Contents

To the Teacher

The investigation of a crime scene is one of the most complicated endeavours a scientist can undertake. The number of disciplines that an investigator must be familiar with is huge. The work of collecting evidence requires a methodical approach and might require a strong background in chemistry, physics, biology, geology, and any number of areas where these fields overlap.

As a teacher, you might wonder how a book on forensics is useful to you in your classroom. You may choose to use some or all of these activities. You will find that each one is a stand-alone activity, but the two summary lessons at the end are best done after many of the earlier activities have been completed. Most of the activities are meant to be finished in a single class period, although some can be made as detail-oriented as possible and can be spread across a few classes. The material covered would fit well into a general science class, and various activities would be fitting for biology, chemistry, physics or earth science classes.

There are television shows that feature forensics so intensely that the science seems like a character. Many students are captivated by the mystery that must be solved. Most shows are careful to have experts on the set to be sure that the science is right, and many of your students will be familiar with the basics. The goal of this book is to advance the scientific-thinking skills of your students by turning students into good scientists. The activities employ a number of process and inquiry skills, much like those used by a good scientist. Good scientists will:

- accept well-tested findings
- utilise time-tested procedures to produce accurate results
- see the things in front of them and not what they want to see
- change their minds when faced with new experimental evidence
- be sceptical of information but open-minded to the possibility that it is correct.

Much of science is a combination of problem solving, the scientific method, and just plain hard work. Forensics might be the ultimate combination of all three. There is a General Rubric to help you with assessment. Properly used, this book can be fun for students while still helping them strive to reach the high standards that you expect from them in your classroom.

Name _____ Date _____

5. Matching DNA

STUDENT ACTIVITY PAGE

OBJECTIVE

To compare DNA profiles for similarities and differences

BEFORE YOU BEGIN

DNA stands for deoxyribonucleic acid. DNA is a molecule found in almost all living organisms. While most of the DNA found in two people is very similar, about one-tenth of one per cent is different. This means that there are about 3 million molecular components that can be arranged in various ways to make genetically unique human beings.

At a crime scene, evidence might be collected that contains DNA. The DNA can be compared to samples collected from victims or criminals. DNA is found in blood, skin, hair, saliva, and other bodily fluids. DNA evidence must be collected carefully so that it is not contaminated. It must be treated carefully in the lab so that as much of the material as possible survives for testing.

VNTRs stands for variable number tandem repeats. This is just a way of saying that there are short stretches of the DNA molecule that have identically repeating parts. The number of times these parts repeat is generally different from person to person. These VNTRs make it possible for a properly trained technician to compare a relatively small number of markers in a short amount of time. Looking at the whole DNA structure takes much longer.

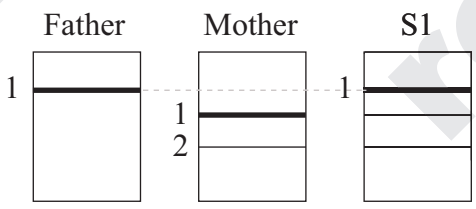
Once the data is collected, a DNA fingerprint is made. A DNA fingerprint can look like a series of bars on a chart or like sharp peaks on a line graph. Whatever the final presentation, a trained person can compare and identify identical (or different) DNA fingerprints just by looking at them.

MATERIALS

- ruler
- sample DNA profiles (see Procedure below)

PROCEDURE

1. Each numbered line represents a genetic trait, such as curly hair. Lines that are on the same level show that the child probably inherited that trait from that parent. In the example below, we see that the first son (S1) inherited trait 1 from his father because the markers in their DNA profiles are aligned. Repeat this process on the next page by comparing each parent's traits to those of each child (S1 = son 1, D1 = daughter 1, and so forth). Record your findings in the data tables by writing *yes* or *no* in each box.

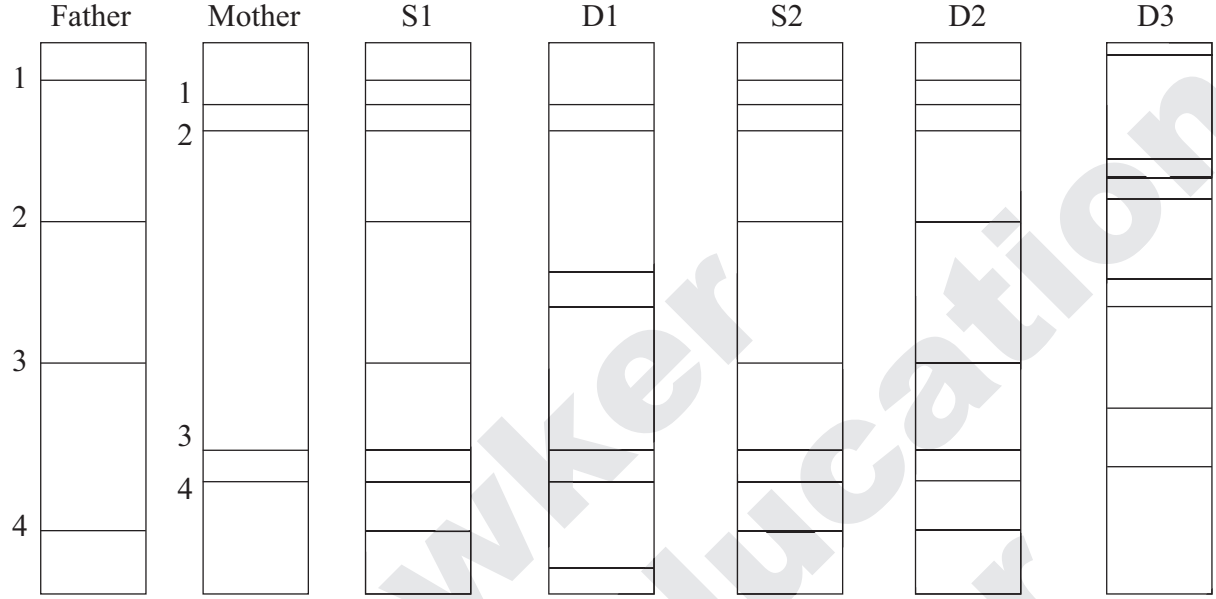


Name _____ Date _____

5. Matching DNA

STUDENT ACTIVITY PAGE

2. Check each child for trait 2, trait 3 and trait 4 of the father. Repeat with the traits for the mother.



EXTENSION OPTION

Create two plausible DNA profiles for the mother and father of Daughter 3.

DATA COLLECTION AND ANALYSIS

Child	Shares trait 1 with father	Shares trait 2 with father	Shares trait 3 with father	Shares trait 4 with father	Child of this father
Son 1					
Daughter 1					
Son 2					
Daughter 2					
Daughter 3					

Child	Shares trait 1 with father	Shares trait 2 with father	Shares trait 3 with father	Shares trait 4 with father	Child of this father
Son 1					
Daughter 1					
Son 2					
Daughter 2					
Daughter 3					

12. Components of Soil

TEACHER RESOURCE PAGE

INSTRUCTIONAL OBJECTIVES

Students will be able to:

- separate soil samples into components of different sizes
- identify components of different sizes in a soil sample
- calculate percentages
- use a sieve to separate soil components
- use a microscope to analyse the small components of soil

SCIENCE BENCHMARK

YEARS 7–8

Content description
Abilities necessary to do scientific inquiry
Understandings about scientific inquiry
Properties and changes of properties in matter
Structure of the earth system
Abilities of technological design
Understandings about science and technology
Science as a human endeavour

LEVEL 5 AND 6 VELS http://vels.vcaa.vic.edu.au/vels/science.
Students demonstrate safe and responsible use of equipment
Students make systematic observations and record data in tables
Students comment on their procedures and report on their investigations

YEARS 9–10

Content description
Abilities necessary to do scientific inquiry
Understandings about scientific inquiry
Structure and properties of matter
Geochemical cycles
Abilities of technological design
Science as a human endeavour

VOCABULARY

- **clay:** rocks with a diameter between 0.001 and 0.002 millimetres
- **colloids:** rocks with a diameter less than 0.001 millimetres
- **pebbles:** rocks with a diameter between 2 and 75 millimetres
- **sand:** rocks with a diameter between 0.05 and 2 millimetres
- **silt:** rocks with a diameter between 0.002 and 0.05 millimetres