Topic 1: Identity

What's the science story?

- heredity as the process by which genetic information is transmitted from one generation to the next
- a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model
- differences between species AND the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation
- changes in the environment which may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction AND the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material

Previous knowledge:

KS2

Yr 4 Living things and their habitats

Yr 6 Evolution and Inheritance

Next steps…

KS3

Organisms

KS4

B1 Cell Biology

B6 Inheritance, variation and evolution

B7 Ecology

Keywords

Variation	Inheritance	Fossils
DNA	Environmental	Evolution
Genome	Continuous	Biodiversity
Chromosome	Discontinuous	Extinction
Gene	Adaptation	
Proteins	Competition	

Lesson No. and Title	Learning objectives - KNOWLEDGE	Working scientifically skills	Practical equipment
1. Cells & Genome	ARE – Identify main structures in the animal cell and where DNA is found. AGD – Explain what the genome is.		
2. DNA Structure	ARE – To describe the structure of DNA and distinguish between the terms DNA, chromosome, gene and genome. AGD – Evaluate models.		PRAC – DNA sweet models Cocktail sticks, liquorice laces, gummy bears PRAC – DNA bracelets Metal thread, elastic thread, x4 coloured beads, tongs
3. DNA Discovery	ARE – To describe the contributions of scientists in the discovery of DNA. AGD – To justify the importance of scientists working together.		
Assessment 1: DNA Discovery			
4. Extracting DNA	ARE – Describe where DNA can be found and follow practical instructions to extract DNA. AGD – Justify method for extraction of DNA.	WS8 – working with a method WS10 – using equipment correctly.	PRAC – Extracting DNA from fruit Fruit, washing up liquid, salt, ethanol, beakers, water bath, pipettes
5. Proteins	ARE – State what DNA codes for and it's significance. AGD – To construct the correct base pairs to order specific amino acids and build a protein.		

Lesson No. and Title	Learning objectives - KNOWLEDGE	Working scientifically skills	Practical equipment
6. Inheritance	ARE – To describe variation as environmental or inherited. AGD – To compare the characteristics of different types of twins.		
7. Inheritance 2	ARE – To model inheritance. AGD – To evaluate and identify limitations in the model.		
8. Continuous vs Discontinuous Data x 3 lessons	ARE – To describe variation as continuous or discontinuous. AGD – To interpret continuous and discontinuous data.	WS14 Graphs WS15 Data	PRAC – Measuring height Metre rulers
Assessment 2: Variation in a family			

KS3 – Year 7

Lesson No. and Title	Learning objectives - KNOWLEDGE	Working scientifically skills	Practical equipment
9. Species	ARE – To describe the term species and give examples. AGD – To justify the importance of classifying and naming species.		
10. Competition	ARE – To describe the different things both animals and plants will compete for. AGD – To explain animals and plants compete for different resources.		
11. Adaptations of animals	ARE – To describe how organisms are adapted to their environment. AGD – To explain how organisms are adapted to seasonal changes.		
12. Adaptations of plants	ARE – To describe how organisms are adapted to their environment. AGD – To explain how organisms are adapted to seasonal changes.	WS8 – working with a method WS10 – using equipment correctly.	PRAC: Investigating leaf adaptations Rulers, leaves from full sun, leaves from shade
Assessment 3: Adaptations of a bear			
13. Evolution	ARE – To describe how finches helped scientists understand evolution. AGD – To explain what 'survival of the fittest' is with example.	WS8 – following a given method	PRAC: Clippy Islands 5 trays: 1. Sand and a coconut 2. Artificial grass and barley seeds 3. Pebbles and brazil nuts 4. Bark chips/leaves and dried chick peas 5. Volcanic (something with creases and crevices – possible paper mâché something) and dried beans Tweezers, 4 different size bulldog clip, grip clips, plastic cups

Lesson No. and Title	Learning objectives - KNOWLEDGE	Working scientifically skills	Practical equipment
14. Types of fossils	ARE – To describe the different ways fossils are formed. AGD – To justify the importance of studying the remains of organism from many years ago.		PRAC: Fossils Selection of fossils and lenses to view them.
15. Fossils	ARE – To describe how evidence is used to show how an organism used to look. AGD – To explain how scientists know that organisms have changed over time		PRAC: Making fossils Plaster of paris, plasticine, disposable tub, card, paper clips, stirrer, newspaper, gloves, selection of objects to be fossilised (plant matter and/or shells)
16. The fossil record	ARE – To explain how fossils provide evidence for evolution. AGD – To evaluate the limitations of the fossil record.		
17. Extinction	ARE – To describe the factors that may lead to extinction. AGD – To evaluate ways to prevent extinction.		
Assessment 4: Evolution and Extinction			
18. Biodiversity and genes banks	ARE – To describe the purpose of gene banks. AGD – To justify the importance of gene banks in maintaining biodiversity.		

Assessment Criteria

Assessment No. & Title	AO1 - Working Towards	AO2 - Age Related Expectations	AO3 - At Greater Depth
1. DNA Discovery	State that more than one scientist was involved in discovering the structure of DNA	Describe how scientists worked together to develop the DNA model	Explain the contribution of each team of scientists to the development of the model of DNA.
2. Variation in a family	State that variation is caused by the environment or inheritance	Describe the difference between environmental and inherited variation	Explain the causes of continuous and discontinuous variation
	State the two types of graphs that can be drawn when representing the two types of variation.	Represent variation within a species using graphs	Explain that some variation is affected by both environmental and inherited factors.
3. Adaptations of a Bear.	State what is meant by the term adaptation	Describe how organisms are adapted to their environments	Explain how organisms are adapted to seasonal changes
4. Evolution and Extinction	Name an environmental change	Describe how organisms adapt to environmental changes	Explain how competition or long-term environmental change can lead to extinction.
	Give a possible reason for adaptation or extinction	Describe how competition can lead to adaptation	
	State that organisms have changed over time, giving examples	Describe how organisms evolve over time.	Explain how scientists know that organisms have changed over time
n/a	State how scientists try to prevent extinction	Describe the purpose of gene banks	Explain the different types of gene bank