

Year 12 - 2024

Biology Lawrence



Task Number: 1

Notification Date: Monday 06/11/2023

Weight: 40%

Due Date: By 3.20pm Friday 15/12/2023 Week 10 Term 4

Depth Study: DNA and Polypeptide Synthesis

OUTCOMES ASSESSED

BIO12-1 develops and evaluates questions and hypotheses for scientific investigation

BIO12-4 selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media

BIO12-5 analyses and evaluates primary and secondary data and information

BIO12-6 solves scientific problems using primary and secondary data, critical thinking skills and scientific processes

BIO12-7 communicates scientific understanding using suitable language and terminology for a specific audience or purpose

BIO12-12 explains the structures of DNA and analyses the mechanisms of inheritance and how processes of reproduction ensure continuity of species

TASK DESCRIPTION

DEPTH STUDY: DNA and Polypeptide Synthesis

Working Scientifically Skills Content:

- develop and evaluate inquiry questions and hypotheses to identify a concept that can be investigated scientifically, involving primary and secondary data
- select qualitative and quantitative data and information and represent them using a range of formats, digital technologies and appropriate media
- derive trends, patterns and relationships in data and information
- use modelling (including mathematical examples) to explain phenomena, make predictions and solve problems using evidence from primary and secondary sources
- select and use suitable forms of digital, visual, written and/or oral communication 🗨️ 📄

Key Content:

- model the processes involved in cell replication, including but not limited to:
 - mitosis and meiosis 🧬 📄
 - DNA replication using the Watson and Crick DNA model, including nucleotide composition, pairing and bonding
- assess the effect of the cell replication processes on the continuity of species
- construct appropriate representations to model and compare the forms in which DNA exists in eukaryotes and prokaryotes 📄
- model the process of polypeptide synthesis, including:
 - transcription and translation
 - assessing the importance of mRNA and tRNA in transcription and translation
 - analysing the function and importance of polypeptide synthesis
 - assessing how genes and environment affect phenotypic expression 🧬 🗨️

Your task is to create a series of small models and accompanying report on DNA Replication and Polypeptide Synthesis

The models and report need to:

- Develop inquiry questions for researching each of the key content points listed above.
- Utilise a range of information sources to support your research, including tables, graphs and diagrams, acknowledged through in text citations, Harvard referencing
- Analyse your research to identify trends, patterns and relationships between DNA replication and polypeptide synthesis
- Develop models to support your explanations within your report
- Predict problems that may arise from errors in DNA Replication and Polypeptide synthesis, including impact on individuals and continuity of the species.
- Assess how genes and environment affect phenotypic expression

Refer to the marking criteria supplied to guide your report writing.

TASK INSTRUCTIONS

This depth study will have 15hours of class time during Weeks 5-7 allocated to its completion.

Additional at-home research may also be required

Include in the presentation of your assessment task:

- A report paper and supporting mini model series, including in text citations
- A separate reference list according to Harvard guidelines

Teacher's signature: _____

Mrs A Lawrence



HT Admin signature: _____


Ms M Eagles

Deputy Principal's signature: _____

Mrs A Lawrence

OUTCOMES	MARKING CRITERIA				
	Marks				
	0	1-3	4-6	7-8	9-10
<p>Questioning and Predicting 12 -1</p> <p><i>A student develops and evaluates questions and hypotheses for scientific investigation</i></p>	<p>No attempt made</p> <p>OR</p> <p>Non-Serious attempt made</p>	<p>Attempts to develop inquiry questions by clearly identifying that some concepts can be investigated scientifically</p> <p>OR</p> <p>Attempts to develop inquiry questions by clearly identifying that some concepts can be investigated scientifically</p>	<p>Develops inquiry questions and hypotheses by identifying concepts that can be investigated scientifically</p>	<p>Develops inquiry questions and evaluates their relevance and whether they can be investigated scientifically.</p> <p>Recognises that new evidence may require a modification of investigations.</p>	<p>Develops and evaluates inquiry questions and hypotheses by identifying concepts that can be investigated scientifically.</p> <p>Uses new evidence to modify investigations.</p>
<p>12-4</p> <p>A student selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media</p>	<p>No attempt made</p> <p>OR</p> <p>Non-Serious attempt made</p>	<p>select qualitative data and information and represent them in a written format</p>	<p>select qualitative or quantitative data and information and represent them using a range of formats</p>	<p>select qualitative and quantitative data and information and represent them using a range of formats</p>	<p>select qualitative and quantitative data and information and represent them using a range of formats</p> <p>Processes findings to present them as tables or graphs</p>
<p>Analysing data and information 12-5</p> <p><i>A student analyses and evaluates primary and secondary data and information</i></p>	<p>No attempt made</p> <p>OR</p> <p>Non-Serious attempt made</p>	<p>Analyses data to identify trends and relationships.</p> <p>Identifies that data has some limitations</p> <p>OR</p> <p>Identifies trends in data.</p> <p>Identifies that data has some limitations</p> <p>Acknowledges information sources</p>	<p>Analyses data to identify trends and relationships.</p> <p>Identifies sources of error, uncertainty and limitations in data.</p> <p>Assesses the relevance, accuracy, validity and reliability of data.</p> <p>Acknowledges information sources</p>	<p>Analyses data sets to identify causal and correlational relationships, patterns and trends.</p> <p>Assesses data sources thoroughly and suggest improvements to data.</p> <p>Acknowledges information sources using Harvard referencing</p>	<p>Thoroughly analyses a wide range of data sets and information.</p> <p>Assesses data sources thoroughly and suggest methods to improve data that were not possible to achieve by the student.</p> <p>Acknowledges information sources using Harvard referencing and in text citation</p>

<p>Problem solving 12-6 <i>A student solves scientific problems using primary and secondary data, critical thinking skills and scientific processes</i></p>	<p>No attempt made OR Non-Serious attempt made</p>	<p>Describes trends, patterns and draws some conclusions OR Recounts conclusions</p>	<p>Explains trends, patterns and relationships to draw scientific conclusions</p>	<p>Uses critical thinking skills to explain trends, patterns and relationships to draw scientific conclusions</p>	<p>Uses critical thinking skills to evaluate trends, patterns and relationships to draw evidence-based scientific conclusions</p>
<p>Communicating 12-7 <i>A student communicates scientific understanding using suitable language and terminology for a specific audience or purpose.</i></p>	<p>No attempt made OR Non-Serious attempt made</p>	<p>Communicates scientific understanding in at least two different modes. OR Attempts to communicate scientific understanding in limited range of modes. (One of digital, visual, written and oral forms)</p>	<p>Communicates scientific understanding using suitable language and terminology in a range of modes.</p>	<p>Communicates scientific understanding effectively and is able to construct evidence-based arguments</p>	<p>Communicates scientific understanding effectively and is able to construct evidence-based arguments to evaluate conclusions</p>
<p>Knowledge and Understanding 12-12 model the processes involved in cell replication, including but not limited to: – mitosis and meiosis   – DNA replication using the Watson and Crick DNA model, including nucleotide composition, pairing and bonding</p>	<p>No attempt made OR Non-Serious attempt made</p>	<p>Identifies -trend/pattern in their data - identifies the process of mitosis in soma cell division - identifies the process of meiosis in gamete cell division - provides a basic diagram of Mitosis and Meiosis - provides a basic diagram of the Watson-Crick model of DNA showing double helix structure</p>	<p>Outlines/describes some of the following: - basic model of mitosis in soma cell division to produce diploid daughter cells - basic model of the process of meiosis in gamete cell division to produce haploid daughter cells - diagram of the Watson-Crick model of DNA showing nucleotide composition and pairing</p>	<p>Discusses some of the following in detail: - explanation of the process and models mitosis in soma cell division to produce diploid daughter cells - explanation of the process and models the process of meiosis in gamete cell division to produce haploid daughter cells - basic summary to compare Mitosis and Meiosis - diagram of the Watson-Crick model of DNA showing nucleotide composition, pairing and bonding</p>	<p>Discusses in detail: - explanation of the process and models mitosis in soma cell division to produce diploid daughter cells - advantages and disadvantages of mitosis - explanation of the process and models the process of meiosis in gamete cell division to produce haploid daughter cells. - advantages and disadvantages of meiosis - related the roles of Mitosis and Meiosis to the continuity of a species - model of the Watson-Crick model of DNA showing nucleotide composition, pairing and bonding</p>

<p>Knowledge and Understanding</p> <p>12-12</p> <p>assess the effect of the cell replication processes on the continuity of species</p>	<p>No attempt made</p> <p>OR</p> <p>Non-Serious attempt made</p>	<p>Identifies -trend/pattern in their data</p> <ul style="list-style-type: none"> - cell cycle through a diagram - defines continuity of species 	<p>Outlines/describes some of the following:</p> <ul style="list-style-type: none"> - provides a brief summary of cell cycle - the effect of the cell replication processes on the continuity of species - an example of a situation where cell replication deviates from the usual pattern 	<p>Discusses some of the following in detail:</p> <ul style="list-style-type: none"> - cell cycle process - the effect of the cell replication processes on the continuity of species - an example of a situation where cell replication deviates from the usual pattern 	<p>Discusses in detail:</p> <ul style="list-style-type: none"> - cell cycle in regulating cell replication - assess the effect of the cell replication processes on the continuity of species - justifies importance through several examples of situations where cell replication deviates from the usual pattern
<p>Knowledge and Understanding</p> <p>12-12</p> <p>construct appropriate representations to model and compare the forms in which DNA exists in eukaryotes and prokaryotes</p>	<p>No attempt made</p> <p>OR</p> <p>Non-Serious attempt made</p>	<p>Identifies -trend/pattern in their data</p> <ul style="list-style-type: none"> - provides diagrams of forms of DNA - defines eukaryotes and prokaryotes 	<p>Outlines/describes some of the following:</p> <ul style="list-style-type: none"> - provides diagrams of forms of DNA - compare the forms in which DNA exists in eukaryotes or prokaryotes - provide tabulated data on DNA in Prokaryotes and Eukaryotes 	<p>Discusses some of the following in detail:</p> <ul style="list-style-type: none"> - construct basic models of forms of DNA - compare the forms in which DNA exists in eukaryotes and prokaryotes - provide tabulated data on DNA in Prokaryotes and Eukaryotes 	<p>Discusses in detail:</p> <ul style="list-style-type: none"> - construct detailed models of forms of DNA - compare and contrast the forms in which DNA exists in eukaryotes and prokaryotes - provide tabulated data on DNA replication in Prokaryotes and Eukaryotes
<p>Knowledge and Understanding</p> <p>12-12</p> <p>model the process of polypeptide synthesis:</p> <ul style="list-style-type: none"> - transcription and translation - assessing the importance of mRNA and tRNA in transcription and translation - analysing the function and importance of polypeptide synthesis - assessing how genes and environment affect phenotypic expression  	<p>No attempt made</p> <p>OR</p> <p>Non-Serious attempt made</p>	<p>Identifies -trend/pattern in their data</p> <ul style="list-style-type: none"> - provides a diagram of polypeptide synthesis - identifies mRNA or tRNA - defines polypeptide synthesis - identifies a phenotype example 	<p>Outlines/describes some of the following:</p> <ul style="list-style-type: none"> - provides a diagram of polypeptide synthesis, transcription and translation - identifies features of mRNA and tRNA - defines polypeptide synthesis and why it is important - how genes or the environment affect phenotypic expression 	<p>Discusses some of the following in detail:</p> <ul style="list-style-type: none"> - model the process of polypeptide synthesis - compares mRNA and tRNA - importance of polypeptide synthesis - how genes and environment affect phenotypic expression with an example 	<p>Discusses in detail:</p> <ul style="list-style-type: none"> - model the process of polypeptide synthesis, transcription and translation - assess the importance of mRNA and tRNA in transcription and translation - analyse the function and importance of polypeptide synthesis - assess how genes and environment affect phenotypic expression with examples

TEACHER COMMENTS

Teacher Signature: _____

Date: _____

Task Total

Task Rank

Cumulative Rank

