



## Year 11 Biology Secondary Source Investigation Task 1 2024

<b>TOPIC:</b> Module 1 – Cells as the Basis of Life	<b>MARKS:</b> / 40
<b>SUBMISSION REQUIREMENTS:</b> Due Week 7, Thursday 15th March 2024.	<b>WEIGHTING:</b> 30 %
<b>OUTCOMES TO BE ASSESSED:</b>  <b>BIO11 – 2</b> designs and evaluates investigations in order to obtain primary and secondary data and information <b>BIO11 – 4</b> selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media <b>BIO11 – 5</b> analyses and evaluates primary and secondary data and information <b>BIO11 - 8</b> describes single cells as the basis for all life by analysing and explaining cells' ultrastructure and biochemical processes	
<b>DIRECTIONAL VERBS:</b> <b>Analyse</b> Identify components and the relationship between them; draw out and relate implications <b>Evaluate</b> Make a judgement based on criteria; determine the value of <b>Design</b> produce a plan, simulation, model or similar; plan, form or conceive in the mind <b>Describe</b> Provide characteristics and features	

### TASK DESCRIPTION:

#### Cell Membrane Model and Report Task Description

Cells are the basis of life. They coordinate activities to form colonial and multicellular organisms. In this task students will examine the structure and function of organisms at both the cellular and tissue levels in order to describe how they facilitate the efficient provision and removal of materials to and from all cells in organisms.

#### Task Outline

\*Note: All parts are due on the same day\*

##### Part A

- Students will define terms as they relate to the cell membrane.
- Students will submit **Part A** via CANVAS by the due date.

##### Part B

- Students will construct a physical (not computer-generated, hand drawn or simulated) 3D model to demonstrate the Fluid-Mosaic model of the structure of the cell membrane.
- Students will submit **Part B** by the due date, in person.

### Part C

- Students will provide a detailed explanation of the Fluid-Mosaic model, describe the features that make the cell membrane 'fluid' and 'mosaic' and explain how the model constructed represents the concept of the Fluid-Mosaic Model.
- Students will discuss the limitations of the model constructed.
- Students will submit **Part C** via CANVAS by the due date.

### Part D

- Students will use appropriate terminology and in text reference factual information, scientific studies and statistical data.
- Students will prepare a list of references in accordance with the Harvard style of referencing.
- Students will submit **Part D** via CANVAS by the due date.

### **Instructions**

- The written component must be submitted on CANVAS by 11:59pm. The model must be submitted at school by 2:59 pm.
- Ensure your name, class, and teacher is clearly labelled.
- All work submitted must be original and completed individually.  
*(NOTE: Any work deemed to be plagiarised will be treated as a non-serious attempt and dealt an appropriate consequence in accordance with the school and faculty policy)*

### **ASSESSMENT CRITERIA:**

- Students will be assessed in accordance with the allocated mark(s) for each part.
- The marking criteria and feedback will be provided to all students on the return of their assessment task.
- All marking will adhere to the strict marking criteria for each question (see below).
- Students are encouraged to complete regular revision to enhance their knowledge during this assessment, this includes completing CANVAS activities and reviewing available resources, and utilising ATOMI.

# Preliminary Biology – Secondary Source Investigation Marking Guidelines

Outcomes: [Planning Investigations \(BIO11-2\)](#) [Processing Data and Information \(BIO11-4\)](#) [Analysing Data and Information \(BIO11-5\)](#) Knowledge and Understanding (BIO11-8)

	Limited	Basic	Sound	High	Outstanding
Part A - Definitions	<ul style="list-style-type: none"> <li>- Demonstrates elementary knowledge and understanding of cells' ultrastructure and biochemical processes.</li> <li>- Recalls terms as they relate to the cell membrane</li> </ul>	<ul style="list-style-type: none"> <li>- Demonstrates basic knowledge and understanding of cells' ultrastructure and biochemical processes.</li> <li>- Describes terms as they relate to the cell membrane</li> </ul>	<ul style="list-style-type: none"> <li>- Demonstrates sound knowledge and understanding of cells' ultrastructure and biochemical processes.</li> <li>- Explains terms as they relate to the cell membrane</li> </ul>	<ul style="list-style-type: none"> <li>- Demonstrates thorough knowledge and understanding of cells' ultrastructure and biochemical processes.</li> <li>- Explains and discusses terms as they relate to the cell membrane</li> </ul>	<ul style="list-style-type: none"> <li>- Demonstrates extensive knowledge and understanding of cells' ultrastructure and biochemical processes</li> <li>- Explains, discusses and justifies terms as they relate to the cell membrane</li> </ul>
	<i>1 mark</i>	<i>2 marks</i>	<i>3 marks</i>	<i>4 marks</i>	<i>5 marks</i>
Part B - Model	<ul style="list-style-type: none"> <li>- Attempts to construct model using correct materials</li> <li>- Model lacking labels or key</li> <li>- Model attempts to represent the fluid-mosaic model</li> </ul>	<ul style="list-style-type: none"> <li>- Attempts to construct model using correct materials</li> <li>- Basic use of labels or key</li> <li>- Constructed model attempts to represent some elements of the fluid-mosaic model</li> </ul>	<ul style="list-style-type: none"> <li>- Constructed using mostly correct non-biodegradable materials with sound detail</li> <li>- Model no larger than a frisbee in size</li> <li>- Most structures clearly and correctly labelled or a correct key is provided</li> <li>- Constructed model represents most elements of the fluid mosaic model</li> </ul>	<ul style="list-style-type: none"> <li>- Constructed using correct non-biodegradable materials with thorough detail</li> <li>- Model no larger than a frisbee in size</li> <li>- All structures correctly labelled or a correct key provided</li> <li>- Constructed model represents all elements the fluid-mosaic model</li> </ul>	<ul style="list-style-type: none"> <li>- Constructed using correct non-biodegradable materials with extensive detail</li> <li>- Model no larger than a frisbee in size</li> <li>- All structures clearly and correctly labelled or a correct key provided</li> <li>- Constructed model accurately represents the shape and size of all elements of the fluid-mosaic model</li> </ul>
	<i>1 mark</i>	<i>2 – 3 marks</i>	<i>4 marks</i>	<i>5 marks</i>	<i>6 marks</i>

Part C – Planning and Analysing of Model	<ul style="list-style-type: none"> <li>- Completes their secondary source investigation which includes a list of construction ideas and materials used in the model</li> <li>- A simple hand-drawn diagram provided</li> </ul>	<ul style="list-style-type: none"> <li>- Describes a construction plan by using secondary source data and information to provide descriptions of materials used in the model</li> <li>- Hand-drawn diagram provided, with minimal elements labels</li> </ul>	<ul style="list-style-type: none"> <li>- Explains a construction plan by using secondary source data and information to inform evidence-based reasoning on materials used in the model</li> <li>- Hand-drawn diagram provided, with most elements labelled</li> </ul>	<ul style="list-style-type: none"> <li>- Analyses a construction plan by using secondary source data and information to make evidence-based analysis on materials used in the model</li> <li>- Hand-drawn diagram provided, with all elements labelled</li> </ul>	<ul style="list-style-type: none"> <li>- Evaluates a construction plan by using secondary source data and information to make evidence-based analysis and judgements on materials used in the model</li> <li>- Clear and neat hand-drawn diagram provided, with all elements correctly labelled</li> </ul>
	1 – 2 marks	3 – 4 marks	5 – 6 marks	7 – 8 marks	9 – 10 marks
	<ul style="list-style-type: none"> <li>- Requires teacher assistance to analyse and evaluate secondary data and information</li> <li>- Identifies how the model was constructed to represent the concept of the Fluid-Mosaic Model</li> <li>- Identifies minimal limitations of the model constructed</li> </ul>	<ul style="list-style-type: none"> <li>- Processes secondary data, and represents it using scientific formats</li> <li>- Describes how the model was constructed to represent the concept of the Fluid-Mosaic Model</li> <li>- Identifies a few limitations of the model constructed</li> </ul>	<ul style="list-style-type: none"> <li>- Processes secondary data, and represents it using scientific formats</li> <li>- Compares how the model constructed represents the concept of the Fluid-Mosaic Model</li> <li>- Identifies and explains some limitations of the model constructed</li> </ul>	<ul style="list-style-type: none"> <li>- Selects, processes, and interprets accurate, reliable, valid, and relevant secondary data and information and represents it using scientific formats</li> <li>- Compares and contrasts how the model constructed represents the concept of the Fluid-Mosaic Model</li> <li>- Identifies and explains most limitations of the model constructed</li> </ul>	<ul style="list-style-type: none"> <li>- Compares, contrasts and justifies how the model constructed represents the concept of the Fluid-Mosaic Model</li> <li>- Identifies, explains and evaluates all limitations of the model constructed</li> </ul>
	1 – 2 marks	3 – 4 marks	5 – 6 marks	7 – 8 marks	9 – 10 marks
	<ul style="list-style-type: none"> <li>- Provides limited information on the Fluid-Mosaic model, describing few components of the structure and their function.</li> <li>- Identifies the cell membrane as being 'fluid' and 'mosaic'</li> </ul>	<ul style="list-style-type: none"> <li>- Provides some information on the Fluid-Mosaic model, describing some components of the structure and their function.</li> <li>- Identifies the features that make the cell membrane 'fluid' and 'mosaic'</li> </ul>	<ul style="list-style-type: none"> <li>- Provides a description of the Fluid-Mosaic model explaining most components of the structure, their function and their significance.</li> <li>- Identifies and provides a description of the features that make the cell membrane 'fluid' and 'mosaic'</li> </ul>	<ul style="list-style-type: none"> <li>- Provides an analysis of the Fluid-Mosaic model describing all components of the structure, their function and their significance.</li> <li>- Provides descriptions of and discusses the features that make the cell membrane 'fluid' and 'mosaic'</li> </ul>	<ul style="list-style-type: none"> <li>- Provides an evaluation of the Fluid-Mosaic model describing all components of the structure, their function and their significance.</li> <li>- Provides description of and justifies the features that make the cell membrane 'fluid' and 'mosaic'</li> </ul>
	1 – 2 marks	3 – 4 marks	5 marks	6 marks	7 – 8 marks

<b>Part D - Referencing</b>	<ul style="list-style-type: none"> <li>- Requires teacher assistance to process data and information</li> <li>- Limited use of a reference list</li> </ul>	<ul style="list-style-type: none"> <li>- Processes secondary data, and represents it using scientific formats</li> <li>- Provides a reference list attempting to use the appropriate reference style</li> </ul>	<ul style="list-style-type: none"> <li>- Processes secondary data, and represents it using scientific formats</li> <li>- Provides a reference list using the appropriate referencing style that may be limited and/or have minor errors</li> </ul>	<ul style="list-style-type: none"> <li>- Selects, processes, and interprets accurate, reliable, valid, and relevant secondary data and information and represents it using scientific formats</li> <li>- Provides an accurate reference list using the appropriate referencing style some minor errors</li> </ul>	<ul style="list-style-type: none"> <li>- Selects, processes, and interprets accurate, reliable, valid, and relevant secondary data and information and represents it using scientific formats</li> <li>- Provides an accurate reference list using the appropriate referencing style</li> </ul>
	<i>1 mark</i>	<i>2 marks</i>	<i>3 marks</i>	<i>4 marks</i>	<i>5 marks</i>
	<i>Grade</i>	<i>Mark</i>	<i>Percentage</i>	<i>Rank</i>	
Feedback					

# Modelling the Structure and Function of the Cell Membrane

## PART A – Terminology

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Define and/or explain the following terms in relation to the cell membrane.

- *cell membrane*
- *selectively permeable*
- *fluidity*
- *carbohydrate*
- *cholesterol*
- *protein*
- *phospholipid*
- *bilayer*
- *hydrophobic*
- *hydrophilic*
- *glycoprotein*
- *glycolipid*
- *intercellular*
- *extracellular*

## PART B – Model of the Structure

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- This task requires you to construct a **physical 3D model** (*not computer-generated, hand-drawn or simulated*) to demonstrate the Fluid-Mosaic model of the structure of the cell membrane.
  - Filmed animations of physical materials (e.g. stop-motion) are permitted.
  - The model can be constructed using any appropriate non-biodegradable materials of your choice.
  - The model **should not** be larger than a Frisbee in size.
  - The model must not be constructed from any part of a commercially available kit. You may gather ideas and inspiration from other models found in your research, but your work must be individual and not plagiarise the work of others.
- The model should function to explain/demonstrate the Fluid-Mosaic model.
- All parts of the model should be **fully labelled** or an **accompanying key** should be provided.
- Include with the model, your **initial plan** with design ideas and materials to be used in the construction of the model. The initial plan, must include:
  - A **hand-drawn labelled diagram** of the Fluid-Mosaic model of membrane structure. This should demonstrate how you planned your design before building it. You may include a scan or photograph of the original.

## PART C – Report explaining the Fluid-Mosaic Model

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This part of the task should contain the relevant theory behind the cell membrane structure and function, a brief explanation on how your model demonstrates the Fluid-Mosaic model as well as identification of the limitations of the model you have constructed.

Use the attached scaffold to help you structure your report. You may use books and reputable internet sources for your research. You may use sub-headings and bullet points to present your work in an organised manner.

Your report should include:

- a) A detailed **explanation and evaluation of the Fluid-Mosaic model** describing all components of the structure, their function and their significance.
- b) **Describe the features** that make the cell membrane referable to as 'fluid' and 'mosaic'.
- c) **Explain the concept of the Fluid-Mosaic model** in relation to the constructed model, i.e. *identify* each component of your model and how they represent each part of the cell membrane structure and function.
- d) **Explain the limitations** of the model you constructed, i.e. where/how it fails to accurately represent any part of the structure and function, where it simplifies or omits any detail.

## PART D – Reference List

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Whenever you include a fact or piece of information in your Secondary Source Investigation you must also include where you found that piece of information. The bibliography is a list of all the sources you used to generate your ideas; this means you must include any resources that you referred to or read about on the topic.

Supply a Reference List of the sources you used using the Harvard style format of referencing.

### What is Harvard Referencing?

The Harvard referencing style is also known as the "author date" system because you must cite both the author and publication date. The prominence of the author and date of publication in a reference list provides a clear indication of the credibility and currency of the resources used in your research. There is no definitive version of Harvard available.

The basics of a Reference List entry for a Web page or Web document:

- Author or authors. The surname is followed by first initials.
- Year.
- Title (in italics).
- Publisher. Where there is a corporate author, the publisher and author may be the same.
- Date viewed.
- Web address <in angled brackets>.

### Example:

Cancer Council 2017, *Causes of cancer*, Cancer Council, viewed 21 May 2018, <<https://www.cancer.org.au/about-cancer/causes-of-cancer/>>



This website generates references for you: <https://www.citethisforme.com/harvard/source-type>

## PART C SCAFFOLD - Report explaining the Fluid-Mosaic Model

Use this scaffold to help structure your report for Part C.

<b>Name and Define:</b> <i>Each area of content</i>	<b>Describe:</b> <i>Features/Characteristics</i>	<b>Explain Significance:</b> <i>What is the function of each area or feature?                      What problem is it addressing?</i>	<b>Analyse:</b> <i>How/Why each area achieves its purpose/function</i>	<b>Critically Analyse:</b> <i>How/Why each area or feature is + and/or – in relation to criteria</i>	<b>Evaluate:</b> <i>To what extent is each area/feature effective?</i>
<b>The Cell Membrane</b>					
What is the cell membrane?	What is its function?	Why is this function important?			
<b>The Fluid Mosaic Model</b>					
What is the Fluid Mosaic model?	What are the individual features/components of the model? Include what features make the cell membrane referable to as “fluid” and “mosaic”.	Why are these features/components needed? (i.e. what are their significance?)	How do these features/components achieve their purpose? (i.e. how do they function?)	How do these features/components of the cell membrane work together to achieve its overall function?	Evaluate the use of the Fluid Mosaic model in explaining how the cell membrane functions. (i.e. how effective is the model in explaining how the cell membrane works?)
<b>The Constructed Model</b>					
Identify each component of your model.	What components are used to represent each part of the cell membrane?	How does each component represent each part of the cell membranes structure and function?	Why did you choose those particular materials to model that component?	How well does the model you constructed accurately represent any part of the structure and function of the cell membrane? What are the limitations of your model?	How significant are the limitations of your model in representing the structure and function of the cell membrane?