filter paper in beaker, making sure the ink is at least 1-2cm above the water.
5. Observe.
6. Remove filter when water has travelled about $\frac{3}{4}$ of the way up the strip.
7. Compare results with the ransom note results.

Results -

Conclusion -

The _____ pen wrote the ransom note because

Reflection - (write here what you have learnt during this lesson).

Lesson Two - Finger Prints

Today's date:

Every person's fingerprint are as different as each person. The use of fingerprints is very important for the police whose only **evidence** at a robbery might be the fingerprints left by the thief. Police keep a record of fingerprints of criminals in banks of computers.

For you to do

1. Read 'being observant'.
2. Complete activity one seeing how many differences you can find between the two drawings.
3. Discuss your findings with your neighbour. Are there any differences between the 2 of you?
4. Complete think activity one.
5. Complete think activity two.
6. Glue sheet in to your book.

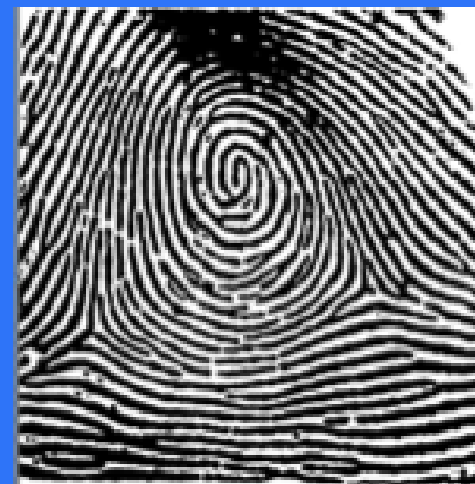
Different types of Prints



Arch



Loop



Whorl

Your Fingerprints

Equipment – Pencil, Paper, Sticky tape, Magnifying glass.

Method

1. Rub the side of a pencil lead back and forth on a sheet of paper to build up the black area large enough to take 10 prints.
2. Press one of your fingertips firmly onto the black. Place the sticky side of a piece of tape over your fingertip. (You may need a friend to help you with this.)
3. Tape the print to the correct location on the fingerprint form.
4. Using the magnifying glass compare your prints to the pictures above and try to label them as either arches, loops or whorls.

HELP PAGE

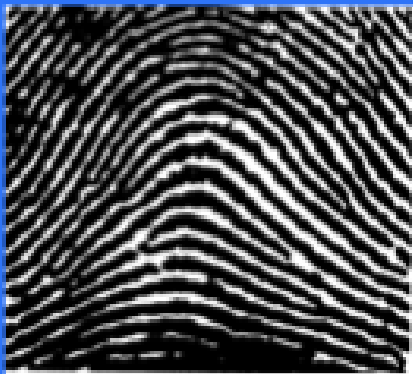
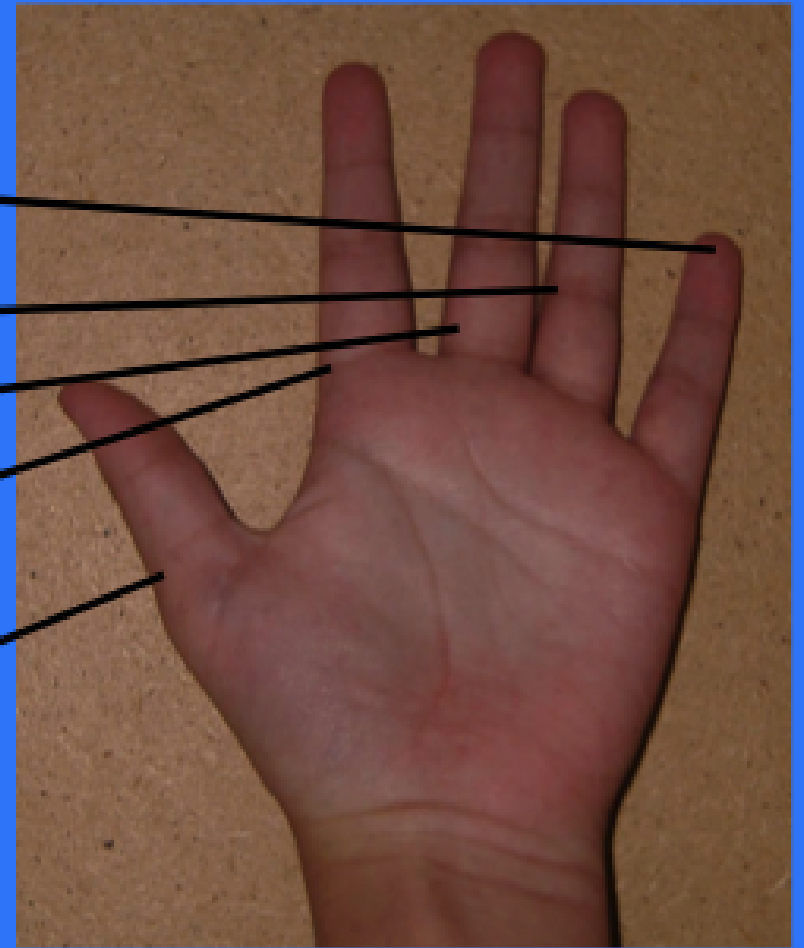
LITTLE

RING

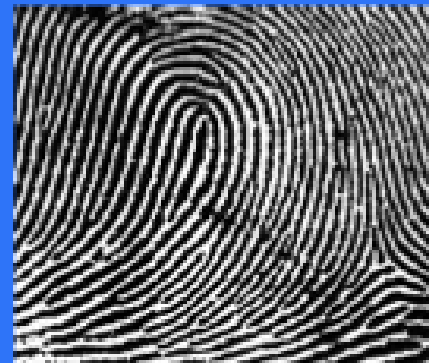
MIDDLE

INDEX

THUMB



Arch



Loop



Whorl

Lesson Three - Kitchen Chaos

Today's date:

The kitchen cupboard has got very damp and the labels have fallen off some of the containers. From the label scraps it is found that there is:

Icing sugar

baking soda

salt

cream of tartar

cornflour

TASK - Make order out of chaos

Use a series of simple tests and good observations to find out what substance is in each container.

Caution: You are not allowed to taste them! Please use small quantities.

Aim: to find out what the substance is by carrying out a series of simple tests.

Hypothesis:

I think that the substance in the different containers is;

Substance A -

Substance B -

Substance C -

Substance D -

Substance E -

Equipment - Five containers with the different substances labelled A, B, C, D, E.

- Eyedroppers
- Vinegar
- Magnifying Glass
- Litmus Paper (red and blue)
- Iodine

CLUES TO HELP YOU.....

1. Cream of tartar is an acid, and turns blue litmus paper red.
2. Cornflour and sugar are neutral and don't affect litmus paper.
3. Salt and bicarbonate of soda are alkaline, that is they turn red litmus paper blue
4. Bicarbonate of soda fizzes when mixed with vinegar.
5. Iodine changes from yellow-brown to blue-black with cornflour.

There are many different ways of telling the differences between substances.

You could:

- * Smell them carefully.
- * Compare the way they dissolve in water.
- * Examine with a magnifying glass.
- * Test the acidity with litmus paper.
- * Test the reaction with vinegar and iodine.

Results:

Substance A is

Substance B is

Substance C is

Substance D is

Lesson 4 - Fossicking for Fuels

Today's date:

Aim: to determine properties of different fibres/materials.

(Record your results on the sheet provided then glue this into your Science book.)

Equipment:

1. 3 different types of material.
2. 2 beakers
3. 3 test tubes
4. Force meter (spring balance)
5. Ruler
6. Felt pen
7. Magnifying glass
8. Tongs
9. Candle

THE TESTS

TASK ONE – HOW MANY FIBRES ARE THERE IN THE MATERIAL?

TASK TWO – WHICH MATERIAL IS THE STRONGEST?

TASK THREE – WHICH FIBRES SOAK UP THE MOST WATER?

TASK FOUR – HOW DO THE MATERIALS BURN?

TASK FIVE – WHICH MATERIALS STRETCH THE MOST?

(Record results on the sheet provided)





LESSON FIVE

**YOUR TURN TO BE THE DETECTIVE .
YOU MUST USE ALL THAT YOU HAVE
LEARNED TO SOLVE THE MYSTERY/CRIME
YOU HAVE BEEN PRESENTED WITH**

GOOD LUCK!

Crime Scene: Tauranga Intermediate School.

After interval a teacher realised her cell phone had gone missing from her work space. After some investigation the cell phone was found stashed under a small bush.

- Finger prints have been taken from the cell phone.**
- A fibre was found on the door latch near the work space.**
- Traces of white powder were found at the scene.**
- A note was found with the cell phone, saying " Ha ha lock your phone away".**

Three potential suspects have been identified.

Suspect X: Mr Diver

Mr Diver was seen eating a cream donut coated in icing sugar near the teachers work space. He also was heard asking Miss Young to repair a hole in his favourite jersey. Mr Diver also claimed to have lost his pen which was later found near the bush.

Suspect Y: Caretaker

The caretaker likes to eat salty fish and chips and has a range of woolen work jersey's that he needs to wear to keep warm when outside. He always has a pen on him.

Suspect Z: The Canteen lady

The canteen lady was seen around the teachers work space wiping her hands on her apron. She had been doing some baking earlier in the morning so was covered in flour. We managed to find a pen from the canteen that was also covered in flour.

YOUR MISSION IS:

Using the evidence that you have been provided with determine the most likely suspect.

You will need to utilise all of the skills that you have learnt previously in Science this term from the lessons below.

- Chromatography
- Fossicking for Fibres
- Finger Printing
- Kitchen Kaos

Record your thoughts and judgements on the worksheet provided.