

BLITZING BIOLOGY 12

Syllabus map



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About Blitzing Biology 12

Blitzing Biology 12 is a student activity book, which contains activities that seek to address the content and skills outcomes for the *Biology Stage 6 Syllabus (2017)* – published by NESA (NSW Education Standards Authority).

To find out more about *Blitzing Biology 12* or to order a copy, please visit:

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Disclaimers

This syllabus map is provided as a tool to assist teachers and students.

This syllabus map is designed as a guide to the main areas where each element of syllabus content for Modules 5–8 is addressed in *Blitzing Biology 12*. Science departments are advised to develop their own teaching program specific to their school and students, ensuring they address the NESA syllabus requirements in their entirety.

The syllabus content referred to in this document uses numerical references to the dot points contained in the NESA syllabus as digitally available at the time of publication. It is possible NESA will make changes to the syllabus following publication of this syllabus map. Please refer to the NESA website to view the most recent edition of the *Biology Stage 6 Syllabus (2017)*.

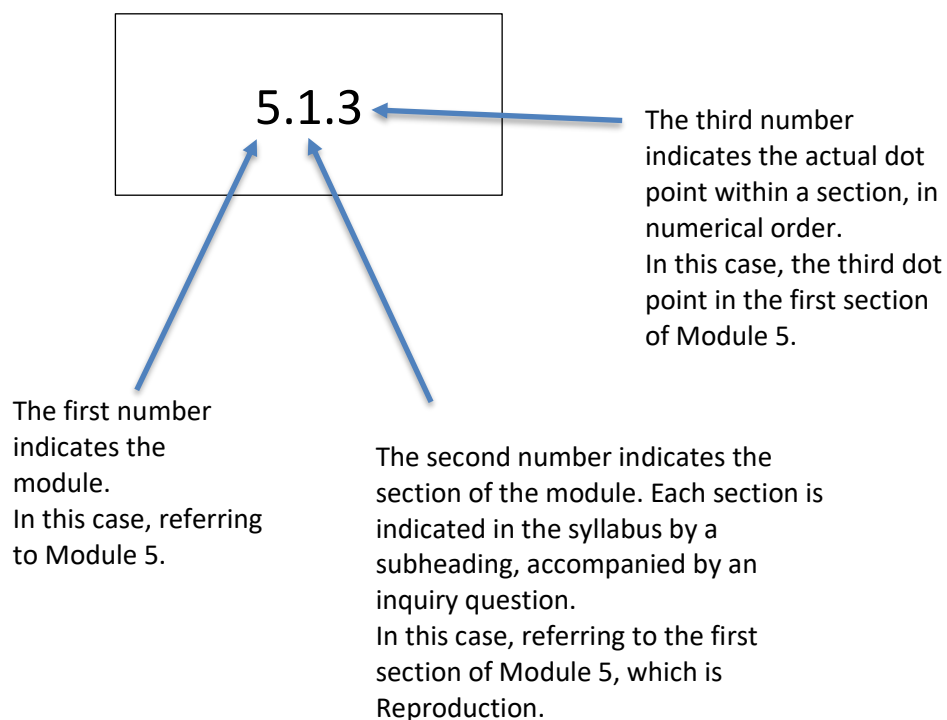
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Guide to numerical syllabus references used in this syllabus map

This Blitzing Biology 12 syllabus map is designed to be used in conjunction with the NESA publication *Biology Stage 6 Syllabus* (2017). The syllabus content has not been reproduced in this document due to copyright restrictions.

Three numbers have been used to identify each of the content dot points of the syllabus. The first number identifies the module, the second number identifies the section (subheadings under each module), and the third number identifies the dot point within each section.

Key word(s) have been placed beside many of the reference numbers to assist in quickly identifying the relevant syllabus content.



Module 5: Heredity

5.1: Reproduction

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 5.1 Species continuity	1.1 – The purpose of life: reproduction? 2.10 – Reproduction revision
5.1.1 Reproduction – Animals	1.2 – Sexual reproduction involves fertilisation 1.3 – Fertilisation can be internal or external 2.1 – Is it a boy or a girl? Or is it an hermaphrodite? 2.2 – ‘Virgin births’: parthenogenesis
– Plants	2.3 – Reproduction in the plant kingdom 2.4 – Sexual reproduction in flowering plants 2.5 – Reproduction in non-flowering plants 2.6 – Asexual reproduction 10.6 – Whole organism cloning in plants <i>(in Blitzing Biology’s Module 6)</i>
– Fungi	2.6 – Asexual reproduction 2.7 – Reproduction in fungi – by spores 2.8 – Reproduction in fungi – by budding
– Bacteria – Protists	2.6 – Asexual reproduction 2.9 – Prokaryotes reproduce via binary fission
5.1.2 Mammalian pregnancies	1.4 – Pregnancy in mammals 1.5 – Ovulation in humans 1.6 – Hormonal control in the human ovarian cycle 1.7 – Fertilisation and implantation in mammals 1.8 – Pregnancy and birth: in the hands of hormones
5.1.3 Manipulating reproduction	Chapter 10 – Reproductive technologies <i>(in Blitzing Biology’s Module 6)</i>

Note: Blitzing Biology 12 has the content of dot-point 5.1.3 into Module 6.

This has been done due to the significant overlap of this content with syllabus section 6.3 Reproductive Technologies.

Module 5: Heredity [continued]

5.2: Cell replication

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 5.2 Exact replication	Chapter 3 – DNA and cell division Chapter 6 – Mutations
5.2.1 Cell replication <ul style="list-style-type: none"> – mitosis and meiosis 	3.6 – The cell cycle 3.7 – Making more cells: mitosis 3.8 – Modelling mitosis using stop-motion 3.9 – Making gametes: meiosis 3.10 – Meiosis is a major source of variation 3.11 – Cell division: mitosis versus meiosis
<ul style="list-style-type: none"> – DNA replication 	3.1 – Delving into DNA 3.2 – DNA is your genetic code 3.4 – DNA replication 3.5 – Modelling DNA replication
5.2.2 Species continuity	3.7 – Making more cells: mitosis 3.11 – Cell division: mitosis versus meiosis

5.3: DNA and Polypeptide Synthesis

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 5.3 Importance	4.1 – Proteins: we can't live without them! 4.2 – Producing proteins: polypeptide synthesis
5.3.1 Locations of DNA	3.3 – DNA in prokaryotes and eukaryotes
5.3.2 Model <ul style="list-style-type: none"> – transcription and translation – role of mRNA and tRNA – importance 	4.2 – Producing proteins: polypeptide synthesis 4.3 – Producing proteins: transcription 4.4 – Producing proteins: translation 4.5 – Producing proteins: review
<ul style="list-style-type: none"> – phenotype 	4.1 – Proteins: we can't live without them! 4.6 – Genes and the environment affect phenotype
5.3.3 Proteins	4.1 – Proteins: we can't live without them!

Module 5: Heredity [continued]

5.4: Genetic Variation

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 5.4 Comparing species' genetics	Chapter 5 – Genetic problem solving Chapter 7 – Population genetics (in <i>Blitzing Biology's Module 6</i>)
5.4.1 Offspring genotypes	3.10 – Meiosis is a major source of variation 6.3 – Types of point mutations (in <i>Blitzing Biology's Module 6</i>) 6.4 – Examples of single-gene mutations (in <i>Blitzing Biology's Module 6</i>) 6.5 – Chromosomal mutations: structural abnormalities (in <i>Blitzing Biology's Module 6</i>) 6.6 – Chromosomal mutations: numerical abnormalities (in <i>Blitzing Biology's Module 6</i>)
5.4.2 – genetics	3.10 – Meiosis is a major source of variation 5.1 – Introduction to genetics 5.2 – The genetics of Mendel's pea plants 5.3 – Incomplete and codominant genes 5.4 – Genes with multiple alleles 5.5 – Sex-linked inheritance 5.7 The polygenic inheritance of skin colour
– pedigrees & Punnett squares	5.1 – Introduction to genetics 5.6 – Pedigrees (family trees)
5.4.3 Population genetics – Frequencies	5.8 Practical activity: frequencies of human height
– SNPs	7.4 – Variations on a theme: SNPs (in <i>Blitzing Biology's Module 6</i>)

Notes: Blitzing Biology 12 has placed some parts of 5.4 Genetic Variation into Blitzing Biology's Module 6.

Aspects of dotpoint 5.4.1 that relate to mutations have been placed in Module 6, due to the overlap with the first topic of Module 6: Mutations.

Likewise, analysis of SNPs from dotpoint 5.4.3 has been placed in Module 6, due to the author's opinion that students will better grasp SNPs once they have learnt about point mutations.

Module 5: Heredity [continued]

5.5: Inheritance Patterns in a Population

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 5.5 Population genetics	5.8 – Practical activity: frequencies of human height Chapter 7 – Population genetics (in Blitzing Biology's Module 6)
5.5.1 – DNA sequencing, DNA profiling	7.5 – DNA sequencing (in Blitzing Biology's Module 6) 7.6 – Your unique DNA profile (in Blitzing Biology's Module 6)
5.3.2 Population genetics in... – conservation – genetic diseases – evolution	7.7 – Using DNA profiles to determine ancestry (in Blitzing Biology's Module 6) 7.8 – Using population data in conservation genetics (in Blitzing Biology's Module 6)

Note: Blitzing Biology 12 has placed all of 5.5 'Inheritance Patterns in a Population' into Module 6. The content of 5.5 complements the population genetics content located in Module 6. Furthermore, it is the author's opinion that students will better grasp this Module 5 population genetics content once they have learnt the content within syllabus section 6.1 Mutations.

Module 6: Genetic Change

6.1: Mutation

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 6.1 new alleles	6.7 – Mutations revision 6.8 – An extended response on mutations and variation
6.1.1 mutagens – – –	6.1 – The mechanics of mutations 6.2 – A closer look at mutagens
6.1.2 types of mutation – point	6.1 – The mechanics of mutations 6.3 – Types of point mutations 6.4 – Examples of single-gene mutations
– chromosomal	6.1 – The mechanics of mutations 6.5 – Chromosomal mutations: structural abnormalities 6.6 – Chromosomal mutations: numerical abnormalities
6.1.3 somatic / germ-line	6.1 – The mechanics of mutations 6.7 – Mutations revision
6.1.4 ‘coding’ / ‘non-coding’	6.1 – The mechanics of mutations 6.7 – Mutations revision
6.1.5 variation	3.10 – Meiosis is a major source of variation (in Blitzing Biology’s Module 5) 6.4 – Examples of single-gene mutations 6.5 – Chromosomal mutations: structural abnormalities 6.6 – Chromosomal mutations: numerical abnormalities 6.8 – An extended response on mutations and variation
6.1.6 gene pool	7.1 – Introduction to population genetics 7.2 – Genetic drift in a population 7.3 – Population genetics example

Module 6: Genetic Change [continued]

6.2: Biotechnology

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 6.2 Biodiversity	10.11 – How does biotechnology impact biodiversity?
6.2.1 Biotechnology	8.4 – Bioethical research 9.1 – Biotechnology in your life 9.2 – Biotechnology over the years 9.3 – ‘Pharm’ goats that will make your blood flow 9.4 – Round-up ready crops 9.8 – Should the Golden Rice project go ahead? 10.1 – The ancient origins of genetic modification
– social... ethics	8.1 – Introduction to ethics 8.2 – Bioethics: your position and beliefs 8.3 – GE salmon’s upstream battle 8.4 – Bioethical research 9.3 – ‘Pharm’ goats that will make your blood flow 9.4 – Round-up ready crops 9.7 – Industrial uses of spider-goats and spider-bacteria 9.8 – Should the Golden Rice project go ahead?
– future	8.4 – Bioethical research 9.5 – The rise and fall of the Enviropig 9.6 – Environmentally friendly industrial biotechnology 9.8 – Should the Golden Rice project go ahead?
– societal benefits	9.3 – ‘Pharm’ goats that will make your blood flow 9.4 – Round-up ready crops 9.5 – The rise and fall of the Enviropig 9.7 – Industrial uses of spider-goats and spider-bacteria 9.8 – Should the Golden Rice project go ahead?
– biodiversity	10.11 – How does biotechnology impact biodiversity?

Note: Blitzing Biology 12 has mixed the presentation of content from syllabus sections 6.2 Biotechnology and 6.3 Genetic Technologies, as there is quite a bit of overlap in these. Together, these sections are addressed in Blitzing Biology 12 chapters 8, 9 and 10.

Module 6: Genetic Change [continued]

6.3: Genetic Technologies

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 6.3 changing populations	10.11 – How does biotechnology impact biodiversity?
6.3.1 genetic technologies	Chapter 9 – Biotechnology Chapter 10 – Reproductive technologies
6.3.2 – artificial insemination – artificial pollination	10.1 – The ancient origins of genetic modification 10.2 – The selective breeding of corn 10.3 – The art of artificial pollination 10.4 – Artificial insemination
6.3.3 – whole organism cloning – gene cloning	10.5 – Whole organism cloning in animals 10.6 – Whole organism cloning in plants 10.7 – Cloning genes using PCR 10.8 – Recombinant DNA 10.9 – Recombinant DNA for cloning genes in bacteria
6.3.4 recombinant DNA – transgenic organisms	10.7 – Cloning genes using PCR 10.8 – Recombinant DNA 10.9 – Recombinant DNA for cloning genes in bacteria (There are also many transgenic organism examples in Chapter 9 – Biotechnology)
6.3.5 benefits	Chapter 9 – Biotechnology Chapter 10 – Reproductive technologies (Evaluation of benefits occurs alongside each case study explored in these two chapters)
6.3.6 biodiversity	10.11 – How does biotechnology impact biodiversity?
6.3.7 social, economic and cultural	8.3 – GE salmon’s upstream battle 9.4 – Round-up ready crops 9.5 – The rise and fall of the Enviropig 9.7 – Industrial uses of spider-goats and spider-bacteria 9.8 – Should the Golden Rice project go ahead?

Module 7: Infectious Diseases

7.1: Causes of Infectious Disease

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 7.1 Transmission	Chapter 11 – Transmission of disease
7.1.1 pathogens <ul style="list-style-type: none"> – pathogens 	11.1 – What is disease? 11.2 – Types of pathogens 11.3 – Transmission of pathogens
<ul style="list-style-type: none"> – transmission in an epidemic 	16.1 – What is an epidemic? 16.2 – Case study: dengue fever 16.3 – Are you at risk of catching measles? 16.4 – News report on a disease epidemic
<ul style="list-style-type: none"> – testing food / water 	11.4 – Experiment: soap versus alcohol hand sanitisers 11.5 – How do we purify water? 11.6 – Water purification experiment design
<ul style="list-style-type: none"> – transmission methods 	11.3 – Transmission of pathogens
7.1.2 Koch and Pasteur <ul style="list-style-type: none"> – postulates – Pasteur 	12.1 – The germ theory of disease 12.2 – Spontaneous generation 12.3 – Pasteur’s contributions to the germ theory 12.4 – Robert Koch and his postulates 12.5 – Modelling Koch’s postulates in mouldy oranges 12.6 – Further exploration of Koch’s postulates
7.1.3 Agricultural diseases <ul style="list-style-type: none"> – plant – animal 	17.2 – Late blight in potatoes caused an Irish famine 17.5 – Disease reduces agricultural output
7.1.4 pathogen adaptations	14.4 – Evasive manoeuvres: pathogen adaptations

Module 7: Infectious Diseases [continued]

7.2: Responses to Pathogens

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 7.2 Respond	Chapter 13 – The immune system Chapter 17 – Diseases in plants and agriculture
7.2.1 Australian plant – –	17.1 – Plant defence mechanisms 17.3 – Disease in an Australian native plant
7.2.2 animals	Chapter 13 – The immune system 13.9 – The immune response in other animals

7.3: Immunity

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 7.3 Immune system	Chapter 13 – The immune system
7.3.1 innate and adaptive	13.1 – The human immune system 13.2 – Barriers to entry 13.3 – The innate immune system 13.4 – The adaptive immune response 13.5 – An overview of the human immune system 13.6 – Humoral immunity: B cells produce antibodies 13.7 – Cell-mediated immunity: T cells
7.3.2 primary exposure	13.3 – The innate immune system 13.4 – The adaptive immune response 13.8 – Interactions in the immune system 14.1 – Vaccinations prevent disease through immunity

Module 7: Infectious Diseases [continued]

7.4: Prevention, Treatment and Control

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 7.4 controlling spread	Chapter 14 – Vaccination and public health Chapter 15 – Treatments Chapter 16 – Disease epidemics
7.4.1 spread	16.2 – Case study: dengue fever 16.3 – Are you at risk of catching measles? 16.4 – News report on a disease epidemic
7.4.2 – hygiene	11.3 – Transmission of pathogens 11.4 – Experiment: soap versus alcohol hand sanitisers
– quarantine	17.4 – Australia’s biosecurity policies
– vaccination	14.1 – Vaccinations prevent disease through immunity 14.2 – Vaccination eradicated smallpox 14.3 – Vaccinations and public health
– public health	14.3 – Vaccinations and public health
– pesticides	17.5 – Disease reduces agricultural output
– genetic engineering	16.2 – Case study: dengue fever
7.4.3 pharmaceuticals – antivirals – antibiotics	15.1 – Antibiotics treat diseases caused by bacteria 15.2 – How do we treat diseases caused by viruses? 15.3 – The efficacy of pharmaceutical treatments
7.4.4 control an epidemic	16.1 – What is an epidemic? 16.4 – News report on a disease epidemic
7.4.5 incidence and prevalence: – mobility – Dengue Fever	16.2 – Case study: dengue fever 16.3 – Are you at risk of catching measles?
7.4.6	Chapter 15 – Treatments
7.4.7 Aboriginal protocols – –	15.4 – Traditional disease remedies

Module 8: Non-infectious Disease and Disorders

8.1: Homeostasis

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 8.1 internal environment	Chapter 18 – Homeostasis
8.1.1 negative feedback <ul style="list-style-type: none"> – temperature – glucose 	18.3 – Negative feedback loops
8.1.2 <ul style="list-style-type: none"> – adaptations in endotherms 	18.6 – Thermoregulation in endotherms 18.7 – Similarities in homeostasis mechanisms 18.8 – Hunger and thirst can aid homeostasis 18.9 – Excretion aids homeostasis 18.10 – How do the kidneys work?
<ul style="list-style-type: none"> – coordination systems 	18.1 – Homeostasis involves maintaining a stable state 18.2 – The nervous system responds to stimuli 18.4 – Homeostasis keeps you healthy
<ul style="list-style-type: none"> – plants 	18.11 – Maintaining water balance in plants

8.2: Causes and Effects

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 8.2 deaths	19.6 – Non-infectious diseases: leading cause of death
8.2.1 non-infectious diseases <ul style="list-style-type: none"> – – – – 	19.1 – Causes of non-infectious diseases 19.2 – Disease case study: Phenylketonuria (PKU) 19.3 – Non-infectious disease research 19.4 – Cancerous cells 19.5 – Disease case study: Cervical cancer
8.2.2 incidence, prevalence and mortality rates <ul style="list-style-type: none"> – – 	19.3 – Non-infectious disease research 19.5 – Disease case study: Cervical cancer

Module 8: Non-infectious Disease and Disorders [cont.]

8.3: Epidemiology

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 8.3	20.1 – What is epidemiology?
8.3.1 patterns – –	20.3 – Epidemiological data on smoking & public health 20.4 – Epidemiological data for diabetes
8.3.2 future directions	20.3 – Epidemiological data on smoking & public health 20.5 – Diabetes treatments and ongoing research
8.3.3 evaluate	20.2 – Correlation versus causation 20.6 – Epidemiological study design 20.7 – Evaluating epidemiology
8.3.4 evaluate	20.4 – Epidemiological data for diabetes 20.7 – Evaluating epidemiology

8.4: Prevention

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 8.4 prevented?	19.2 – Disease case study: Phenylketonuria (PKU)
8.3.1 prevention methods: – educational – genetic engineering	19.5 – Disease case study: Cervical cancer 20.8 – Preventing non-infectious diseases 20.9 – Debatable disease prevention policies 20.10 – Can genetic engineering prevent disease?

Module 8: Non-infectious Disease and Disorders [cont.]

8.5: Technologies and Disorders

<i>Biology Stage 6 Syllabus (2017) content</i>	<i>Blitzing Biology section</i>
IQ 8.5 disorders	Chapter 21 – Treating eye, ear and kidney conditions
8.5.1 causes of disorders	21.4 – What is sound? 21.5 – How do we hear sounds? 21.6 – What causes hearing loss?
– hearing	
– visual	21.1 – Structure and function of the human eye
– kidney	18.9 – Excretion aids homeostasis 18.10 – How do the kidneys work? 21.8 – Kidney function is essential for health
8.5.2 technologies	
– hearing	21.7 – Hearing aids and implants
– visual	21.2 – Glasses can fix common eye disorders 21.3 – Eye surgery
– kidney	21.9 – Kidney dialysis
8.5.3 evaluate	Chapter 21 – Treating eye, ear and kidney conditions

Assessment suggestions from Blitzing Biology 12

A possible depth study: Water purification experiment design

<i>Depth study requirements</i>	<i>Blitzing Biology section</i>
<p>Compulsory skill outcomes:</p> <ul style="list-style-type: none"> • Questioning and predicting • Communicating 	<p>Blitzing Biology activity 11.6 – <i>Water purification experiment design</i> could be incorporated into your program as an assessable depth study.</p> <p>Chapter 11 includes introduction to the experimentation skills required for this activity through the scaffolded activity 11.4 – <i>Experiment: soap versus alcohol hand sanitisers</i>. You may wish to introduce your students to further first-hand microbiology skills within your depth study hours. You may also elect to complete activity 12.5 – <i>Modelling Koch’s postulates in mouldy oranges</i> to further expand students’ skills in microbiology before they do an assessable practical task.</p>
<p>Additional skill outcomes:</p> <ul style="list-style-type: none"> • Planning investigations • Conducting investigations 	<p>The experiment in activity 11.6 is scaffolded to assist students in designing and conducting their experiment. There is a selection of suggested inquiry questions for the experiment. You may wish to provide additional guidance for students through designing and conducting one of these inquiry questions as a class. Students can then design and conduct a different inquiry question by themselves.</p> <p>The Questioning and Predicting outcome can be addressed in preparing experiment hypotheses, while the Communicating outcome can be addressed in preparing an experiment report. You may wish to include a background research section in students’ experiment reports to allow them to further develop their questioning skills in relation to their inquiry question.</p>
<p>Related knowledge and understanding outcome:</p> <p>7.1.1 testing food / water</p>	<p>The Questioning and Predicting outcome can be addressed in preparing experiment hypotheses, while the Communicating outcome can be addressed in preparing an experiment report. You may wish to include a background research section in students’ experiment reports to allow them to further develop their questioning skills in relation to their inquiry question.</p>
<p>Assessment</p> <p>One assessment task in your program must focus on a depth study or aspect of a depth study.</p> <p>This task can have a minimum weighting of 20% and a maximum weighting of 40%.</p>	<p>A depth study must include an assessable component. It is recommended that the experiment report produced from completing 11.6 – <i>Water purification experiment design</i> be assessed.</p>

Note: 15 hours of the program should be allocated to the depth study or covered via multiple depth studies.

Assessment suggestions from Blitzing Biology 12 [cont.]

Other Blitzing Biology activities that could inspire a school-based assessment:

<i>Style of assessment</i>	<i>Blitzing Biology section</i>
Research and presentation	8.4 – Bioethical research 9.8 – Should the Golden Rice project go ahead? 16.4 – News report on a disease epidemic 17.3 – Disease in an Australian native plant 19.3 – Non-infectious disease research 20.8 – Preventing non-infectious diseases
Modelling	3.5 – Modelling DNA replication 3.8 – Modelling mitosis using stop-motion
Group performance	13.8 – Interactions in the immune system (Activity 3)
Practical activity	5.8 Practical activity: frequencies of human height 11.6 – Water purification experiment design

Notes: Several of these activities could be used as part of a depth study if desired. Ensure you are addressing the syllabus requirements for depth study outcomes, hours and assessment.

The NESA publication *Assessment and Reporting in Biology Stage 6* should be consulted for the current requirements of course assessment. This can be found on the NESA website.