

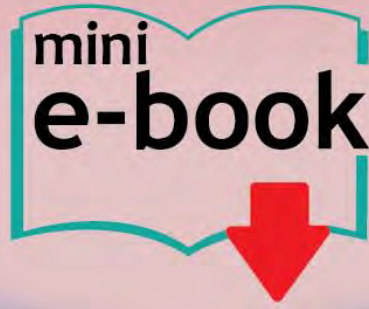


Science

Forensic Science



For Upper Primary



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Preview

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Meet The Team

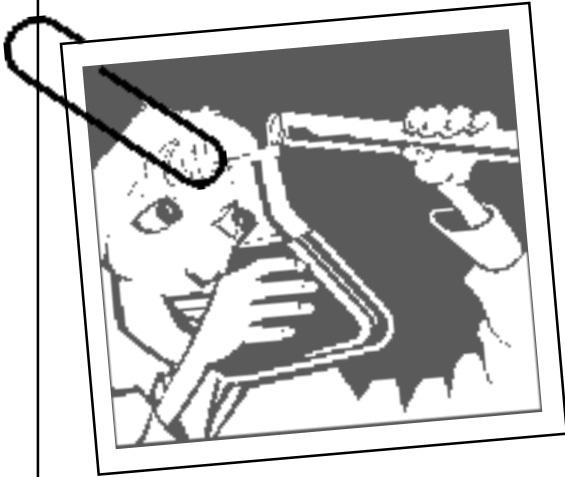
Identify Yourself

- 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



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.

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 testify in a particular case.

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:**

▷ **palynologist:**

Who Dunit?





► Identify Yourself

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► Date: _____

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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 storing the item with the prints on, and using sticky tape and powder to "lift" the print, which can then be kept.

The print 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



PREVIEW

- **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).**

Dust this page for prints! -

Hands Up!



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

► Today you will be taking your own prints and comparing them to the loop, whorl and arch.

► You will need:

- 10 small pieces (5 cm) sticky tape
- a lead pencil
- scrap paper

INSTRUCTIONS:

1. Line up the pieces of tape along the edge of your desk ready for use.
2. Rub the pencil on the scrap paper to form a large grey smudge.
3. Press the end of your right thumb into the smudge and roll it till it turns grey.
4. Place a piece of tape on your thumb and then gently peel it off. You should see a finger print.
5. Stick the tape plus print into the correct box below.
6. Take prints from the rest of your fingers. You may need to colour in the smudge between prints.
7. Wash your hands using soap.
8. Identify and label each print as a loop, arch or whorl.

My Right Hand				
THUMB	FIRST FINGER	SECOND FINGER	THIRD FINGER	FOURTH FINGER
TYPE:	TYPE:	TYPE:	TYPE:	TYPE:
My Left Hand				
THUMB	FIRST FINGER	SECOND FINGER	THIRD FINGER	FOURTH FINGER
TYPE:	TYPE:	TYPE:	TYPE:	TYPE:

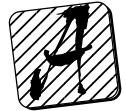
FINGERPRINT CARD

Something to think about ...

Use the back of this sheet to write your responses to the questions below.

- Do identical twins have different prints?
- Should everyone's prints be kept on file to make it easier for criminals to be caught in the future?
- Why do some dogs have their nose prints taken?





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Tick if forensic evidence is attached

▶ **One of the first things investigators often look for at a crime scene are prints. They may discover fingerprints on various objects, footprints in the soil and even sets of tyre prints. One type of print however, that isn't commonly heard about but which may also be found is the lip print. These prints can be left behind on drinking glasses and cups.**

▶ **The study of lip prints is called *cheiloscopy*.**

▶ **Like your fingerprints, your lips are covered with fine lines and grooves. Also, like fingerprints, no two lip prints are exactly the same so a lip print can be used to help identify an individual.**

▶ **The object with print on it can be taken to a laboratory to be looked at or the print can be lifted. To lift the print, the investigator spreads talcum powder over it with a soft brush. Then the print is photographed. Next, a piece of clear plastic tape may be placed over the print and then peeled away, taking the print with it. This print can then be compared with those taken from suspects.**

Like fingerprints, lip prints can be grouped according to the patterns they create. Many people's lips have parts of at least two patterns.

Here are the five most common patterns:

Short vertical grooves



Long vertical grooves



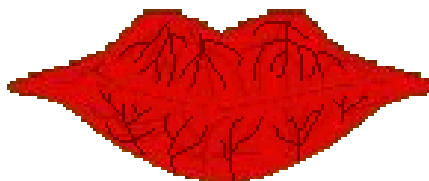
Rectangular grooves that may crisscross



Grooves that form diamond patterns



Branching grooves like those in a plant root



Preview

Read My Lips



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▶ Here is a lip print taken from the scene of a crime. Look carefully at its patterns and see if you can match it with one of the prints provided by suspects.

▶ Lip print found at crime scene:



▶ Lip prints taken from suspects:



Suspect A



Suspect B



Suspect C

▶ I think the lip print belongs to suspect

Time for you to pucker up and take a closer look at your own smackaroos.

(If your teacher respects your feelings they might let you do this for homework – if they like a good laugh you'll be doing it in class).

You will need:

- a lipstick
- a piece of white cardboard
- a tissue

Method:

- 1 Apply the lipstick to your lips.
- 2 Pucker up.
- 3 Give the cardboard a smooch kiss.
(Don't get carried away as you are aiming to produce a clear print and not a muddy smur.)
- 4 Stick your print in the box below.

Pucker Up!



▶ These lips belong to _____

▶ I can see the following patterns on them:

Did You Know?

In America, lip prints were used to convict the driver of a car after a hit and run accident. They were also used to send a Peeping Tom to gaol.



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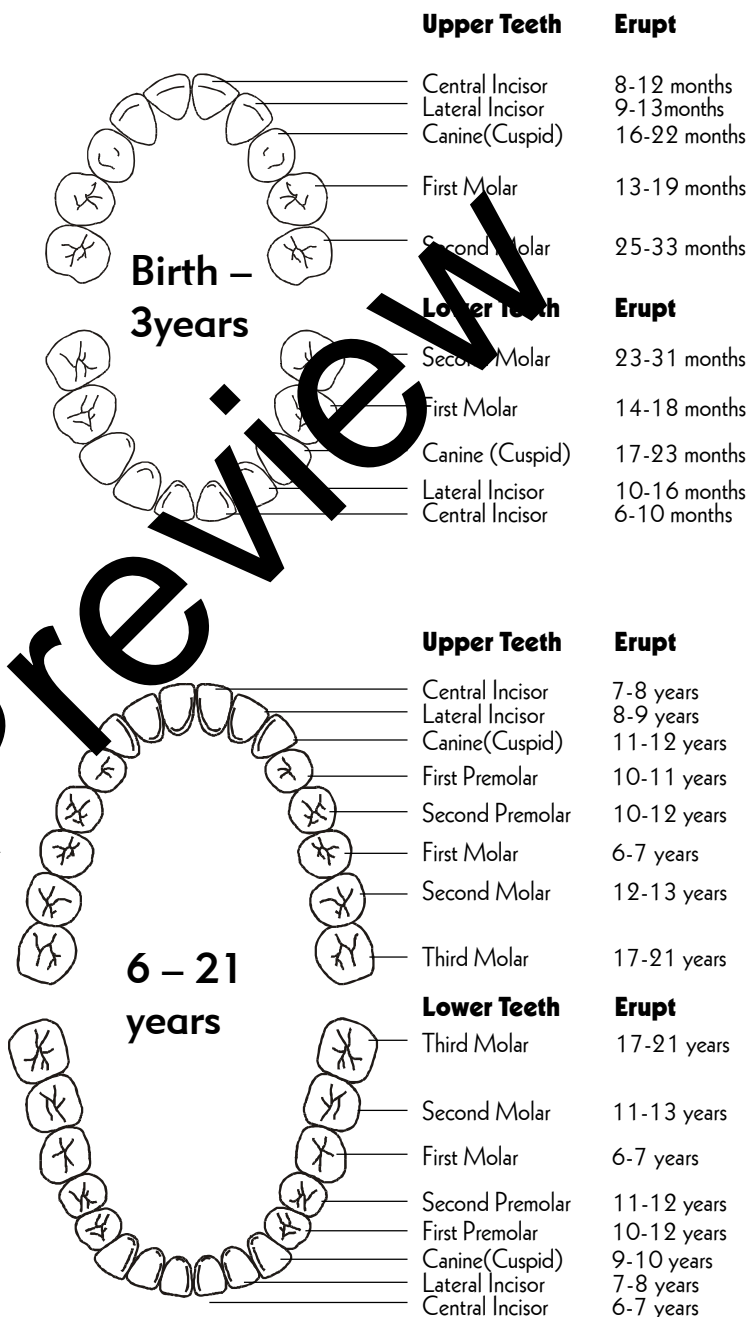
► **Forensic odontologists are dentists who specialise in helping to solve crimes.**

► **They may study skeletons or the remains of people who have died, for example in fires or plane crashes, and who can't be easily identified in any other way.**

► **Sometimes the examiner may have a good idea who the person was. Identification may have been found with the body or the individual may seem similar to one on a missing persons' list. The forensic odontologist tries to confirm the identity by matching the person's remains with ante mortem (before death) dental records. They compare the teeth of the deceased with dental records such as notes and X-rays from the person's dentist.**

► **Even when there are no clues to the person's identity the forensic odontologist can still help by providing a post mortem (after death) dental profile. This may give enough information to help narrow down the search.**

Teeth erupt and are lost at different times during a person's life. By using charts, such as this one, a forensic odontologist can calculate the approximate age of an individual when they died.



Reference: www.ada.org/public/topics/tooth_eruption.asp



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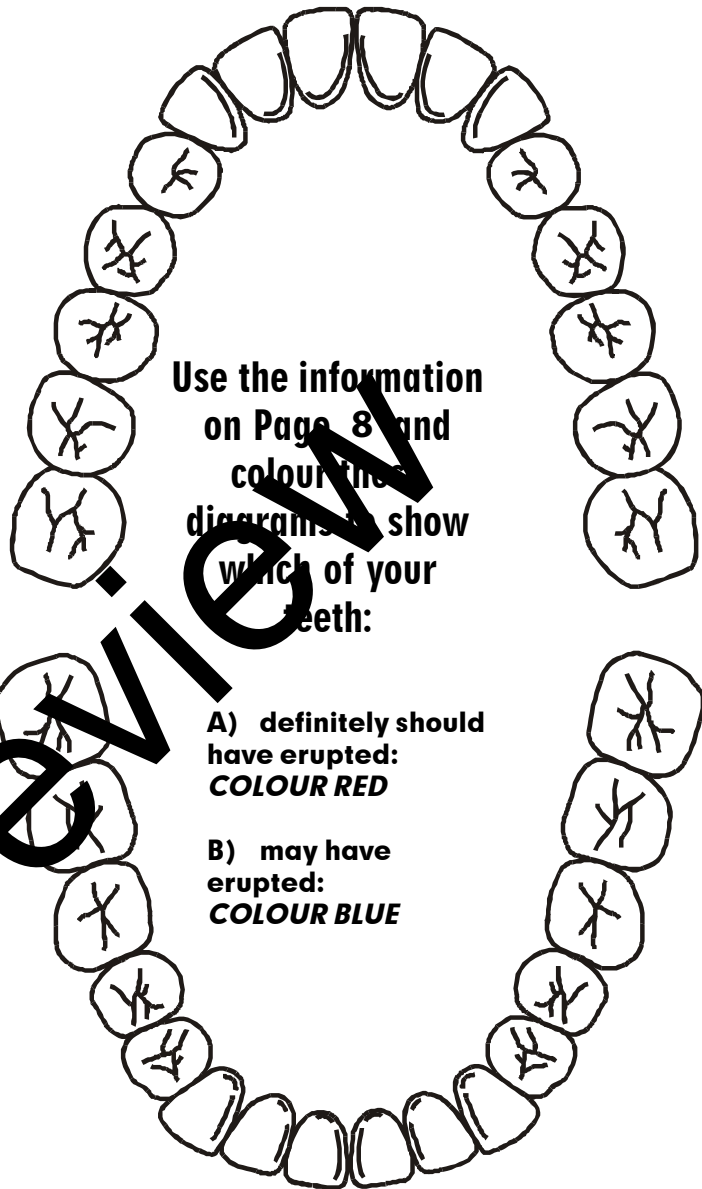
Name: _____

Date: _____

Tick if forensic evidence is attached

The state of a person's teeth can also reveal other clues.

- The amount and quality of any dental work done may hint at a person's income.
- Substances such as tobacco, coffee and certain medications can cause staining.
- People suffering from anorexia, chronic alcoholism or gastric problems may have badly eroded teeth.
- Tooth wear on one side may suggest that they commonly smoked a pipe!



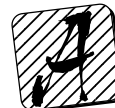
Use the information on Page 8 and colour the diagrams to show which of your teeth:

A) definitely should have erupted:
COLOUR RED

B) may have erupted:
COLOUR BLUE

Did You Know?

Even after burning, immersion in water or burial under ground, teeth still remain an excellent source of DNA. When normal methods of dental identification fail this may be used to identify the body.



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► **Criminals sometimes wear gloves on their hands to prevent leaving fingerprints and masks over their faces to avoid recognition, but they very rarely attempt to conceal what they've got on their feet!**

► **This may prove to be a big mistake because shoes can provide evidence that may help investigators locate a suspect and link them to the scene of the crime.**

► **Little pieces of broken glass or soil become stuck in the treads while shoe prints or impressions get left behind in dirt, grease or blood.**

► **Police investigators use a number of techniques such as photography, sketching and plaster casts to preserve the evidence for analysis. If you want to know how they do this and some of the other methods they use, check out this website:**

► **www.crime-scene-investigator.net/footwear.html**



Different types of shoe will make different types of patterns on the ground and will also indicate the size of the person wearing them.



Draw lines to match up the shoes with prints that you would expect them to make.



Impressions can suggest how heavy a person is. Deeper tracks indicate a heavier person, while shallow tracks indicate a lighter person.

Patterns can also reveal who the shoe was manufactured by and possibly where and when.

Experts can tell how many people were present at the scene and possibly the events that occurred. They can tell whether a person was moving forwards or backwards, if they were struggling, jumping or carrying a heavy load (such as a body). The distance between the footprints can show whether the person was walking or running.

Your shoe's own unique personality has been developing since the day you first wiggled your toes into it and stepped out into the world

The way that your skeleton is put together and your posture means you walk slightly differently from everyone else. This causes the soles of your shoes to wear down in a different way and to produce a slightly different print. Each pair of shoes you own will have the same pattern of wear.

The tiny cuts, gouges and scratches on the soles of your shoes caused by pebbles in the playground, loose fragments from roadways and other sharp objects found on floors and pavements, helps make your shoes different from others and identifiable.



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

Today you will be discovering what secrets your shoes can reveal about you.

You will need:

- shoes
- sticky tape
- sharp pencil
- magnifying glass (optional)

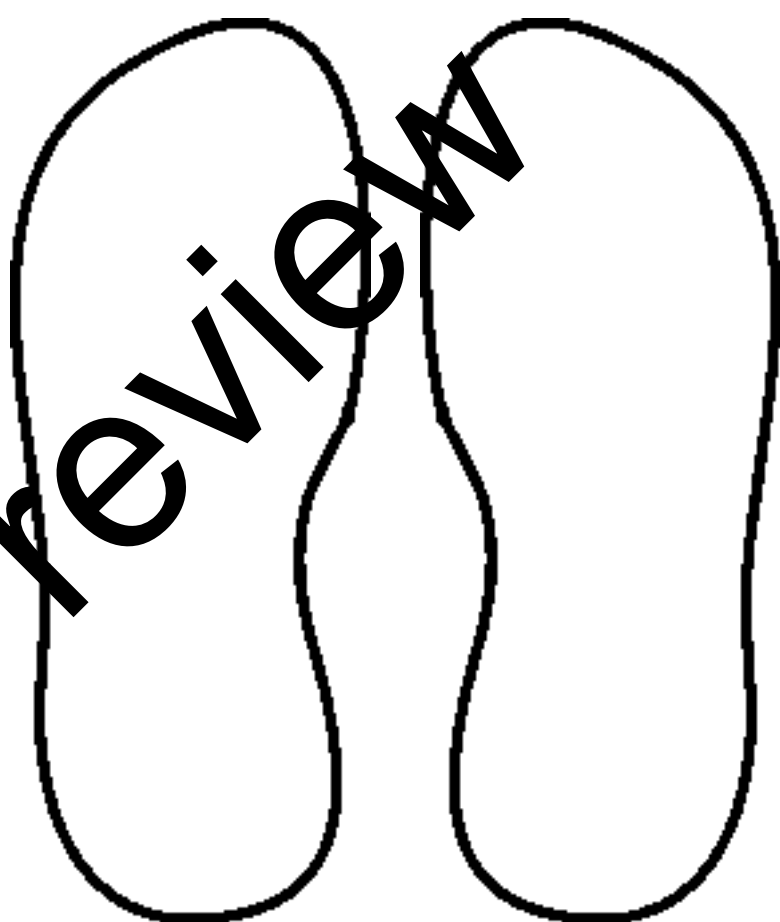
Method:

1. Take off one of your shoes.
(I hope you've changed your socks recently!)
2. Examine the shoe's sole for dirt, grass, small stones and other debris. If you have a magnifying glass you may want to inspect closer.
3. Use a sharp pencil to remove the material.
4. Use a strip of sticky tape to stick it into the boxes above.
5. Repeat the procedure with your other shoe.



Evidence of wear:

1. Look carefully at the bottom of each shoe.
2. Record any areas of wear on the chart below – show position and extent.
3. Indicate any cuts, holes major scratches to the soles.
4. Do not draw the tread.



Extra

When you get home tonight, check out some of your other shoes and see if the wear is similar.

Shoe print:

- 1 Place a plain piece of paper on the soles of one of your shoes.
- 2 Use a pencil or a dark crayon to gently rub over the paper until the pattern of the sole emerges.
- 3 Staple the rubbing to this page.



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▶ It's found over most of your body and it grows about one centimetre a month.

▶ At the moment, 90% of your scalp hairs are growing and 10% are resting.

▶ Diseases (such as scurvy) can make the hair change shape.

▶ Hair can be used to determine racial origin!

▶ It's the fastest growing tissue in your body.

▶ The scalps of people with black or brown hair contain about 100,000 hairs, redheads have 80,000 while blondes have 120,000.

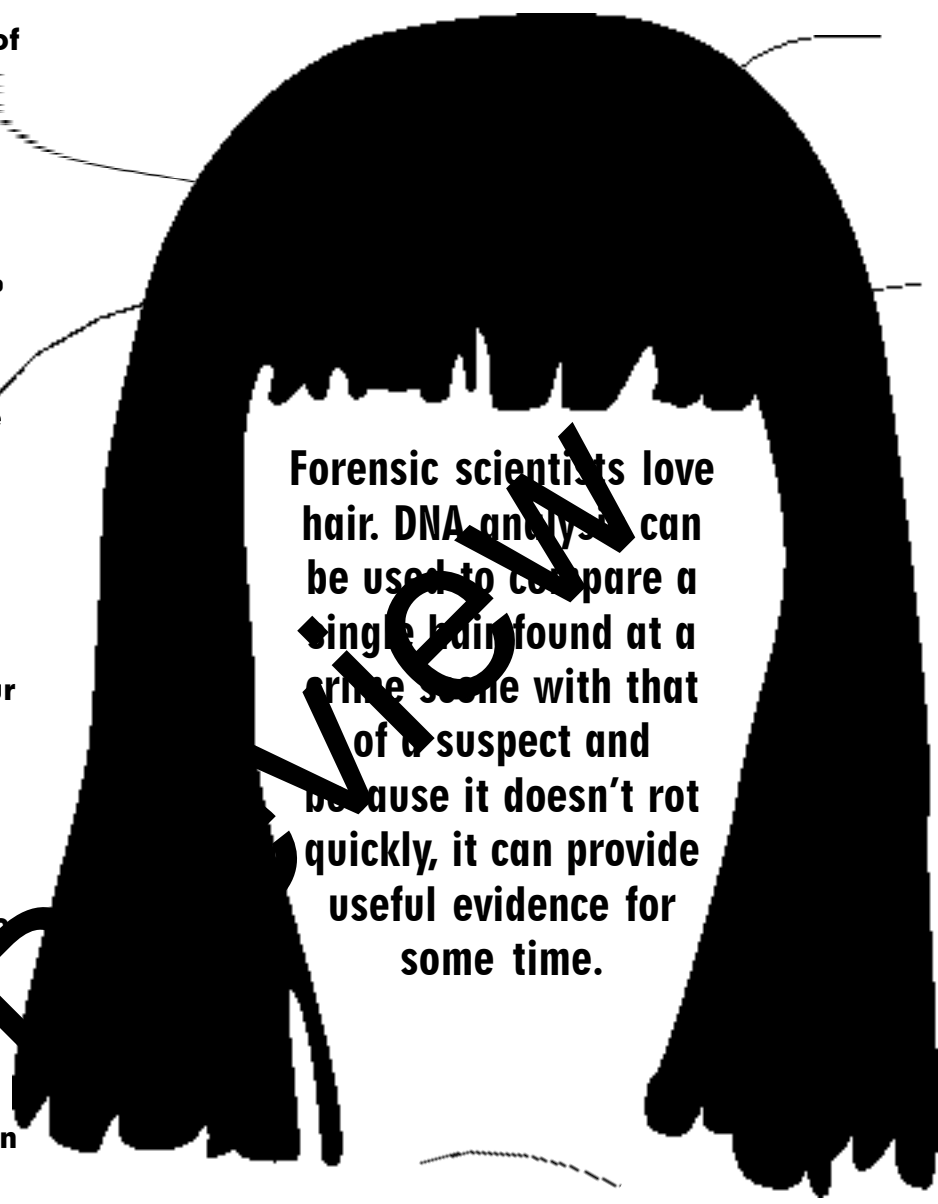
▶ An adult has approximately 5 million hair follicles in total.

▶ There are no hair follicles on the palms of your hands or the soles of your feet.

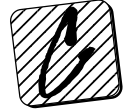
▶ Hair keeps you warm and provides protection. Hair can be oval, kidney shaped, triangular or flat in cross section.

▶ Apart from its DNA, your hair is distinctive, not just because of its colour and texture, but also because of the trace elements it contains. These elements vary depending on such things as what you eat, the environment that you live in and even what shampoo you use.

▶ Each day you lose about 100 hairs from your head! Where do they all go? Some will still be stuck on you, some will have been transferred to people that you've been in contact with and the rest will be scattered wherever you've travelled.



Forensic scientists love hair. DNA analysis can be used to compare a single hair found at a crime scene with that of a suspect and because it doesn't rot quickly, it can provide useful evidence for some time.



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► Today, in the interest of science, you will be removing a few hairs from your head.

You will need:

- a comb
- magnifying glass
- white piece of paper
- sticky tape

Method:

- 1 Gently comb your hair over the paper.
- 2 How many hairs fell on to the paper? _____
- 3 Use a small piece of sticky tape to place one of the hairs into the box below.
(Do not put tape on the ends of the hair)
- 4 Gently pluck **one** hair from your head and tape it into the box below
- 5 Use the magnifying glass to examine both samples, paying particular attention to the ends of the hair.

Combed hair sample

Plucked hair sample

► Comparing hairs from different individuals

You will need:

- tape
- magnifying glass
- ruler
- one hair sample from three different individuals (either plucked or combed) and one hair of your own.

Method:

- 1 Tape samples into the boxes below.
- 2 Examine each hair carefully and complete the table below.

Sample 1

Sample 2

Sample 3

Sample 4

Extra

Hair Extensions! Pat your clothes with sticky tape to see how many hairs are stuck on you – they may not all have originally come from you and they may not all be human!

	Sample 1	Sample 2	Sample 3	Sample 4
► Colour				
► Length (mm)				
► Texture e.g. wavy, straight				
► Plucked/combed				
► cut/tapered/ split end				

Page 3: Meet The Team

Ballistics expert: firearms and ammunition; **Toxicologist:** poisons; **Odontologist:** teeth; **Entomologist:** insects; **Pathologist:** a medical doctor who tries to discover the cause of a sudden or unexpected death; **Meteorologist:** reconstructs weather events at a certain location - sometimes used in murder and insurance claims; **Serologist:** blood; **Musicologist:** music piracy and copyright issues; **Psychiatrist:** a medical doctor involved in the diagnosis and treatment of mental disorders; **Palynologist:** pollen and powdered minerals.

Page 5: Hands Up! (Something to think about)

Identical twins have different fingerprints. A dog's nose print is as unique as a fingerprint. Some breeders take dogs' nose prints as an insurance requirement.

Page 7: Read My Lips!

The bottom lip print is a match.

Page 8: What Big Teeth You Have!

Canine teeth leave triangular indentations while incisors make rectangular ones.

Preview