

Evolution and Inheritance: Lesson 5

DNA and Variation

Science KS2 Year 6



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Evolution and Inheritance: Lesson 5

Science

Key Stage 2 Year 6

Learning Aims:

- learn that variation we see in our DNA for features like hair, skin and eye colour comes from chance mutations
- learn how scientists are using DNA to predict hair, skin and eye colour for ancient skeletons and to catch criminals
- look at examples of variation in Covid-19 and fossil records to see how living things change over time or become extinct
- recap what “evolution” means

Curriculum Link:

In this lesson we find out the variation in features like hair, skin and eye colour are due to chance mutations in our DNA. We look at how these mutations enable living things to change over time and how others become extinct.

Pupils should be taught to:

- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago

Working Scientifically

- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- Identifying scientific evidence that has been used to support or refute ideas or arguments.

Key Vocabulary

Deoxyribonucleic Acid (DNA). Variation. These were also in previous lessons.

DNA sequence. Genes. Mutation. Variant. Extinct. Evolution.

These can also be found at the end of this PDF and can be placed on a learning wall as they are discussed during the presentation.



Some Reading Links:

These books and websites are a great way to further engage children.

1. The “DNA Detectives – To Catch a Thief” is an exciting, page-turner of a story, where the characters in the book use DNA to catch the pet thief who has stolen their pet dog, Milly. In the story, the children break into their Mum’s laboratory and extract DNA from evidence they have collected. The story also recaps on what they have learnt in this lesson about DNA, cells and the nucleus. This book can be purchased via the following websites:

- Primary Science – the DNA Detectives – Insight and Perspective.
<https://insightandperspective.co.uk/primary-science-the-dna-detectives>
- The Little Story Telling Company: Books | Story telling and published author.
<https://www.thelittlestorytellingcompany.co.uk/>

2. “My DNA diary All about you” by Lisa Mullan provides a great introduction to DNA for children. It also complements the information children have learnt in lesson 1 and this lesson.

You will need:

- coloured pens, pencils or crayons
- worksheet - DNA reference (on page 5 of this PDF)
- worksheets - Case files (on pages 6 to 11 of this PDF)

PowerPoint Presentation

The accompanying PowerPoint presentation has 21 slides with the following learning points. At intervals throughout the lesson, we suggest asking the children what questions they might have. These can be collected throughout the unit of learning and added to the slide at the end of the lesson.

- Slides 1 and 2 introduce the lesson.
- Slide 3 asks where does variation come from? The PowerPoint sets up a magic lamp that has been discovered in the classroom. We introduce the children to the idea that we can use DNA to find out what the person to whom this magic lamp belongs looks like. We are going to find out their hair, skin and eye colour.
- Slide 4 shows us that DNA is made up of 4 letters, A, C, G and T and that DNA has been extracted from our item. How can the children find out what our person looks like?



Activity (slides 5 – 8)

- Slides 5 - 8: we learn what a DNA sequence is and find out how we can compare DNA sequences to find out what someone looks like. See if the children can work out what hair, skin and eye colour our person has. To make this activity more fun you could make these DNA sequences out of coloured beads, balls used for indoor hockey or balls used for soft play. You could also cut out different templates of paper or card for the different hair, skin and eye colour. You could then build a model of your person using coloured tights for skin, wigs and Velcro eyes. Are they ready for the big reveal on slide 8?
- Slide 9 shows how the scientists do this in real life. What are they using this technology for?
- Slide 10 tells how DNA was used to find out what an ancient skeleton ("Cheddar Man" who is over 10,000 years old) looked like. A BBC news clip of the big reveal is included in the Useful Links at the end of the PowerPoint.
- Slide 11 shows how forensic scientists in America and Australia are using DNA to catch criminals.

Activity (slide 12)

- Slide 12: see if the children can help the police catch some criminals. They will need the DNA reference sheet (on page 5 of this PDF). They will then use this reference to fill in three case studies (on pages 6 - 11 of this PDF). Allow five or ten minutes for this, and then reveal the case studies on the slide. Did they get it right?
- Slide 13: we learn about mutations which occur by chance and how they lead to variation. It is this variation which drives evolution, allowing living things to change over time.
- Slide 14 recaps the evolution of the polar bear.
- Slide 15: we learn how mutations and variation can happen very quickly, as with the corona virus. Ask the children if they can think of the names of any of the variants of the corona virus. They may have heard them on the news or heard people talking about it.
- Slides 16 to 18: we learn that other living things take millions of years to change, some may even become extinct. We can see evidence of this in fossil records. Ask the children what 'extinct' means and if they can think of any examples.
- Slide 19: useful weblinks
- Slide 20 is kept blank so that you can add the children's questions, and carry them through this unit of learning.
- Slide 21: End of lesson



DNA reference sheet (known DNA)

Feature	DNA sequence	Variation
Hair colour	C G C A A T	Blonde
	C G C A T T	Dark brown
	C G T A G T	Light brown
	C A C A A T	Black
	C G C A G T	Ginger
Eye colour	T G C A T C	Blue
	T G C A G T	Green
	T G G A G T	Brown
	T T C A T C	Hazel
Skin colour	C G G A T T	Pale
	C G C A T T	Medium
	C G G A G T	Dark
Freckles / no freckles	C C G A T T	Freckles
	A G G A G T	No freckles
Straight / curly hair	C T C A G T	Straight
	C T G A G T	Curly



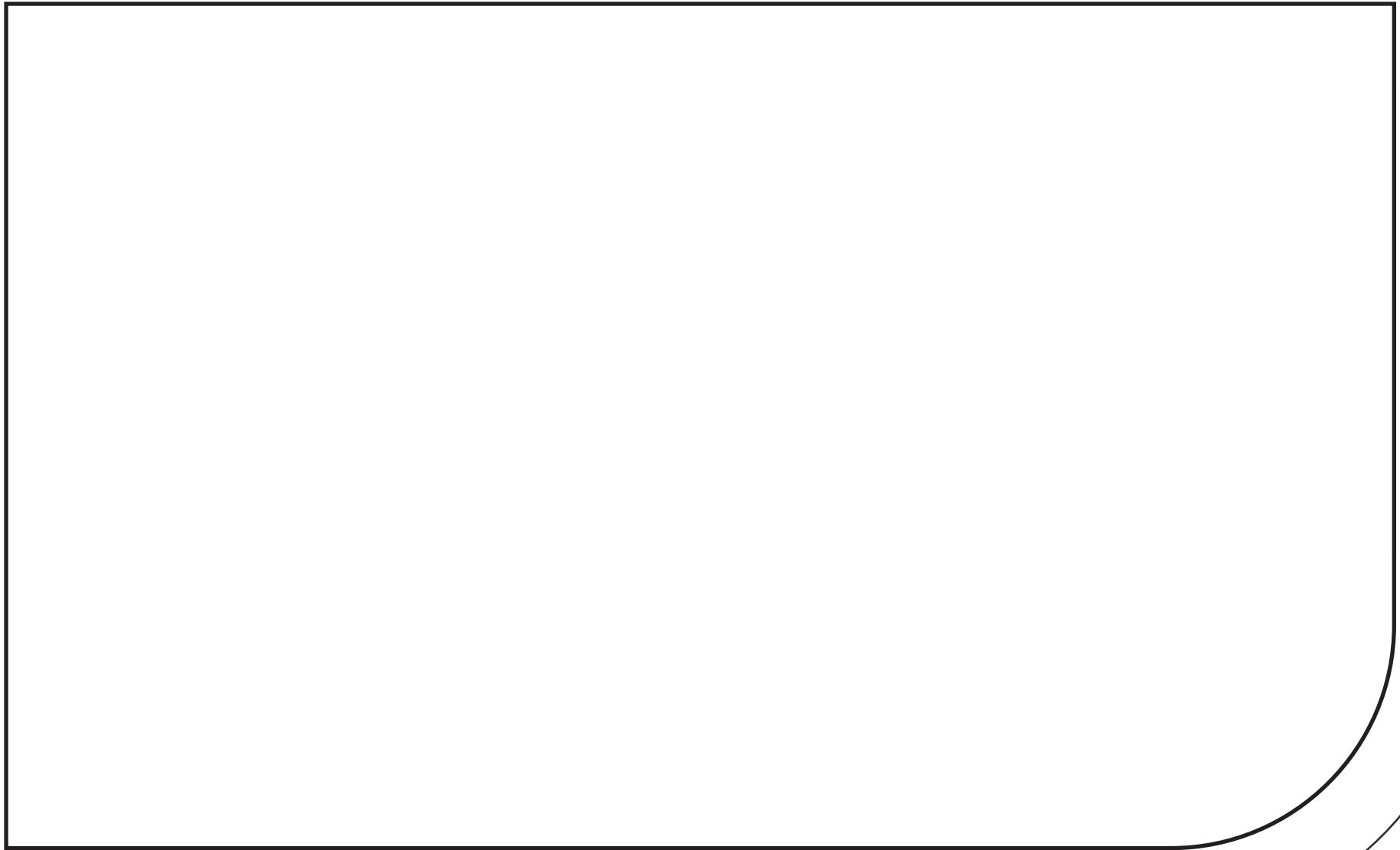
Can you catch the criminals? Case 1

Crime	A thief has been trying to sell stolen computers to people.		
Evidence	Swab taken from computer seized at the crime scene. DNA extracted from swab.		
DNA sequence results (DNA is from a female)	Gene	DNA sequence	Result (match)
	Hair	C G C A A T	
	Eyes	T G G A G T	
	Skin	C G G A T T	
	Freckles / no freckles	A G G A G T	
	Straight / curly hair	C T C A G T	



Evolution and Inheritance: Lesson 5

Draw a picture of the thief from the DNA evidence.



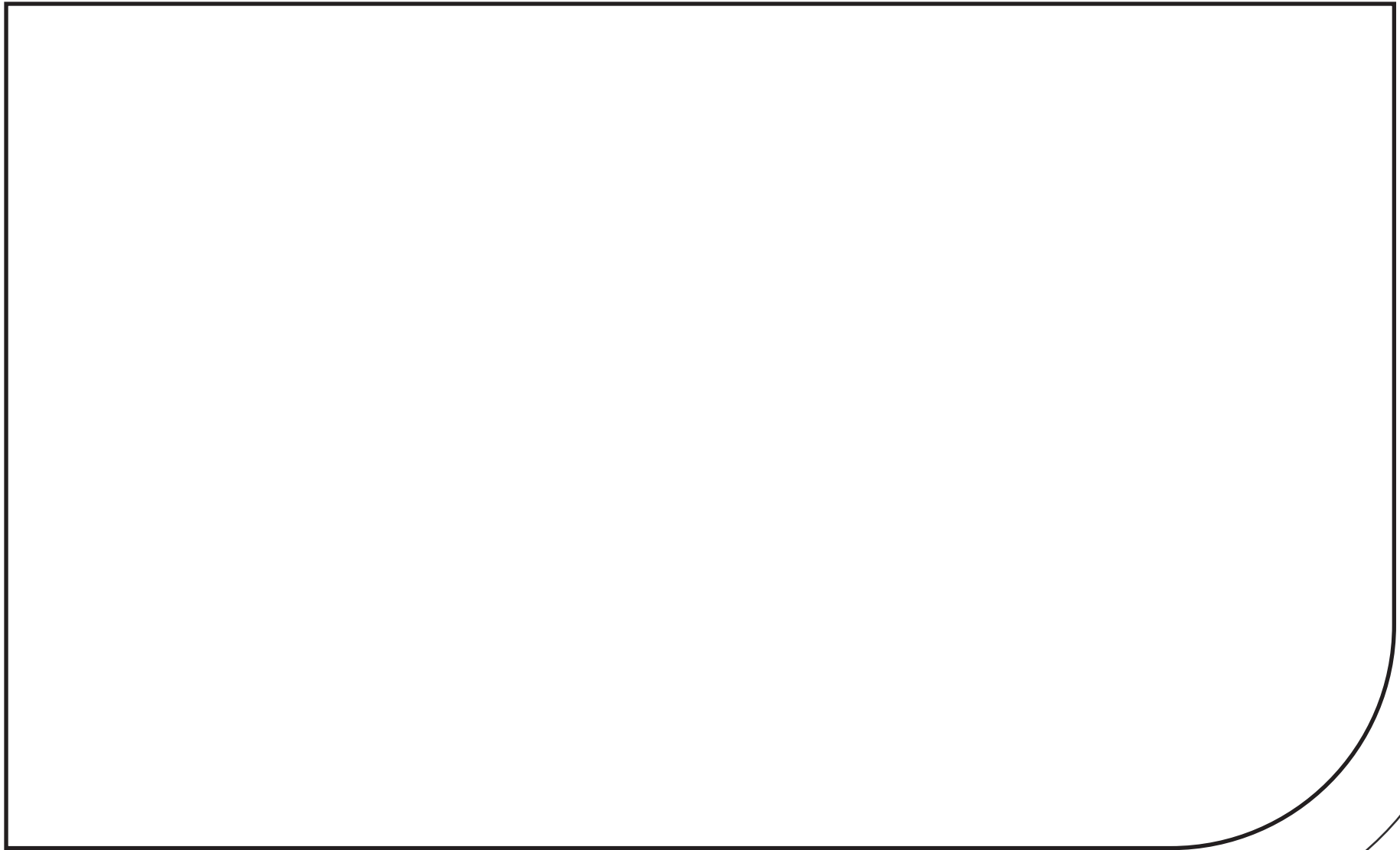
Can you catch the criminals? Case 2

Crime	Someone has broken into a shop.		
Evidence	Swab taken from blood on broken glass in shop. DNA extracted from swab.		
DNA sequence results (DNA is from a female)	Gene	DNA sequence	Result (match)
	Hair	C G C A G T	
	Eyes	T G C A G T	
	Skin	C G G A T T	
	Freckles / no freckles	C C G A T T	
	Straight / curly hair	C T G A G T	



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Draw a picture of the thief from the DNA evidence.



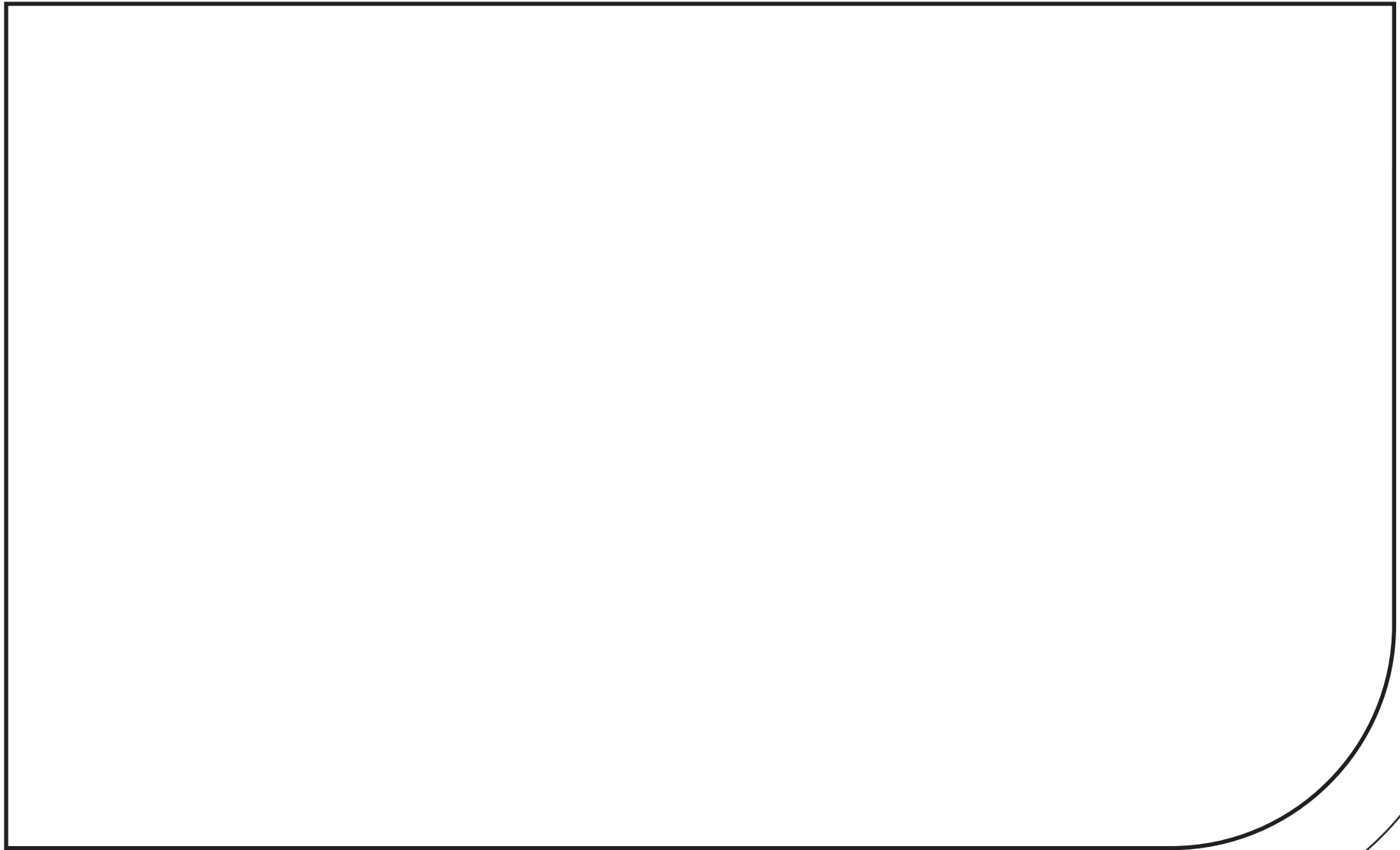
Can you catch the criminals? Case 3

Crime	Someone has stolen some sweets from the classroom.		
Evidence	Swab taken from half-eaten sweets left at the scene. DNA extracted from swab.		
DNA sequence results (DNA is from a female)	Gene	DNA sequence	Result (match)
	Hair	C A C A A T	
	Eyes	T T C A T C	
	Skin	C G G A G T	
	Freckles / no freckles	A G G A G T	
	Straight / curly hair	C T G A G T	



Evolution and Inheritance: Lesson 5

Draw a picture of the thief from the DNA evidence.



Evolution and Inheritance: Keywords Flashcards



**Deoxyribonucleic
Acid (DNA)**

Variation

**DNA
sequence**

Genes

Mutation

Variant

Extinct

Evolution



DNA sequence



Genes



Mutation



Variant



Extinct



Evolution

