FORENSICS

ELECTIVE ADVENTURE

SNAPSHOT OF ADVENTURE

Everywhere you go, you leave behind clues: fingerprints on your juice glass, DNA on your toothbrush, bits of fabric on your favorite chair, and footprints in your yard. Criminals leave behind clues, too. Forensic scientists study those clues to help law enforcement officers solve crimes.

Forensics is all about using science to answer questions about crimes (and other things that have happened). In this Adventure, you will practice some of the skills of a forensic scientist.

You will analyze a fingerprint, a footprint, the contents of ink, and some mysterious white powder. Grab your magnifying glass and start detecting!

REQUIREMENTS

1. Explore the term "forensics" and how it is used to help solve crimes.
2. Analyze your fingerprints.
3. Make a shoe imprint.
4. Do an analysis of four different substances: salt, sugar, baking soda and cornstarch.
5. Learn about chromatography and how it is used in solving crimes.
6. Find out how officers collect evidence.

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REQUIREMENT 1

Explore the term "forensics" and how it is used to help solve crimes.

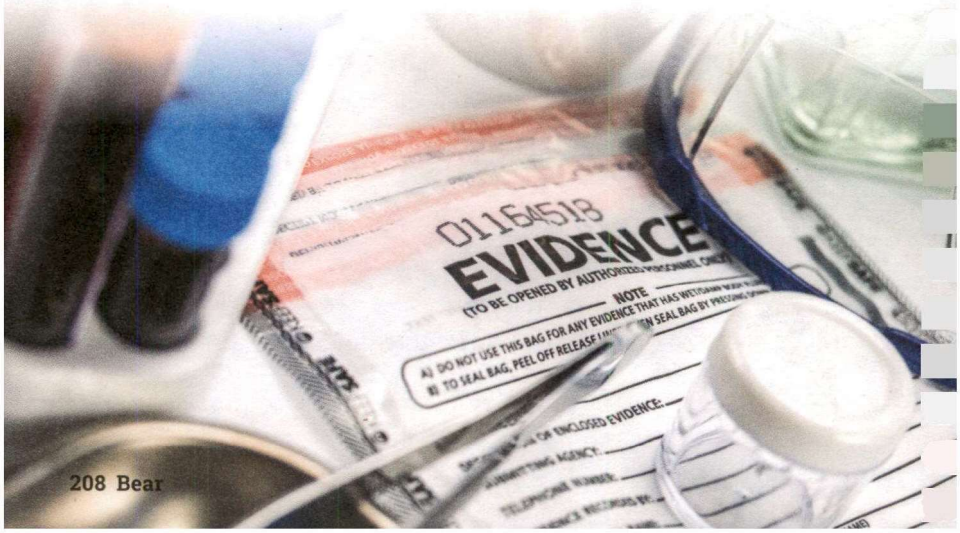
The word "forensics" comes from a Latin word that means "to make public." Forensic scientists make information public that was hidden in plain sight.

Thanks to detective stories and crime shows on TV, many people know something about forensics. Talk with the other people in your family and den to find out what they know (or think they know) about forensics.

Write down any questions they have. As you do the other requirements for this Adventure, you might be able to answer some of those questions. With an adult's supervision, you can also search the internet for sites that teach about forensics for kids.

1

Date _____ Adult's Signature _____



REQUIREMENT 2

Analyze your fingerprints.

As you probably know, everybody's fingerprints are unique. Even identical twins have different fingerprint patterns! Police use fingerprints to identify criminals. Fingerprints are also used in other ways, like fingerprint scanners on laptop computers and smartphones. In this requirement, you'll discover what your fingerprints look like. You will need an ink pad and a magnifying

glass. Press the tip of one forefinger down on the ink pad so your fingertip is covered with ink. Press that finger straight down in the space on the next page, and then lift it straight up. (If you let it slide around, you'll get a smeared print.) Wait for the ink to dry. Be sure to wash your fingers!

LEFT

RIGHT

Using the magnifying glass, study the print you made. Do the ridges form an arch, a whorl, or a loop? Is the pattern short or tall? Does it lean one way or the other? How does it compare with the prints of others in your den or members of your family?

ARCH

WHORL

LOOP

2

Date

Adult's Signature

REQUIREMENT 3

Make a shoe imprint.

There is a lot of information you can get from just one shoe print. When you make your print, compare it to the other members of your den.

- How many different sizes are there?
- How many different types of shoes?
- Can you tell if a shoe is well worn?
- Are there two shoe prints that look exactly alike?

Chances are that each shoe print in your den is different. Even when two people have the same shoe, there are differences that a trained person can identify. How someone walks, how much they weigh, and even someone's height can be determined by a set of footprints.

Materials

- An old worn shoe
- Cooking spray
- Cocoa powder, sand, or dirt
- White paper
- Small paintbrush
- Magnifying glass (optional)

Instructions

Use an old shoe that you're not wearing, and lightly spray the bottom of it with the cooking spray. Press the shoe with the tread side down on the white paper, then carefully lift it away. Sprinkle a small amount of cocoa powder, sand, or dirt to the wet area. Shake off any excess powder. Look at your footwear impression closely with a magnifying glass and see if you can find any unique marks like cuts in the tread.

3

Date

Adult's Signature

REQUIREMENT 4

Do an analysis of four different substances: salt, sugar, baking soda, and cornstarch.

Forensic chemists conduct tests to identify unknown substances. For example, they might add a chemical to the substance to see how it changes.

For this requirement, you'll analyze four common substances: salt, sugar, baking soda, and cornstarch. Use the chart on the next page to keep track of your results.

Do these tests:

- Examine what the substance looks like, with both your unaided eye and with a magnifying glass.
- See how it feels when you rub it between your fingers.
- Sniff it to determine how it smells.
- Add a drop of water and, in a different spot, a drop of vinegar. Record how the substance reacts. Does it dissolve? Does it become hard?

	Salt	Sugar	Baking soda	Cornstarch
Appearance (naked eye)				
Appearance (magnifying glass)				
Feel between fingers				
Smell				
Reaction to water				
Reaction with vinegar				

After you've tested all the substances, ask your parent or a friend to give you a sample of one of the substances without telling you what it is. Can you identify it based on your test results?

Date

Adult's Signature

REQUIREMENT 5

Learn about chromatography and how it is used in solving crimes.

Chromatography is a big word that means "color writing." It is a technique for separating mixtures of different chemicals. Most chromatography is done in laboratories with expensive equipment, but you can do a simple experiment using materials found around your home. With these materials, you can separate the components of ink.

The pictures on the next page show what your investigations might produce. In this example, several different colors were hidden in the black ink. Chromatography causes the different pigments that make up the black ink to separate and spread out. Each formula used for black ink will create a unique spread of colors.

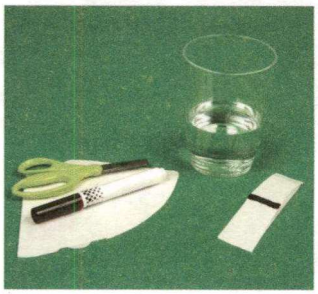
Forensic scientists do similar investigations on chemicals found at crime scenes. For example, using chromatography, they could identify the type of pen that was used to write a document.

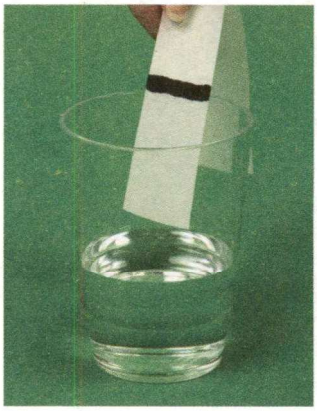
Materials

- A coffee filter
- Several nonpermanent felt-tip markers of different brands
- A glass of water
- Scissors
- Newsprint

Instructions

1. Cut the coffee filter into strips an inch or so wide.
2. Draw a horizontal line across the middle of one of the strips.
3. Put the strip in the glass of water, making sure the line you drew is above the water.
4. Now watch what happens. The coffee filter will slowly absorb water, which will rise toward the top of the strip. As the water rises, it will carry along components of the ink. Lighter components will travel the longest distance; heavier components won't travel very far.
5. When the water nearly reaches the top of the strip (or when you don't see any more changes happening), take the strip out of the water and set it on a piece of newsprint to dry. Repeat the experiment with several pens. Compare the results to see how similar or different the inks you used are.





5

Date

Adult's Signature

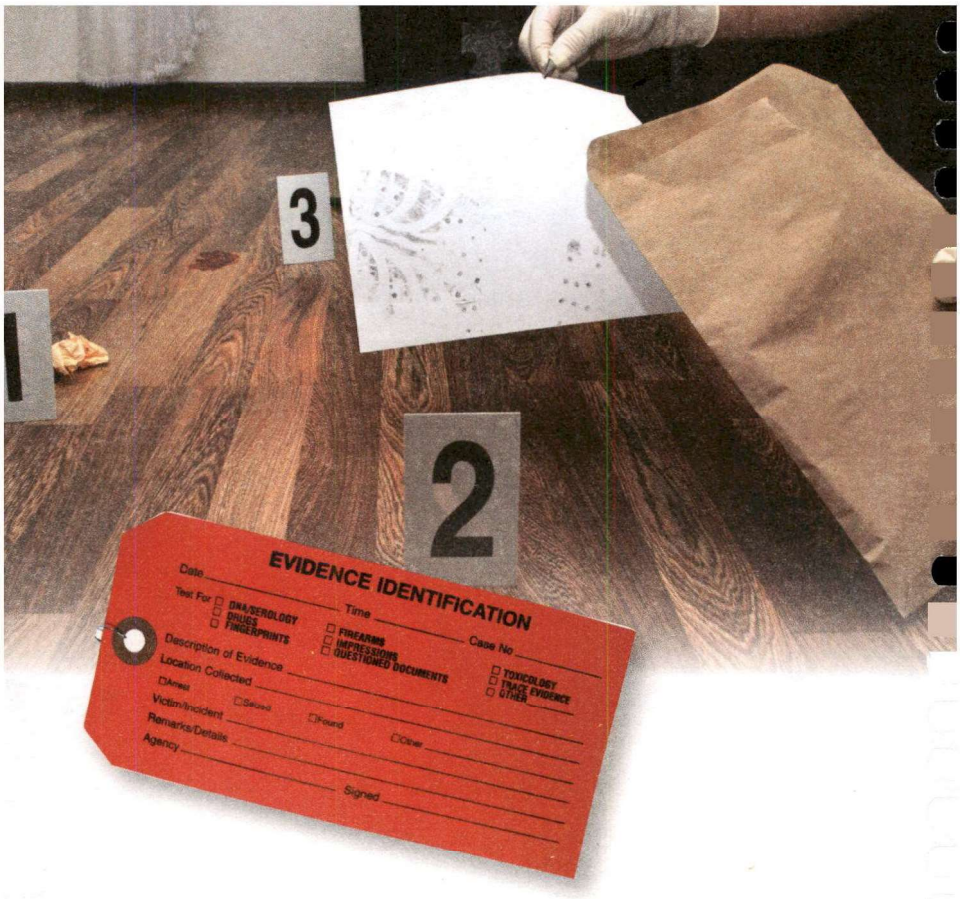
REQUIREMENT 6

Find out how officers collect evidence.

Law enforcement officers collect all sorts of forensic evidence. They interview witnesses. They check security camera videos.

Officers may work with other professionals to help collect evidence.

- A medical examiner performs autopsies to determine why people died.
- A toxicologist tests for poisons.
- A fingerprint expert identifies patterns in fingerprints.
- A forensic engineer tries to figure out how a structure collapsed.
- A multimedia scientist looks for clues in surveillance videos and crime-scene photos.



There are numerous jobs in the area of forensic science.

K-9 UNITS

Did you know that dogs can serve as official law enforcement officers? You probably know that dogs have a really good sense of smell. Because of that, they can be trained to find all sorts of evidence, including blood and drugs that humans might not be able to detect.

Visit the library, explore the internet (with your parent's or legal guardian's permission), or talk with a law enforcement officer to learn more about how animals are used to gather evidence.

Your den or pack may schedule a visit to your local sheriff's office or police station. Find out how law enforcement officers look for and collect evidence.

6

Date

Adult's Signature