



Lesson Plans

Year 10 Science

Chapter 2

DNA and Genes

Some general points about the following lesson plans:

- ★ The lesson plans outline only one way of sequencing the learning material in this chapter of the textbook.
- ★ The content and sequence will obviously vary from class to class (The following guide is ambitious in many instances).
- ★ All activities and investigations in each chapter have been deliberately designed to support the National Curriculum content whilst keeping in mind the development and reinforcement of skills required in the study of science in Year 11/12.
- ★ The length of lessons vary from school to school and even within schools. The following guide is based on 35/40 min lessons because it was reasoned that adjustment to 60/75/90 mins lessons would be easier than reducing lesson plans.
- ★ Students may be challenged further by completing each chapter Task, Competition Questions, Challenges, and by finding and entering any of the many competitions, challenges, projects etc that may be found on the Internet. Such students may benefit by doing an Internet search early in the year and planning entries before they close.

Assessment

A Task page 7
End of Unit Test

Content Description (5 weeks)

Chapter 2 DNA and Genes

The transmission of heritable characteristics from one generation to the next involves DNA and genes (ACSSU184)

- ★ Describe the role of DNA as the blueprint for controlling the characteristics of organisms.
- ★ Use models and diagrams to represent the relationship between DNA, genes and chromosomes.
- ★ Recognise that genetic information passed on to offspring is from both parents by meiosis and fertilisation.
- ★ Represent patterns of inheritance of a simple dominant/recessive characteristic through generations of a family.
- ★ Predict simple ratios of offspring genotypes and phenotypes in crosses involving dominant/recessive gene pairs or in genes that are sex-linked.
- ★ Describe mutations as changes in DNA or chromosomes and outline the factors that contribute to cause mutations.

Content structure

The Australian Curriculum: Science has three interrelated strands: *Science Understanding*, *Science as a Human Endeavour* and *Science Inquiry Skills*.

Together, the three strands of the science curriculum provide students with understanding, knowledge and skills through which they can develop a scientific view of the world. Students are challenged to explore science, its concepts, nature and uses through clearly described inquiry processes.

Science Understanding

Science understanding is evident when a person selects and integrates appropriate science knowledge to explain and predict phenomena, and applies that knowledge to new situations. Science knowledge refers to facts, concepts, principles, laws, theories and models that have been established by scientists over time.

The **biological sciences** sub-strand is concerned with understanding living things. The key concepts developed within this sub-strand are that: a diverse range of living things have evolved on Earth over hundreds of millions of years; living things are interdependent and interact with each other and their environment; and the form and features of living things are related to the functions that their body systems perform. Through this sub-strand, students investigate living things, including animals, plants, and micro-organisms, and their interdependence and interactions within ecosystems. They explore their life cycles, body systems, structural adaptations and behaviours, how these features aid survival, and how their characteristics are inherited from one generation to the next. Students are introduced to the cell as the basic unit of life and the processes that are central to its function.

Science Inquiry Skills

Science inquiry involves identifying and posing questions; planning, conducting and reflecting on investigations; processing, analysing and interpreting evidence; and communicating findings. This strand is concerned with evaluating claims, investigating ideas, solving problems, drawing valid conclusions and developing evidence-based arguments.

Science as a Human Endeavour

Through science, humans seek to improve their understanding and explanations of the natural world. Science involves the construction of explanations based on evidence and science knowledge can be changed as new evidence becomes available. Science influences society by posing, and responding to, social and ethical questions, and scientific research is itself influenced by the needs and priorities of society. This strand highlights the development of science as a unique way of knowing and doing, and the role of science in contemporary decision making and problem solving. It acknowledges that in making decisions about science practices and applications, ethical and social implications must be taken into account. This strand also recognises that science advances through the contributions of many different people from different cultures and that there are many rewarding science-based career paths.

Science across Foundation to Year 12

Years 7–10, typically students from 12 to 15 years of age, Curriculum focus: explaining phenomena involving science and its applications

During these years, students continue to develop their understanding of important science concepts across the major science disciplines. It is important to include contemporary contexts in which a richer understanding of science can be enhanced. Current science research and its human application motivates and engages students.

Within the outlined curriculum, students should undertake some open investigations that will help them refine their science inquiry skills. The quantitative aspects of students' inquiry skills are further developed to incorporate consideration of uncertainty in measurement. In teaching the outlined curriculum, it is important to provide time to build the more abstract science ideas that underpin understanding.

Chapter 2 DNA and Genes (5 weeks)

Lesson	Method	Resources
1	<ul style="list-style-type: none"> <input type="checkbox"/> General (covering book, ruling pages, paste study guide etc.) <input type="checkbox"/> Purpose of chapter <input type="checkbox"/> Introduce/discuss DNA and Genes p8 <input type="checkbox"/> Watch a couple of online videos on 'physical traits'. <input type="checkbox"/> Activity p8 'Inherited human traits'. <input type="checkbox"/> HW: Complete activity p8 	Internet
2	<ul style="list-style-type: none"> <input type="checkbox"/> DNA structure p9 <input type="checkbox"/> Activity p9 'Make a DNA model' <input type="checkbox"/> Watch a couple of online videos on 'DNA models' <input type="checkbox"/> Exercise p9 <input type="checkbox"/> HW: Complete exercise 	Material for activity p9 Internet
3	<ul style="list-style-type: none"> <input type="checkbox"/> Short test: DNA structure <input type="checkbox"/> DNA replication p10 <input type="checkbox"/> Watch a couple of online videos on 'DNA replication' <input type="checkbox"/> Demonstrate example p11 <input type="checkbox"/> Exercise p11 <input type="checkbox"/> Watch a couple of online videos on 'DNA extraction' <input type="checkbox"/> HW: Complete exercise 	Internet
4	<ul style="list-style-type: none"> <input type="checkbox"/> Short test: DNA structure <input type="checkbox"/> Activity p11 'Extracting DNA' <input type="checkbox"/> HW: DNA structure. Write a catchy DNA slogan/icon for use on a T shirt 	Material for activity p11
5	<ul style="list-style-type: none"> <input type="checkbox"/> Short test: DNA structure <input type="checkbox"/> DNA and genes p12 <input type="checkbox"/> Exercise p13 and activity p13 'Mutations' <input type="checkbox"/> Watch a couple of online videos on 'The genetic code' <input type="checkbox"/> HW: Challenge p13 and complete exercise 	Internet
6	<ul style="list-style-type: none"> <input type="checkbox"/> Short test: DNA and genes <input type="checkbox"/> Chromosomes p14 and Genes p15 <input type="checkbox"/> Watch a couple of online videos on 'Chromosomes' and 'Genes' <input type="checkbox"/> Exercise p15 <input type="checkbox"/> HW: Challenge p15 and complete exercise 	Internet
7	<ul style="list-style-type: none"> <input type="checkbox"/> Short test: DNA, genes, and chromosomes <input type="checkbox"/> Meiosis p16 <input type="checkbox"/> Sketch and label the process of meiosis. Repeat until proficient. <input type="checkbox"/> Exercise p17 <input type="checkbox"/> HW: Meiosis (process and terms) 	
8	<ul style="list-style-type: none"> <input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis <input type="checkbox"/> Inheritance p18 <input type="checkbox"/> Demonstrate punnet square p18 <input type="checkbox"/> Work through example top p19 <input type="checkbox"/> HW: Inheritance definitions p18 	
9	<ul style="list-style-type: none"> <input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis, inheritance <input type="checkbox"/> Work through examples p19 <input type="checkbox"/> Support students through Exercise p19. Repeat with similar problems. <input type="checkbox"/> HW: Complete exercise p19 	
10	<ul style="list-style-type: none"> <input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis, inheritance <input type="checkbox"/> Inheritance and pedigree analysis p20 <input type="checkbox"/> Watch some online videos on 'Pedigree charts' <input type="checkbox"/> Exercise p21 <input type="checkbox"/> HW: Exercise p21 	Internet

Chapter 2 DNA and Genes (5 weeks)

Lesson	Method	Resources
11	<input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis, inheritance <input type="checkbox"/> Activity p21 'Single gene inheritance' <input type="checkbox"/> HW: Puzzles p33	Materials for activity p21
12	<input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis, inheritance <input type="checkbox"/> Sex-linked p22 <input type="checkbox"/> Watch some online videos 'sex-linked inheritance' <input type="checkbox"/> HW: Challenge p22	Internet
13	<input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis, inheritance <input type="checkbox"/> Exercise p23 <input type="checkbox"/> Complete a Word Bank p23 <input type="checkbox"/> HW: Complete exercise p23 and Word Bank	
14	<input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis, inheritance <input type="checkbox"/> Mutations p24 <input type="checkbox"/> Activity p25 'Mutations' <input type="checkbox"/> HW: Challenge p25	
15	<input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis, inheritance, mutations <input type="checkbox"/> Mutations p24 <input type="checkbox"/> Exercise p25 <input type="checkbox"/> HW: Sweet Trick p33 Can you push the skewer through the balloon?	
16	<input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis, inheritance, mutations <input type="checkbox"/> Discuss/demonstrate Sweet Trick p33 <input type="checkbox"/> Exercise p25 <input type="checkbox"/> HW: Complete exercise p25	
17	<input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis, inheritance, mutations <input type="checkbox"/> Blood types p26 <input type="checkbox"/> Exercise p26 <input type="checkbox"/> HW Complete exercise p26	Activity materials
18	<input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis, inheritance, mutations <input type="checkbox"/> Human Genome p27 <input type="checkbox"/> Watch some online videos 'human genome' <input type="checkbox"/> Exercise p27 <input type="checkbox"/> HW Complete exercise p27	
19	<input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis, inheritance, mutations <input type="checkbox"/> Science Inquiry - undertake some of the suggested investigations p29 <input type="checkbox"/> HW: Investigations p29	Materials for investigations p29
20	<input type="checkbox"/> Short test: DNA, genes, chromosomes, meiosis, inheritance, mutations <input type="checkbox"/> Science Inquiry - undertake some of the suggested investigations p29 <input type="checkbox"/> HW: Investigations p29	Materials for investigations p29

Chapter 2 DNA and Genes (5 weeks)

Lesson	Method	Resources
21	Chapter Review and Task <input type="checkbox"/> Exercises p30, p31 <input type="checkbox"/> Begin work on 'A Task' p7 <input type="checkbox"/> HW: Complete exercises & work on task as required	
22	Chapter Review and Task <input type="checkbox"/> Exercises p32 and Competition Questions p35 <input type="checkbox"/> Begin work on 'A Task' p7 <input type="checkbox"/> HW: Complete exercises & work on task as required	
23	Chapter Review and Task <input type="checkbox"/> Exercises p34 and Harder test questions p36 <input type="checkbox"/> Continue work on 'A Task' p7 <input type="checkbox"/> HW: Complete exercises & work on task as required	
24	Chapter Review and Task <input type="checkbox"/> Preparation for test <input type="checkbox"/> Continue work on 'A Task' p7 <input type="checkbox"/> HW: Complete exercises & work on task as required	
25	<input type="checkbox"/> End of chapter/unit test	