



Ebook Code:
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Forensic Science

By Fiona Rayns

For Key Stages 2 / 3

(Ages 10+)

Rationale

This book contains a range of simple yet fun, hands-on activities based around a topic that many students already have an interest in. It has been designed for use in the Year 6 - 8 classroom with students aged from 10 - 13, but could equally be used as extension work for younger gifted students, homeschoolers and also by those wishing to run a science club.

The material is designed to be stimulating and easily used by the teacher and student alike. Most worksheets are stand-alone and require minimal and easily obtainable materials. Sections are not sequential and may be used in any order.

Some activities are designed for students working by themselves while others are based around group work and whole class discussion. The book includes short-response items (requiring written answers or the completion of tables, graphs or diagrams), practical techniques (including experimental activities and simple investigations) and research assignments (involving written reports and/or extended oral presentations). Answers have been provided where necessary.

Where relevant, teachers' notes and extension ideas have been included along with references to suitable websites and suggestions for further extension.

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Sample

Teaching Points & Extension Ideas

Meet the Team:

Could be set as homework or team work in class to see which group can find the occupations first.

Use general knowledge dictionaries and the following websites to help.

- ▶ encyclopedia.thefreedictionary.com/Forensic+technology
- ▶ www.websters-online-dictionary.org/definition/english/Sp/Specialist.html

Look at Me:

Extension - Survey another class and compare results. Survey and compare with family.

Discuss why students are more likely to have traits in common with family.

Hands Up:

Super glue (cyanoacrylate) is often used inside cars to check for latent (invisible) prints because its fumes stick to the prints.

Demonstration: Equipment - glass jar with tightly fitting lid, 2 small squares of aluminium foil (5cm x 6cm), super glue.

Method:

- 1) Rub your fingers through your hair to make them oily.
- 2) Press your finger tips onto one piece of the foil and put the foil into the jar.
- 3) Squeeze a few drops of glue onto the other square and carefully put it into the jar.
- 4) Close the lid tightly and wait for 30 minutes.
- 5) Remove foil and observe prints.

Puzzling Powders:

Remind students that unidentified chemicals should not be tasted and that iodine stains.

Splat!:

A glow in the dark chemical called Luminol is used to detect blood stains which someone has tried to remove. It can detect blood that has been diluted 10 000 times.

Guess Who?:

Use these descriptions, modify them or make up your own.

Suspect One:

She had shoulder length hair. I think it was wavy and you could see it had been dyed because her eyebrows were a different colour. She was wearing a lot of make up and large earrings. She would have been about 40 or older. She had a thin face and thin lips and her nose looked bit like yours.

Suspect Two:

He was much younger, probably in his early twenties. He had short spiky hair and I remember that one of his front teeth was missing. He had small eyes, they were exactly the same colour as yours. His face was round and spotty. I think he had a stud in his nose.

Corpse Cooling:

Use tap water. On a cold day make the water warmer as it will cool quickly and vice versa.

Show students how to extrapolate their results if they run out of time.

Spot the Difference:

Make up your own paragraph for them to copy, e.g. homework excuse, ransom note or a joke. Stress that forgery in the real world is a crime.

Read My Lips:

This can be done in the classroom or as a homework exercise. Check out:

- ▶ www.geocities.com/Athens/Atrium/5924/forensicscienceactivites.htm

A 5000 Year Old Murder Investigation:

Check out these websites:

- ▶ www.channel4.com/history/
- ▶ www.bbc.co.uk/history/
- ▶ www.discoverychannel.co.uk/timeteam/
- ▶ www.pbs.org/wgbh/nova/teachers/programs/3011_redbaron.html - Red Baron

Curriculum Links

Links to the National Curriculum Attainment Targets

The activities can be used to address the following areas of the Science curriculum at Key Stage 2 and 3 levels.

Scientific Enquiry (Sc1)

Knowledge, Skills and Understanding:

Ideas and evidence in science

Students will:

- understand that science is about thinking creatively and attempts to explain how living and non-living things work; **(KS 2 - 1. a)**
- establish links between causes and effects; **(KS 2 - 1. a)**
- test ideas using evidence from observation and measurement. **(KS 2 - 1. b)**

Investigative skills

Students will:

- ask questions that can be investigated scientifically and decide how to find answers; **(KS 2 - 2. a)**
- consider what sources of information, including first-hand experience and a range of other sources, they will use to answer questions; **(KS 2 - 2. b)**
- think about what might happen or try things out when deciding what to do and what kind of evidence to collect. **(KS 2 - 2. c)**

Obtaining and presenting evidence

Students will:

- use simple equipment and materials appropriately; **(KS 2 - 2. e)**
- make systematic observations and measurements including the use of ICT for datalogging; **(KS 2 - 2. f)**
- use a wide range of methods, including diagrams, drawings, tables, bar charts, and ICT to communicate data. **(KS 2 - 2. h)**

Considering evidence and evaluating

Students will:

- make comparisons and identify simple patterns or associations in their own observations and measurements; **(KS 2 - 2. i)**
- use observations, measurements or other data to draw conclusions; **(KS 2 - 2. j)**
- decide whether these conclusions agree with any prediction made and/or whether they enable further predictions to be made. **(KS 2 - 2. k)**

Life Processes and Living Things (Sc2)

Knowledge, Skills and Understanding:

Life Processes

Students will:

- make links between life processes in familiar animals and plants and the environment in which they are found. **(KS 2 - 1. c)**

Meet The Team

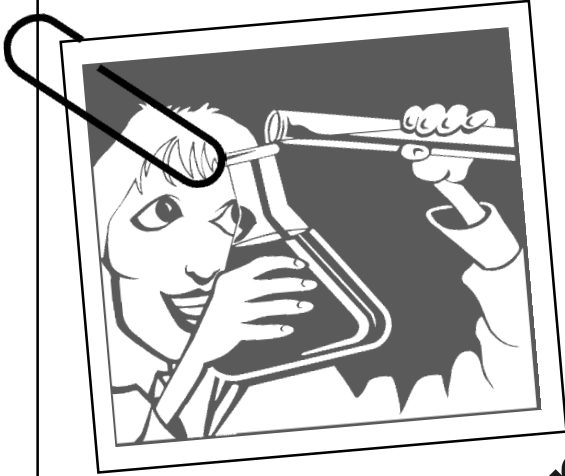
► **Identify Yourself**

- Mad Scientist
 Lab Girl
 Lab Guy
 Lab Rat
 Super Sleuth
 Corpse Specialist
 Good looking Investigator
 The Cool Detective
 Suspect

► Name: _____

► Date: _____

Tick if forensic evidence is attached



Because these people are so specialised they work as part of a team. Sometimes a scientist may contribute the vital piece of evidence in a case but usually what they say is only part of an array of evidence that the court will hear. Scientists from many different disciplines may result in a particular case.

What is a forensic scientist?

Well, that's pretty easy you think, I've watched enough TV to answer that one.

"A forensic scientist is a scientific super sleuth who single-handedly, in about an hour and using the tiniest smidgen of evidence, can solve a seemingly insolvable crime and once they get out of their lab coat look like they have a modelling contract with a major fashion house."

... and most people would probably agree, but unfortunately there are a few problems with this description.

Firstly, a forensic scientist is not multi-skilled, i.e. they can't examine all the evidence themselves. They are usually highly specialised in one particular area or discipline, and within these disciplines people usually specialise even further. Some experts on forgery specialise in bank notes while others are involved with diplomatics, the origin of handwritten documents such as diaries.

The job of a forensic scientist is not just to get a conviction. Often their findings are used to eliminate suspects and establish the innocence of others.

And finally, not all of them are that good looking!

There are forensic statisticians, forensic vets, forensic engineers and even forensic knot specialists.

Use your research skills to find out what these forensic experts specialise in.

► **ballistics expert:**

► **toxicologist:**

► **odontologist:**

► **entomologist:**

► **pathologist:**

► **meteorologist:**

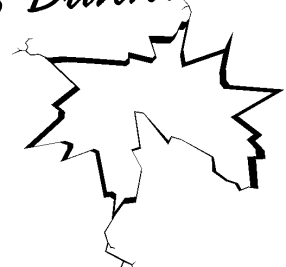
► **serologist:**

► **musicologist:**

► **psychiatrist:**

► **palyнологист:**

Who Durnnit?





▶ Identify Yourself Mad Scientist Lab Girl Lab Guy Lab Rat Super Sleuth Corpse Specialist Good looking Investigator The Cool Detective Suspect

▶ Name: _____ ▶ Date: _____ Tick if forensic evidence is attached

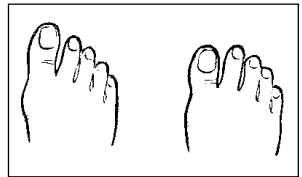
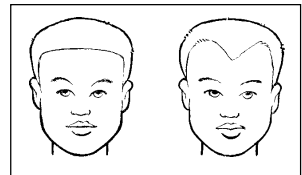
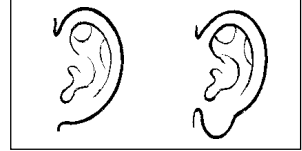
▶ Before you can begin your career as a forensic scientist, we need to check that you have what it takes.

▶ Imagine you had to describe your appearance to someone who had never seen you before. The "pretty cool", "a real chick magnet" and "as cute as a button" comments that you make in front of your mirror each morning, will not stand up in court of law!

▶ You need to be more scientific and much more specific.

▶ Use the illustrations provided, along with your powers of observation, to complete this table of your individual traits and to demonstrate your attention to detail.

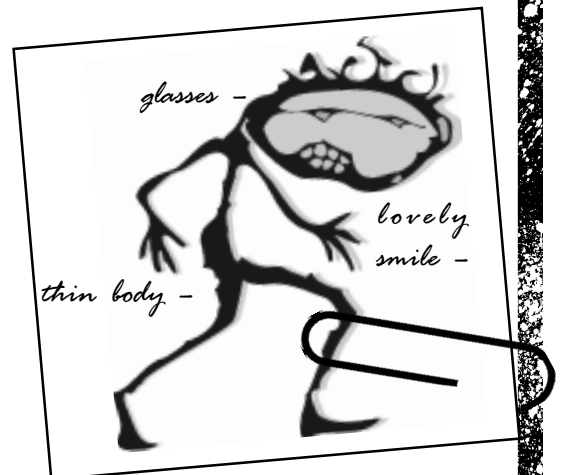
- ▶ I have detached earlobes.
- ▶ I have a "hitchhiker's thumb".
- ▶ I have Darwin's points on my ears.
- ▶ I can roll my tongue.
- ▶ I have straight hair.
- ▶ I am a female.
- ▶ I have hair on my knuckles
- ▶ I have a widow's peak.
- ▶ I am right handed.
- ▶ I have freckles.
- ▶ I have dimples when I smile.
- ▶ When I clasp my hands together, my left thumb is on the top.
- ▶ My big toe is longer than my other toes.



Extra information about me

Extra

- eye colour _____
- height _____
- hair colour _____
- weight _____
- Other _____





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Tick if forensic evidence is attached

▶ **Let's compare your personal information with the rest of the group.**

▶ **Your teacher will record and call out the group results while you enter the information into the correct space. Write down the number of people who answered yes to each trait.**

▶ **Total number in my group.**

- A- Female
- B- Tongue roller
- C- Detached earlobes
- D- Hitchhiker's thumb
- E- Straight hair
- F- Darwin's points
- G- Hairy knuckles
- H- Widow's peak
- I- Right handed
- J- Longer big toe
- K- Dimples
- L- Thumb on top
- M- Freckles
- N- Other

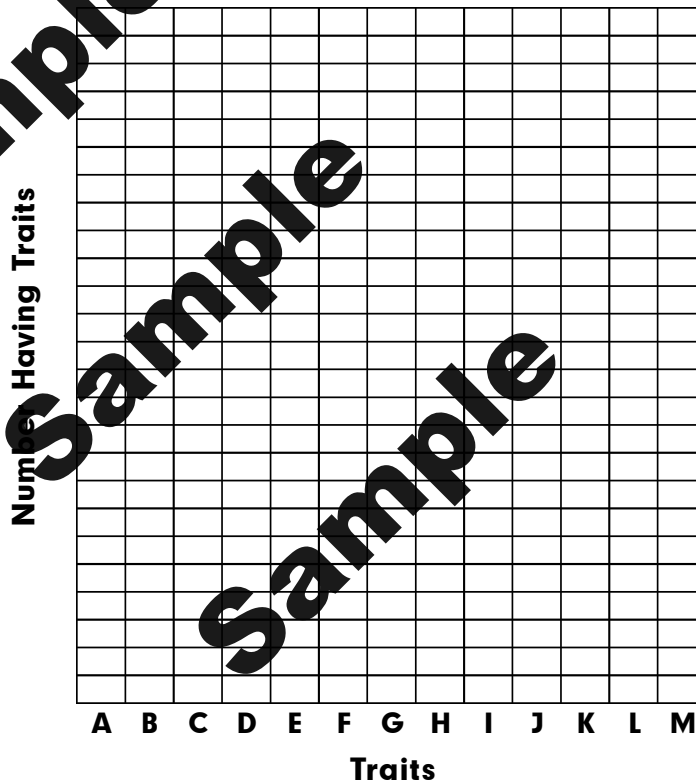
Use the information you recorded to answer these questions.

1] Which is the most common trait in your class?

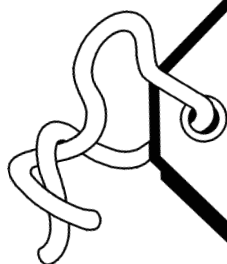
2] Which is the least common?

3] Are there any traits that no one had?

4] Draw a bar graph showing your class results.



5] What other traits would it have been interesting to study?



Extra

As you can see from your information people might look different but they also have many traits in common. Forensic scientists need more accurate methods of identifying individuals to help them solve crimes.



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A Dactylographer is a fingerprint expert



- **About three months before you were born, tiny ridges started to form on your fingers and toes. No matter how old you get, these lines will not go away and their patterns will never change.**
- **Your skin produces sweat and oil. When you touch something, small amounts of these substances get left behind in the pattern of the ridges, making a finger print.**
- **Because fingerprints are unique, they can be very useful in solving crimes. Using fingerprints to identify individuals is called *dactylography* (dac-ty-log-ra-phy).**

Forensic scientists have over 40 different ways of detecting fingerprints left at a crime scene. On hard surfaces, e.g. metal or glass, they often use a dusting powder, while on plastic or aluminium or wood, a fuming method is often used (your teacher may demonstrate this later). On soft surfaces such as paper, special chemicals such as *ninhydrin* react with the prints to form a purplish stain, while lasers make prints fluoresce (glow) and can be used on very delicate surfaces.

Once the prints have been made visible they can be preserved as evidence. This involves taking photos of them, carefully staining the item with the print or using sticky tape and powder to "lift" the print, which can then be kept.

The prints can then be compared with those held on police records or those taken from suspects.

Sometimes they are matched by eye but more often this is now done by computer.

There are three basic type of fingerprint pattern:

- The loop
- The whorl
- The arch

A fourth kind of print is made up of two or more of these types. This is known as a composite print and is not as common.



The loop



The whorl



The arch



Dust this page for prints!