

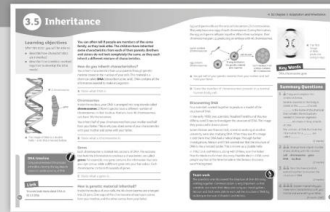
3.5 Inheritance

Biology NC link:

- 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.

Working Scientifically NC link:

- understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review.



Band	Outcome	Checkpoint	
		Question	Activity
Developing	State what is meant by a gene (Level 4).	C, 1	Starter 2, Plenary 2, Homework
	State that more than one scientist was involved in discovering the structure of DNA (Level 4).	3	Lit, Main
	State that the different teams of scientists produced different pieces of evidence (Level 4).	3	Lit, Main
Secure	Describe how characteristics are inherited (Level 6).	1, 4	Starter 2, Plenary 2, Homework
	Describe how scientists worked together to develop the DNA model (Level 6).	3	Lit, Main
	Describe that one team of scientists built on earlier work of another team in the discovery of DNA structure (Level 6).	3	Lit, Main
Extending	Explain how characteristics are inherited through and coded for by genes (Level 7).	B, C, 1, 4	Starter 2, Plenary 2, Homework
	Explain the contribution of each team of scientists to the development of the model of DNA (Level 7).	3	Lit, Main
	Explain how poor communication between the teams of scientists held back the discovery of the structure of DNA (Level 8).		Main

Maths

Students must understand quantitative size and scale to appreciate how DNA molecules fit in with cells, nuclei, chromosomes, and genes.

Literacy

Students read text on the discovery of the double-helix structure of DNA, extracting relevant information to summarise roles different teams played in discovery.

APP

Students use models to explain the structure of DNA (AF1), and suggest how collaborative approaches to investigations improve the evidence collected (AF3).

Key Words

DNA, chromosome, gene

Answers from the student book

In-text questions	A Genetic material stored in the nucleus, containing all the information needed to make an organism. B A long strand of DNA. C A section of DNA that contains the information to produce a characteristic. D 46
Activity	DNA timeline Must show key steps in scientists' understanding of DNA: role of Darwin (evolution), Mendel (selective breeding), discovery of double-helix structure of DNA, DNA fingerprinting, Human Genome Project, Dolly the sheep

Summary Questions

- 1 nucleus, DNA, chromosomes, characteristic, genes (5 marks)
- 2 gene, chromosome, DNA, nucleus, cell (2 marks)
- 3 Image produced using X-rays by Franklin and Wilkins. Image shared with Watson and Crick. Watson and Crick deduced double-helix structure. (2 marks)
- 4 6 mark question. Example answers:
Genes code for characteristics. Genes are found on chromosomes. A human has 46 chromosomes. Each parent supplies 23 chromosomes. A sex cell/egg/sperm contains 23 chromosomes. During fertilisation the egg and sperm combine. An embryo/fertilised egg has 46 chromosomes. The embryo/fertilised egg contains chromosomes from both parents.



Starter	Support/Extension	Resources
An alternative question-led lesson is also available. What's the fuss with DNA? (5 min) Project an image of the double-helix structure of DNA. Ask students what it is. Other questions to ask include: What is DNA? Why is it important? What do you know about it? Where do we get our DNA from? Why did we want to find the structure of it? What's the DNA? (10 min) Interactive resource where students decide if statements about DNA are true or false. They then correct the false statements.	Extension: Introduce the idea that DNA molecules are made from strands made from the bases A, T, C, and G. Extension: Students justify the changes they have made.	Question-led lesson: Inheritance Interactive: What's the DNA?
Main	Support/Extension	Resources
The discovery of the structure of DNA (40 min) Introduce the importance of DNA and its role in inheritance and variation. Discuss how DNA links in with the wider picture of cell, nucleus, DNA, chromosome, and gene. This can be shown visually using the 'Scale of the Universe' animation. Students use the information sheets provided and work in groups to determine the relative contribution of the two research teams towards the discovery of the double-helix structure of DNA. They discuss factors given on the information cards that contributed or hindered the progress of research into DNA structure, before summarising their findings on the grids provided.	Support: Ask groups of students to concentrate on three contributing factors towards the discovery of the structure of DNA Extension: Students rank each factor on their grid according to relative importance. Students write a short paragraph to discuss whether it was fair to leave Rosalind Franklin out of the Nobel Prize for this discovery.	Activity: The discovery of the structure of DNA
Plenary	Support/Extension	Resources
Where now? (10 min) Discuss as a class how our knowledge of DNA has moved scientific understanding forward. You may wish to use the following questions: Have scientists carried on with DNA research? Have there been any DNA stories in the news recently? What is DNA fingerprinting? Has our knowledge of DNA helped cure any diseases? Sugary DNA (5 min) Show students a ready-made model of DNA using licorice laces, toothpicks, jelly babies, and/or marshmallows. Ask students to describe different parts of the model, and relate these to facts learnt from this lesson.	Support: Allow students to work in small groups when discussing these questions. Give prompts where necessary. Extension: If models are made 'accurately', students should be able to distinguish between the different pairs of bases that are constantly repeated.	
Homework	Support/Extension	Resources
Students make a poster to explain the role of DNA in inheritance and variation. Students explain how chromosomes determine the different characteristics shown and how traits are inherited by future generations.	Extension: Students should include a short paragraph explaining what genetically modified (GM) crops are, and the implications they may have on society.	