**SKILLS AND APPLICATIONS TASK**

**SUMMATIVE ASSESSMENT TASK**

**TOPIC 1: CELLS AND MICROORGANISMS TEST**

**Purpose and Background Information of the Assessment Task: To have the opportunity to show your in-depth knowledge and understanding of the concepts taught in Topic 1: Cells and Microorganisms**

 **TASK DESCRIPTION:**

**The test will be conducted under supervision.**

**Time: 60 minutes + 5 mins reading time**

**The test will contain the following questions:**

**Part A: Multiple Choice Questions**

**Part B: Short Answer Questions including Science as an Inquiry**

**Part C: Paragraph answer question**

**The amount of space is an indicator on how much you should write.**

**Use of appropriate Biological Terminology will be assessed.**

**You may use a calculator.**

**Performance Standard:**

|  |  |  |
| --- | --- | --- |
|  | Investigation, Analysis and Evaluation | Knowledge and Application |
| A | Critically deconstructs a problem and designs a logical and coherent biological investigation with detailed justification.Obtains, records, and represents data, using appropriate conventions and formats accurately and highly effectively.Systematically analyses and interprets data and evidence to formulate logical conclusions with detailed justification.Critically and logically evaluates procedures and their effect on data. | Demonstrates deep and broad knowledge and understanding of a range of biological concepts.Applies biological concepts highly effectively in new and familiar contexts.Critically explores and understands in depth the interaction between science and society.Communicates knowledge and understanding of biology coherently, with highly effective use of appropriate terms, conventions, and representations. |
| B | Logically deconstructs a problem and designs a well-considered and clear biological investigation with reasonable justification.Obtains, records, and represents data, using appropriate conventions and formats mostly accurately and effectively.Logically analyses and interprets data and evidence to formulate suitable conclusions with reasonable justification.Logically evaluates procedures and their effect on data. | Demonstrates some depth and breadth of knowledge and understanding of a range of biological concepts.Applies biological concepts mostly effectively in new and familiar contexts.Logically explores and understands in some depth the interaction between science and society.Communicates knowledge and understanding of biology mostly coherently, with effective use of appropriate terms, conventions, and representations. |
| C | Deconstructs a problem and designs a considered and generally clear biological investigation with some justification.Obtains, records, and represents data, using generally appropriate conventions and formats, with some errors but generally accurately and effectively.Undertakes some analysis and interpretation of data and evidence to formulate generally appropriate conclusions with some justification.Evaluates procedures and some of their effect on data. | Demonstrates knowledge and understanding of a general range of biological concepts.Applies biological concepts generally effectively in new or familiar contexts.Explores and understands aspects of the interaction between science and society.Communicates knowledge and understanding of biology generally effectively, using some appropriate terms, conventions, and representations. |
| D | Prepares a basic deconstruction of a problem and an outline of a biological investigation.Obtains, records, and represents data, using conventions and formats inconsistently, with occasional accuracy and effectiveness.Describes data and undertakes some basic interpretation to formulate a basic conclusion.Attempts to evaluate procedures or suggest an effect on data. | Demonstrates some basic knowledge and partial understanding of biological concepts.Applies some biological concepts in familiar contexts.Partially explores and recognises aspects of the interaction between science and society.Communicates basic biological information, using some appropriate terms, conventions, and/or representations. |
| E | Attempts a simple deconstruction of a problem and a procedure for a biological investigation.Attempts to record and represent some data, with limited accuracy or effectiveness.Attempts to describe results and/or interpret data to formulate a basic conclusion.Acknowledges that procedures affect data. | Demonstrates limited recognition and awareness of biological concepts.Attempts to apply biological concepts in familiar contexts.Attempts to explore and identify an aspect of the interaction between science and society.Attempts to communicate information about biology. |

**Part A: Multiple Choice Questions. Put the correct letter corresponding to each question in the answer box provided at the end of the section.**

1. Osmosis

J. occurs more rapidly when the difference in the concentration between two areas is greater.

K. only occurs when an input of energy has occurred.

L. occurs more rapidly at lower temperatures than at higher temperatures.

M. refers to the movement of water molecules.

2. Which one of the following statements is ***correct***?

J. Prokaryotic cells do not possess a cell membrane whereas eukaryotic cells have both a cell membrane and nuclear membrane

K. Eukaryotic cells contain internal membranes whereas prokaryotic cells do not.

L. Prokaryotic cells contain internal membranes whereas eukaryotic cells do not.

M. Prokaryotic cells possess both a cell membrane and nuclear membrane whereas eukaryotic cells have neither.

3. The function of the ribosome is

J. the site of the later stages of aerobic respiration.

K. the control centre of the cell.

L. the site of photosynthesis.

M. the site of protein synthesis.

4. When an animal cell is placed in a solution of a lower salt concentration, the cell

J. shrinks because water diffuses out of the cell.

K. stays the same size because the cell wall prevents any decrease in size

L. swells and becomes turgid because water diffuses into the cell

M. increases in size and bursts as water continues to enter the cell.

5. One of the similarities between lactic acid fermentation and alcoholic fermentation is

J. lactic acid fermentation and alcoholic fermentation do not require oxygen.

K. lactic acid fermentation and alcoholic fermentation requires the addition of carbon dioxide for the reaction to occur.

L. lactic acid fermentation and alcoholic fermentation both produce only one product.

M. lactic acid fermentation and alcoholic fermentation produce non-toxic products.

6. The specificity of an enzyme for its substrate is determined by the

J. temperature at which the enzyme is operating.

K. concentration of the substrate.

L. active site of the substrate molecule.

M. structure of the enzyme molecule.

7. Refer to the following table, which shows the surface area to volume ratio of a spherical cell at two stages of its growth.

|  |  |
| --- | --- |
| Stage of Growth | Surface Area to Volume Ratio |
| W | 3:1 |
| X | 1:1 |

At stage W of its growth, the cell

J. has a smaller mass than at stage X.

K. is less efficient in exchanging materials by diffusion that at stage X.

L. has a larger surface area that at stage X.

M. has a larger volume than at stage X.

8. Which one of the following statements about the cell membrane is correct?

J. Some small molecules move passively between the phospholipid molecules.

K. Cellulose molecules act as receptors on a plant cells membrane surface.

L. Some molecules move passively through the membrane against the concentration gradient.

M. Phospholipid molecules are embedded in two layers of protein molecules.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Question** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| Answer |  |  |  |  |  |  |  |  |

**Part B: Short Answer Questions.**

**Please answer all questions in the space provided.**

11. Label the following cell and answer the questions.

a.



b. Is this a plant or animal cell? Give two reasons for your answer.

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c. State the function of the nucleus in a cell.

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d. Identify two (2) ways in which a plant cell differs from an animal cell.

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1. a.) Strawberries can be prepared and eaten in a number of different ways. Strawberries can be eaten raw, cooked, dried, or frozen. Compare the different methods of preservation by completing the table below.

|  |  |  |
| --- | --- | --- |
| Preservation method | **Explain how** it limits bacterial growth? | Shelf life (long or short)Reason |
| Cooked (Jam) |  |  |
| Dried |  |  |

b.) A group of strawberry pickers were discussing who enjoyed eating dried strawberries or if they preferred frozen strawberries. A question was then posed by one of the strawberry pickers, “Which method of preservation will give the strawberries the longest shelf life?”

To find an answer to this question, deconstruct this question by considering the factors that would need to be considered and design an investigation to determine which method of preservation would provide the longest shelf life for the strawberries. In a different coloured pen or pencil, annotate *three* steps in your design to justify the reason behind that step.

Factors: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Design:

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1. The following diagram summaries the steps of an experiment similar to that carried out by Louis Pasteur, which identified microbes as agents of food spoilage.



Explain, ***with reference*** to this experiment,

1. State 3 variables that must be held constant and explain ***why*** they need to be kept constant

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1. The steps a scientist would need to take to ensure the data obtained is both reliable and accurate

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1. Louis Pasteur was working on why wine turned to vinegar and therefore became spoiled. With a chemical equation, describe the process that must occur for wine to be produced from grape juice.

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1. An experiment was conducted to determine the effect of temperature on bacterial growth, which was measured by counting the number of bacterial colonies on an agar plate.

The following results were obtained, when the experiment was conducted on the same day. The experiment has three trials and an average was calculated.

|  |  |  |
| --- | --- | --- |
| Temperature(0C) | Number of Bacterial Colonies | Average Number of Bacterial Colonies |
| Trial 1 | Trial 2 | Trial 3 |
| 5 | 52 | 98 | 101 | 84 |
| 15 | 192 | 185 | 202 | 193 |
| 21 | 232 | 245 | 231 | 236 |
| 37 | 301 | 291 | 283 |  |
| 45 | 195 | 242 | 215 | 217 |

1. Calculate the Average Number of Bacterial Colonies for the experiment conducted at 370C. Write your answer into the table above.
2. Using the data in the table, *complete* the graph on the following page to show these results.

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1. State the name of the type of reproduction used by bacteria.

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d) Describe the pattern of results seen in the data in the table or graph.

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1. State and justify one conclusion from the data.

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1. Mitosis enables cells to reproduce.
2. Compare the genetic content of the daughter cells produced in mitosis to their parent cell.

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| 1. This diagram represents one phase in mitosis
 | http://www.yvonnebraden.com/Metaphase.gif |

Show in the space provided a representation of the next phase that would follow immediately after the diagram above.

**Part C: Paragraph answer questions**

Microorganisms are important to humans.

Use an example, to discuss, in detail, the role of microorganisms in:

1. the environment

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1. producing something of direct benefit to humans.

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