



Edith Cowan University

2023 ATAR Revision Seminar

ATAR Biology
Revision seminar WORK BOOK

Curriculum Dot points

Examination and study tips

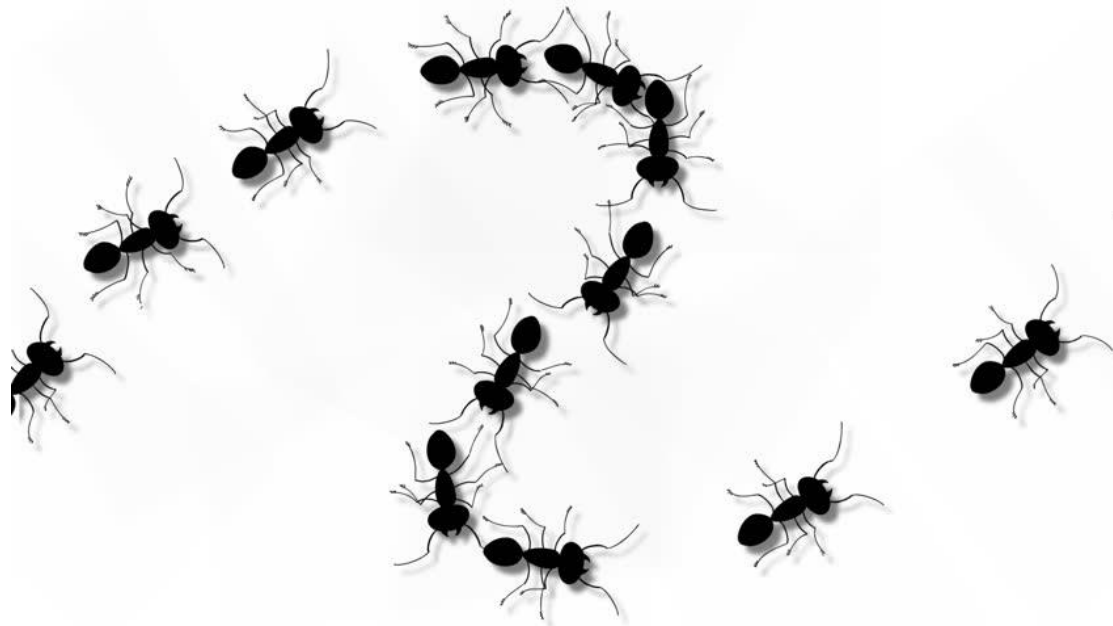
Revision notes Examination questions

Examination marker comments

Prepared and presented by

Alison Siciliano

12 ATAR Biology
ECU Revision Seminar
Unit 3 Workbook



The golden opportunity you are seeking is in yourself.

It is not in your environment; it is not in luck or chance, or the help of others; *it is in yourself alone.*

--- Orison Swett Marden

It is not too late to make a difference to your results. You can improve your exam performance by studying effectively. This seminar will help you to do that, with specific revision for Units 3 & 4 ATAR Biology.

The **School Curriculum and Standards Authority (SCSA)** is responsible for setting the curriculum and developing the ATAR exams. On their website you will find the curriculum for Biology Units 3&4 (hopefully you have seen this already!), past exam papers and other useful information.

Website: <https://senior-secondary.scsa.wa.edu.au/>

Techniques for active study

- Summarize the text you are reading.
- Put class notes or text into retrieval charts.
- Go back to the unit outline and write notes or draw diagrams for each objective.
- Redo test or exam questions that you got wrong.
- Complete the suggested text questions that are on your programme.
- Ask someone to quiz you.
- Write charts for the wall of your bedroom.
- Draw mind maps for each topic.
- Use revision/study books. If you haven't got one go to the library (school or community), they will have copies.

Creating a work space!

It is important that you find a space at home where you can work without distractions. Lying on the floor in front of the t.v is NOT a good space!! Some households don't allow for your own study room- you may have to think outside the square. I had a friend who put a desk in the back of her walk-in robe, so she could have a quiet space to study when she went back to university at the age of 40.

Where possible hang a notice board on the wall for important notices. Personally, I blue-tack my notes straight on the wall (not all parents would like that but since I am the parent in my house, I can get away with it!).

Get organised: (it's not too late)

- create a study timetable and stick to it- a routine will help you remain consistent
- use a planner to map out your exams;
- highlighter's, coloured post it notes are both good for making information stand out.

General Exam advice

- ATAR exams (and most assessments) are written with the aim to have a mean of 60%. 2020 & 2021 had a mean of 55%, 2022 a mean of 58%. This means that most candidates scored around 58%. Keep this in mind when setting yourself a goal for the Biology exam.
- Section A: Multiple choice is usually answered well- a mean of around 74%, Section C: Short answers has a mean around 54% and Section C: Extended Response scoring the lowest with the mean around 45%.

Feedback from the SCSA Examiners Board 2016-2023

- *Read questions carefully!* Often students lose marks by not answering the question fully or by misinterpreting the question. (see SCSA Glossary of Key Words in the formulation of questions. Appendix 1)
- Use *formal* and *precise* language.
- Use *science* terminology. Using the correct science words demonstrates your understanding.
- *Be clear* in your answers- **just state the answer**, especially in the short answer section where time and space are at a premium.
- Do not *repeat or rephrase* the question.
- Annotate diagrams (label them) and refer to them in your written answer, this demonstrates your understanding.
- Spend time planning your answers to extended response questions.
 - Dot points, sub-headings are acceptable.
- Develop an in-depth understanding of important concepts such as: scientific method (validity and reliability), replication of genetic material (eg meiosis), protein synthesis, variation, DNA Technology- in particular recombinant DNA and DNA Identification, Natural Selection and homeostasis- maintaining the internal environment.

Science Inquiry Skills

Unit 3

- identify, research and construct questions for investigation; **propose hypotheses**; and predict possible outcomes
- design investigations, including the procedure(s) to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics, including the ethics of research involving living organisms.
- conduct investigations safely, competently and methodically for the collection **of valid and reliable data**
- **represent data** in meaningful and useful ways, including the use of **mean, median, range and probability**; **organise and analyse data to identify trends, patterns and relationships**; discuss the ways in which **measurement error, instrumental accuracy, the nature of the procedure and the sample size may influence uncertainty and limitations in data**; and **select, synthesise and use evidence to make and justify conclusions**
- interpret a range of scientific and media texts, and evaluate models, processes, claims and conclusions by considering the quality of available evidence, and use reasoning to construct scientific arguments
- **select, construct and use appropriate representations** to communicate conceptual understanding, solve problems and make predictions
- communicate to specific audiences and for specific purposes using appropriate language, nomenclature, genres and modes, including scientific reports

What is a FAIR test?

	Validity	Reliability
Definition		
How to increase it		

Typically, there is one question in Section Two: Short answer.

Q1. '*Redback spiders*'

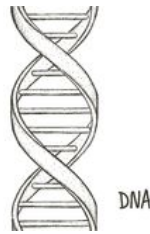
- What is the independent variable?
- What is the dependent variable?
- State a hypothesis for this experiment.
- Name two (2) variables need to be controlled?
- How could the reliability be increased?

Unit 3: Continuity of the Species

Learning outcomes

By the end of this unit, students:

- understand the cellular processes and mechanisms that ensure the continuity of life, and how these processes contribute to unity and diversity within a species
- understand the processes and mechanisms that explain how life on Earth has persisted, changed and diversified over the last 3.5 billion years
- understand how models and theories have developed over time
- use science inquiry skills to design, conduct, evaluate and communicate investigations into heredity, gene technology applications, and population gene pool changes
- evaluate, with reference to empirical evidence, claims about heredity processes, gene technology, and population gene pool processes, and justify evaluations
- communicate biological understanding using qualitative and quantitative representations in appropriate modes and genres.



Understand the **cellular processes and mechanisms** that ensure the **continuity of life**, and **how** these processes **contribute to unity and diversity within a species**.

• **PART ONE**

- Structure of DNA
- DNA Replication
- Genetic Code
- Protein Synthesis
- DNA Technologies
 - Genetic engineering techniques
 - DNA sequencing
 - DNA profiling
 - Recombinant DNA
 - Transgenic organisms
- Cell Reproduction
- Patterns of Inheritance



DNA

In the space below draw a labelled diagram of a nucleotide.

DNA Replication

Q2.

The process of DNA replication requires enzymes.

Identify the **two (2)** main enzymes that *attach* to the DNA molecule and describe their function.

(4 marks)

Q3.

Describe the **main steps** of **DNA replication** in a cell. (5 marks)

Genetic Code

A set of rules by which the genetic information in DNA or mRNA is translated into proteins.

Q4.

The diagram shown to you depicts protein synthesis during the transcription phase. HOW do you know this?

Identify the structures on the diagram above at the areas labelled A – E.

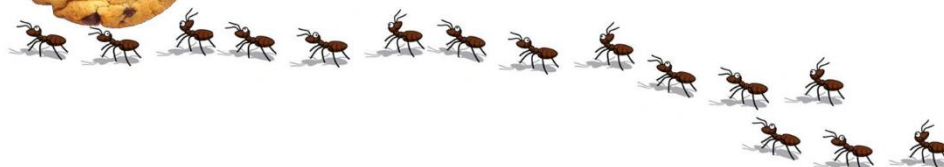
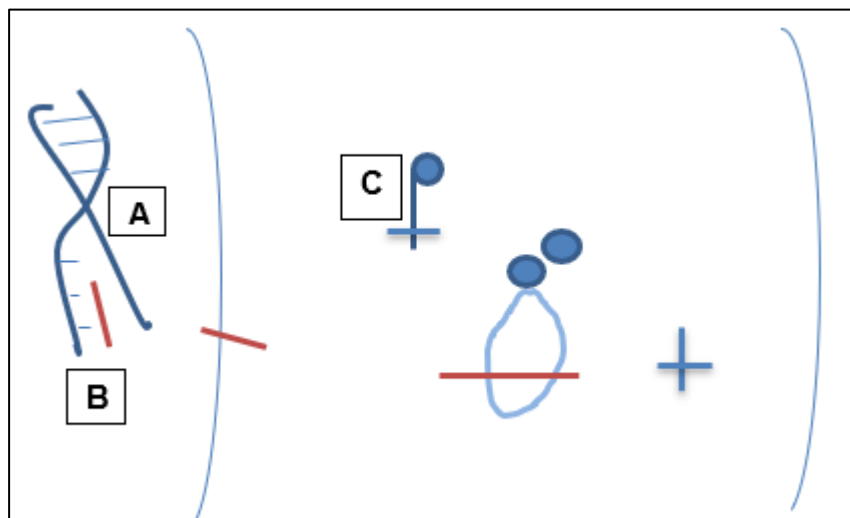
- A: _____
- B: _____
- C: _____
- D: _____
- E: _____

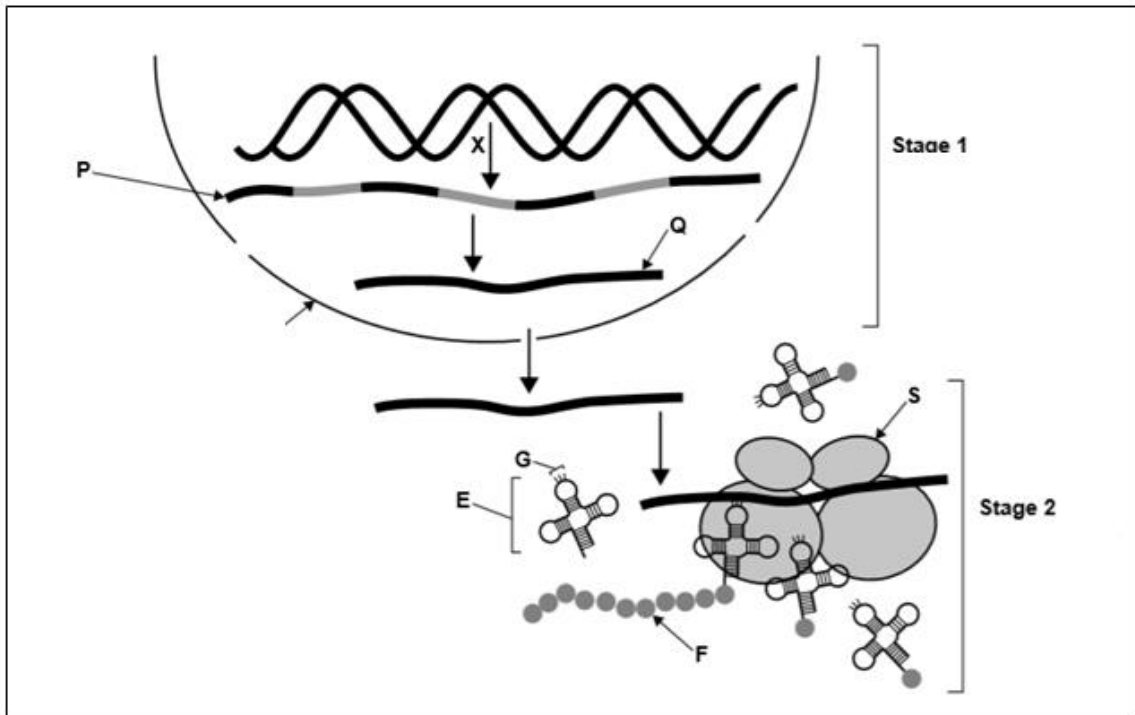
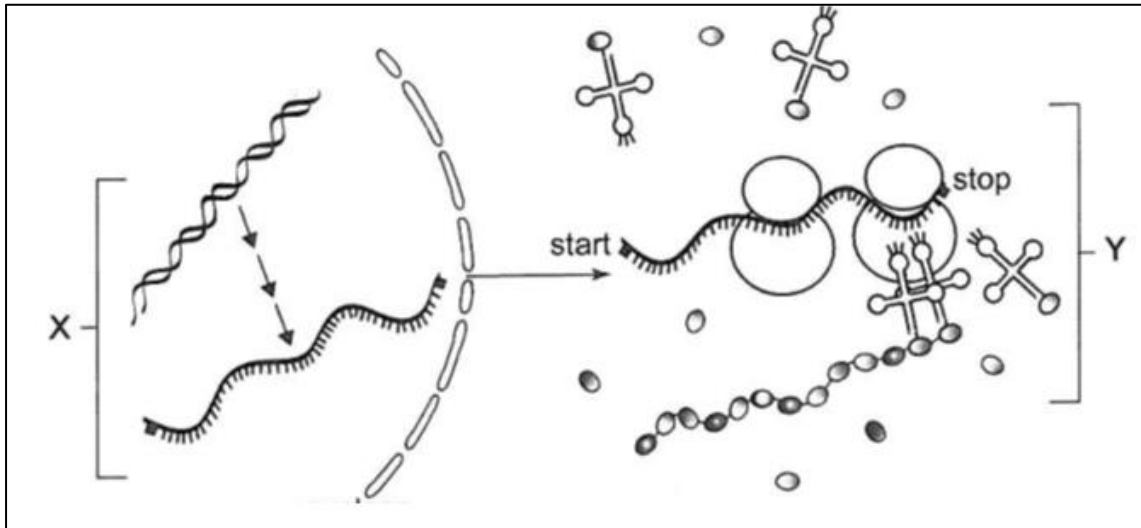
(5 marks)

Distinguish between the structures labelled A and B (2 marks)

A.
B.

Below are 3 diagrams of protein synthesis.





It is important to recognise that this is protein synthesis NOT DNA replication. The following questions could relate to any of these diagrams.

Q5. What is the purpose of protein synthesis?

There are two processes occurring in the diagram, what are they and where in the cell do they occur? (4 marks)

Describe the sequence of events from start to finish (10 marks)

DNA Technologies

Biotechnology: The use of living things to make new products or systems.

Traditional	Modern

Q6. Distinguish between; **Cutting DNA, Recombining DNA** and **Amplifying DNA**. (6 marks)

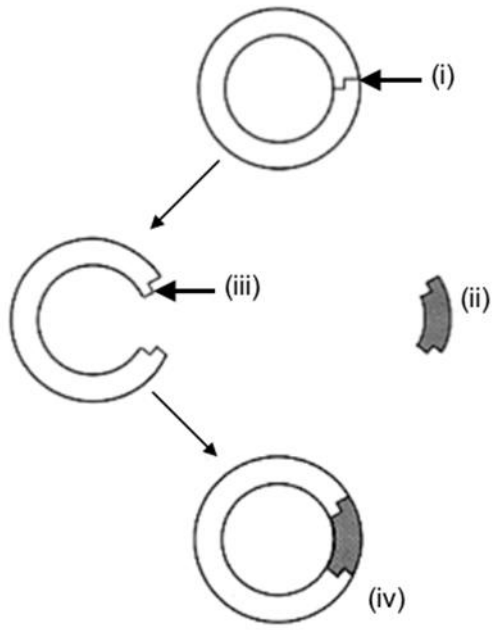


Q7. Explain how DNA profiling could be used to determine whether these people had contracted the virus through the dental practice. (4 marks)

Genetic Cloning

Q8:

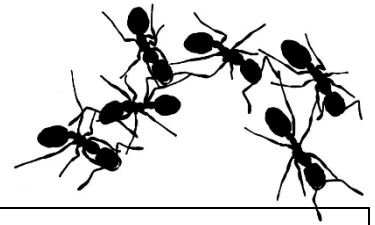
Now label the diagram below



Cellular Reproduction

Chromosomes, Mitosis v's Meiosis: see summary booklet.

Q9:

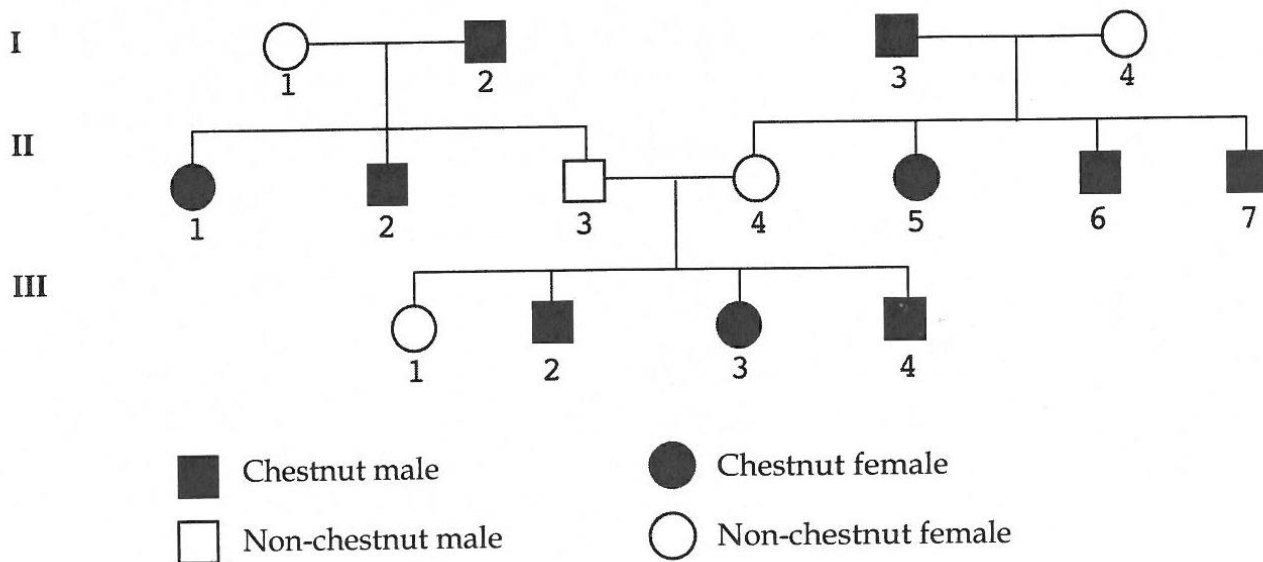


(4 marks)

Mutations: see summary booklet

Patterns of Inheritance

See summary book for examples.



Understand the processes and mechanisms that explain how life on Earth has persisted, changed and diversified over the last 3.5 billion years

PART TWO

- Fossils
- Evidence for Evolution
- Phylogenetic Trees
- Natural Selection
- Changes in allele frequency
- Speciation
- Evolution
- Extinction
- Environmental Conservation



Fossils

see summary booklet

Evidence for Evolution

Q10. *Glossopteris* is a genus of flowerless seed ferns, common 250 million years ago, it is now extinct. Many species of *Glossopteris* have been identified from leaf fossils.

a. Define the term 'fossil'. (1 mark)

b. Outline how fossils can provide evidence for evolution. (3 marks)

c. It has not been possible to determine the total number of *Glossopteris* species because the fossil record is incomplete. List four reasons why the fossil record is incomplete. (4 marks)

d. Approximately when did life first evolve on Earth? (1 mark)

--

e. Describe the first life forms on Earth. (3 marks)

f. Use these data to describe the evolutionary relationships of these monkeys. (4 marks)



g. Explain how differences in the amino acid sequence of a protein can provide evidence of evolutionary relationships between organisms. (4 marks)

Phylogenetic Trees (see summary booklet)

- often diagrams in multiple choice sections.
- be able to read a phylogenetic tree
- be able to construct a simple phylogenetic tree.

Natural Selection: *the selection of those alleles (genes) in a population that give an organism greater survival advantage.*

Q11: Describe how natural selection resulted in the evolution of more than 150 species of Anolis lizards in the Caribbean Islands. [6 marks]

Q12. “Discuss how ‘genetic drift’ and ‘gene flow’ change allele frequencies in the gene pool of a population.” [10 marks] WACE 2018 Extended Response

Extinction and Environmental conservation

See summary booklet.

12 ATAR Biology ECU Revision Seminar Unit 4 Workbook

Never measure the height of a mountain until you reach the top.
Then you will see how low it was.
Dag Hammarskjold

Websites, Facebook pages and You tube channels

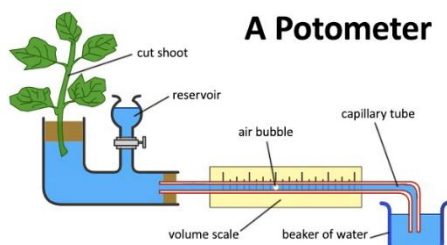
- bioninja : <https://ib.bioninja.com.au/>
- Amoeba Sisters: <https://www.youtube.com/user/AmoebaSisters>
- Crash Course: <https://www.youtube.com/user/crashcourse/featured>
- All About Molecular Biology: <https://all-about-molecular-biology.jimdo.com/> and also on Facebook!

Unit 4: Surviving in a Changing Environment

Learning Outcomes

By the end of this unit students will

- understand the mechanisms by which plants and animals use homeostasis to control their internal environment in a changing external environment
- understand the ways in which infection, transmission and spread of disease occur in vector-borne diseases
- understand how biological models and theories have developed over time
- use science inquiry skills to design, conduct, evaluate and communicate investigations into organisms' responses to changing environmental conditions and infectious disease
- communicate biological understanding using qualitative and quantitative representations in appropriate modes and genres.



<http://www.passmyexams.co.uk/GCSE/biology/measuring-transpiration.html>

Understand the **mechanisms** by which plants and animals **use homeostasis to control their internal environment in a changing external environment.**

PART ONE:

- Homeostasis
 - stimulus-response model
 - negative feed-back loops
- Tolerance limits
- Thermoregulation
- Water and Salt balance
- Nitrogenous waste
- Xerophytes and halophytes

Homeostasis

Question 1: Mammals regulate their core body temperature through a model which is represented in the diagram being shown on the PowerPoint.

a. In this flow chart name the:

i. stimulus: _____

ii. response: _____

(2marks)

b. What is meant by negative feedback? In the case above what is the negative feedback?

(2marks)

Question 2: Many Australian mammals do not sweat, to cool themselves they will pant. Describe, in detail, the homeostatic mechanism of panting. (10 marks) *Dot point an answer- you only need 10 facts.*

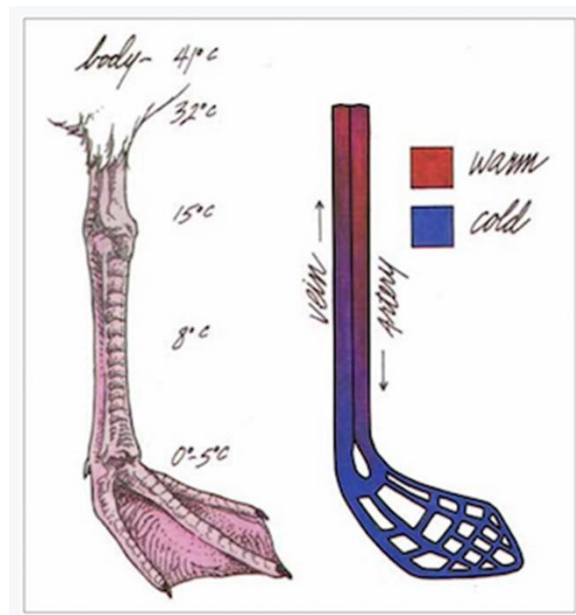
Thermoregulation

Thermoregulation in Red Kangaroos

Thermoregulation in Spinifex mice

Thermoregulation in seals

Counter-current blood flow



FROM COLD TO WARM: Two views of a gull's leg show how heat is exchanged between blood vessels. Art by Michael McNelly (after Ricklefs. 1990. Ecology. W.H. Freeman, New York).

Question 4: Describe how marine iguanas regulate their body temperature through the following methods of heat transfer.

a.

Conduction	2
Convection	2
Evaporation	1
Radiation	2

4b. Explain why small marine iguanas must feed in the shallow intertidal zones while large marine iguanas are able to dive to 12 metres for up to 30 minutes. (4 marks)



hint: this question still relates to heat loss

Osmoregulation: water balance.

Question 5:

a.

b.

Behavioural adaptation:

Explanation:

c.

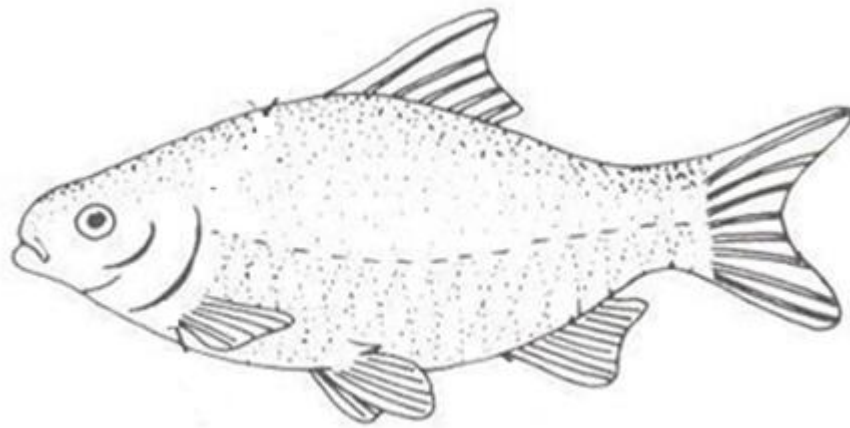
d.



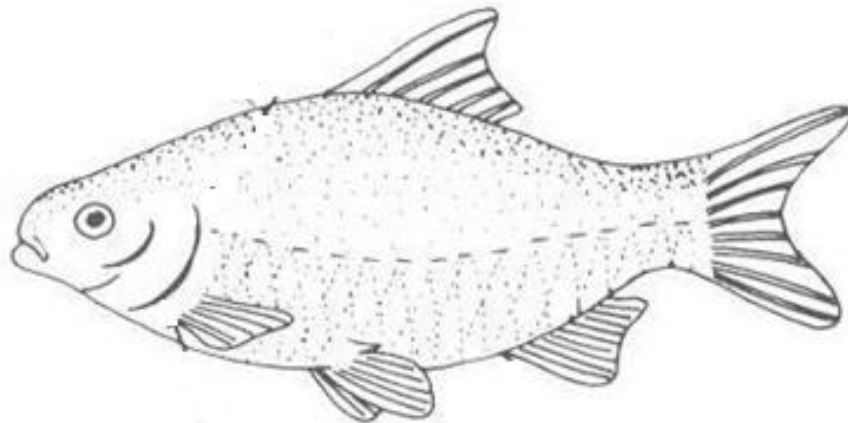
Question 6: [remember 10 marks means 10 points to write]

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Marine Fish



Freshwater Fish

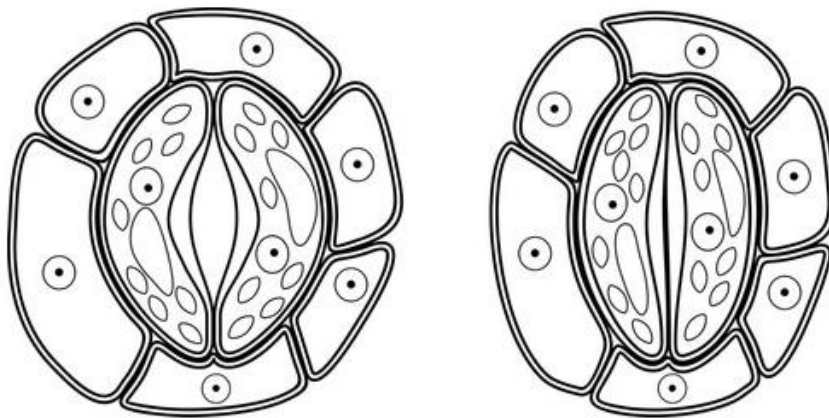


Nitrogenous Wastes

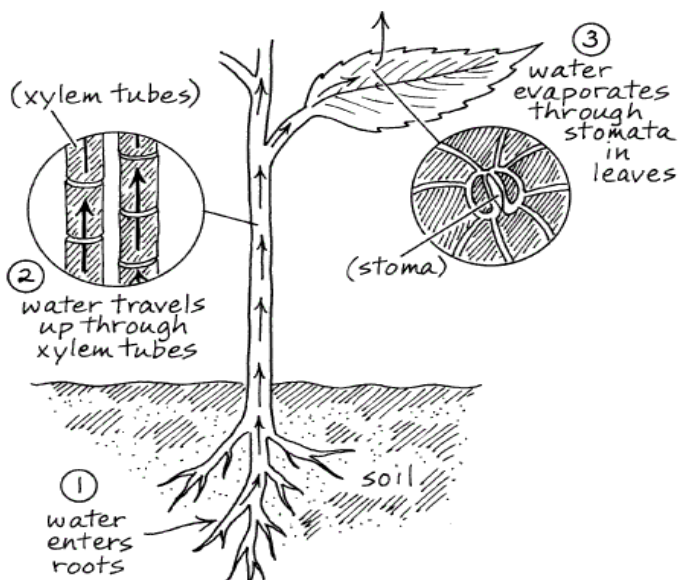
Question 7:

Animal	Type of Nitrogenous waste	Availability of water	Benefit	Cost
Freshwater fish				
Dog				
Desert lizard				

Water movement in plants: STOMATAL FUNCTION



Transpiration Process



Understand the ways in which infection, transmission and spread of disease occur in vector-borne diseases.

Part Two

- Infectious Disease
- Zoonoses
- Bacteria
- Fungi
- Protists
- Viruses
- Spread of disease
- Management Strategies



Flying insects.

What do you know? Questions.

Q11.

Q12. Complete this table:

Disease	Type of organism causing the disease	Type of organism affected by the disease
Tuberculosis		
Crown Gall		
Chytridiomycosis		
Phytophthora dieback		
Influenza		
Malaria		

Malaria

Q13.

Q14.

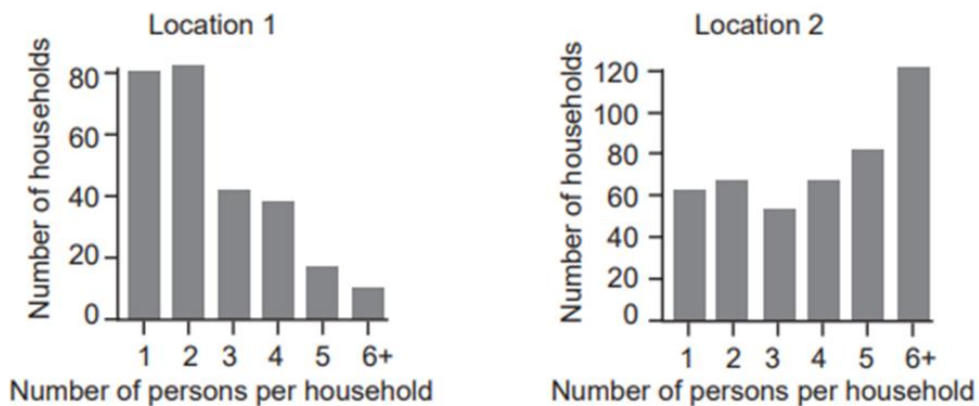
Q15a.

Q15d.

Q15e.

Influenza- common flu

Q16. A group of biologists developed a model for predicting the spread of influenza in human populations. As a part of this, they collected data on the number of individuals per household in two locations, which are shown in the figure below.



16a. **Compare** the number of people per household in the two locations. **Use data** from the figure to support your answer. (4 marks)

(b) **Explain why** data on the number of people per household are relevant to the development of a model for predicting the spread of influenza in human populations. (4 marks)

(c) Can influenza be treated with antibiotics? Explain why or why not. (4 marks)

Q22.

Congratulations! You have now completed your revision booklet!

Edith Cowan University would like to wish all students the best of luck with their future exams!

