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Grade 10
Life Sciences Examination
Theory
24 July 2015 – Session 1

Examiner: C Marangoni
Internal Moderators: L Dell, K Winson

Time: 1,5 hours
Marks: 105

NAME: _____

TEACHER: _____

INSTRUCTIONS

- This test consists of 11 pages. Please ensure that you have all the pages.
- Write your name and your teacher's name in the space provided on this page.
- Answer all the questions on the question paper.
- Pay attention to the mark allocation and space provided for the amount of detail required in an answer.
- It is in your own interest to work neatly and to write legibly.

Question	Marks
1	/20
2	/23
3	/19
4	/26
5	/17
Total	/105

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QUESTION 1 [20 marks]

1.1) Place the most correct option in the table below. There is only **ONE** correct option per question. (10)

Question	1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.1.6	1.1.7	1.1.8	1.1.9	1.1.10
Answer										

1.1.1) When the DNA in a cell is uncoiled and spread throughout the nucleus it is called…

(A) chromosomes.

(B) chromatids.

(C) centromeres.

(D) chromatin.

1.1.2) Osmosis involves the movement of…

(A) solutes from a region of high concentration to a region of low concentration.

(B) solutes from a region of low concentration to a region of high concentration.

(C) water molecules from a region of high concentration to a region of low concentration.

(D) water molecules from a region of low concentration to a region of high concentration.

1.1.3) Carbon dioxide moves into the spongy mesophyll tissues of the leaf by…

(A) active transport.

(B) diffusion.

(C) phagocytosis.

(D) osmosis.

1.1.4) During which stage of mitosis do chromatids separate to form two sets of daughter chromosomes?

(A) Telophase

(B) Prophase

(C) Interphase

(D) Anaphase

1.1.5) Cells divide when the…

(A) ratio of the cell membrane in relation to the cytoplasm is small.

(B) ratio of the cell membrane in relation to the cytoplasm is large.

(C) ratio of the cell membrane in relation to the cytoplasm is equal.

(D) cell wants to irrespective of the ratios

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1.1.6) The cell membrane of plant cells is made up of the following organic compounds:

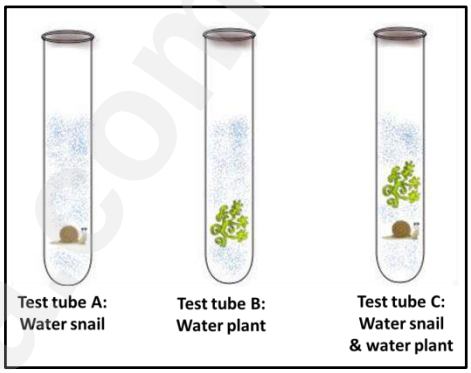
(A) Proteins, lipids

(B) Proteins, lipids, lignin

(C) Proteins, lipids, cellulose

(D) Proteins, lipids, starch

1.1.7) Three test tubes are filled with water and living organisms, as illustrated below. The test tubes are placed in the dark for 6 hours. In which test tube will the greatest amount of CO2 accumulate?



(A) Test tube A

(B) Test tube B

(C) Test tube C

(D) It will be the same in all 3 test tubes

1.1.8) Which macronutrient forms part of both the cell membrane and the energy carrier of the cell?

(A) Calcium

(B) Phosphorous

(C) Potassium

(D) Magnesium

1.1.9) Leaves appear green because…

(i) they absorb the green wavelengths of light.

(ii) they reflect the green wavelengths of light.

(iii) they contain chlorophyll.

(iv) they contain carotenoids.

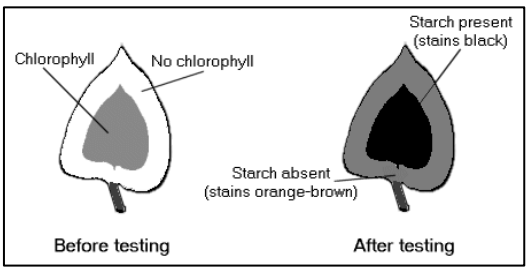
(A) All of the above (i-iv) are true

(B) Only i and iii are true

(C) Only ii and iii are true

(D) Only i and iv are true

1.1.10) The aim of the experiment on the right is:



(A) to show that leaves change colour with starch.

(B) to show that starch is needed for photosynthesis.

(C) to show that light is needed for photosynthesis.

(D) to show that chlorophyll is needed for photosynthesis.

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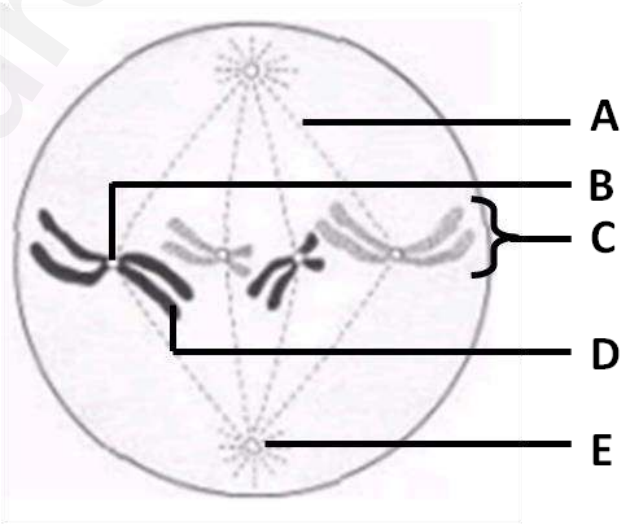
1.2) Link the statement in Column 1 with the correct term from Column 2 (you only need to insert the letter in the answer column). There is **only one correct term per definition**. (10)

Column 1	Answer	Column 2
The colour change when iodine is in the presence of starch.		(A) Cellulose
Thin cytoplasmic threads that reach through the cell wall.		(B) Biuret
The organelle that is responsible for controlling the activities of the cell.		(C) Carbohydrates
Mineral salt required for making amino acids.		(D) Cuticle
The test used to demonstrate the presence of a monosaccharide		(E) Blue-black
Organic substance that contains twice as many hydrogen atoms as oxygen atoms.		(F) Benedict's
The mass of like cells in animal and plant bodies that perform specific functions as they combine to form an organ.		(G) Exhaustion
The splitting of water during the light dependent phase.		(H) Tissues
Waxy layer on the outer surface of epidermal cells in leaves.		(I) Lipids
Respiration in the absence of oxygen.		(J) Plasmodesmata
		(K) Nitrogen
		(L) Lilac
		(M) Fermentation
		(N) Nucleus
		(O) Plasmolysis
		(P) Photolysis

[20 marks]

QUESTION 2 [23 marks]

2.1) Use the diagram below to answer the following questions.



2.1.1) On the diagram, provide labels for structures A, B, C, D and E. (5)

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2.1.2) What is the end product of mitosis? (2)

_____

_____

_____

2.2) Use the micrograph below, showing a stage of mitosis, to answer the following questions.

2.2.1) Is this a plant or animal cell? Give TWO visible reasons for your answer. (3)

_____

_____

_____

2.2.2) What phase of mitosis is captured in the micrograph? Provide a visible reason for your answer. (2)

_____

_____

_____

2.3) Read the following paragraph and answer the questions that follow.

Skin cancer is one of the most common cancers. Most skin cancers are curable, although the most serious form, malignant melanoma, can be fatal if not treated early. Skin cancer is caused when ultraviolet radiation affects the division of cells just below the surface of the skin. Melanin, a dark pigment in the skin, protects the skin. The ozone layer in the atmosphere filters out some of the harmful ultraviolet radiation.

(modified from Pickering, W.R., 2000; Complete Biology; pg. 197)

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2.3.1) What is a cancer cell? (2)

_____

_____

_____

2.3.2) Distinguish between malignant and benign cancer tumours. (2)

_____

_____

_____

_____

2.3.3) Why should we be concerned about the damage to the ozone layer caused by pollutants? (2)

_____

_____

2.3.4) Why are most skin cancers curable? (2)

_____

_____

_____

2.4) Radiotherapy involves killing cancer cells by exposing them to radiation. Different types of radiation have differing degrees of penetration. Below is a table that lists materials and the thickness necessary to stop the three types of radiation.

Radiation type	Material and thickness necessary to stop radiation
Alpha	Paper 20µm
Beta	Aluminium foil 3mm
Gamma	Concrete 2m

2.4.1) Which type of radiation has the greatest penetrating power? (1)

_____

2.4.2) Which type of radiation could be used to treat skin cancer? Explain. (2)

_____

_____

[23 marks]

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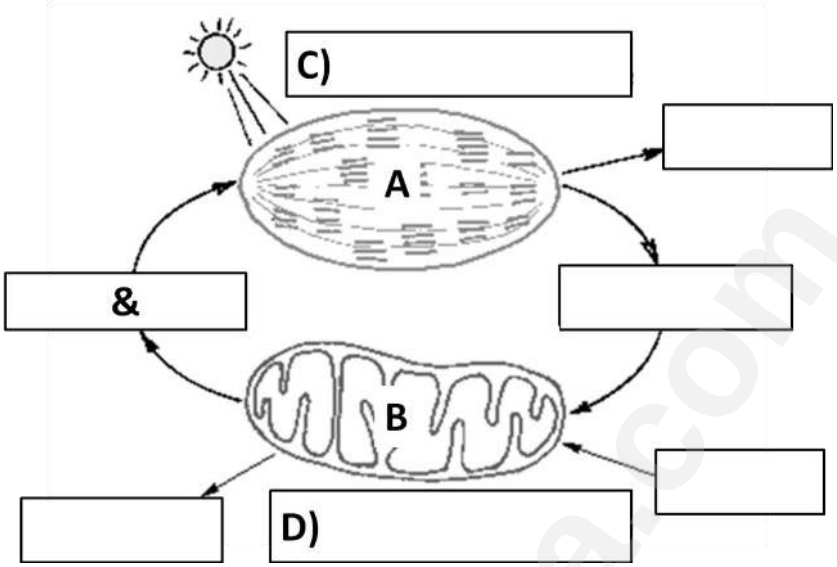
QUESTION 3 [19 marks]

3.1) Examine the diagram below and answer the questions that follow.



3.1.1) Identify organelles A and B. (2)

A:_____ B:_____

3.1.2) On the diagram, write down the biological processes that are happening at **C** and **D**. (2)

3.1.3) On the diagram, fill in the boxes with the correct ingredient(s)/product(s) of these processes. (6)

3.1.4) Correctly label the site where the light dependent phase occurs. (2)

3.1.5) Where does glycolysis occur? Place an X on the diagram to illustrate where this process occurs. (1)

3.1.6) The starch test is used to determine if photosynthesis takes place, even though starch is not a product of photosynthesis. How is this possible? (3)

_____

_____

_____

_____

3.1.7) Which stage of aerobic respiration cannot occur in the absence of oxygen? (1)

_____

3.1.8) What are the products of anaerobic respiration in animals? (2)

_____

[19 marks]

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QUESTION 4 [26 marks]

4.1) From the list below, decide which of the following substances are monomers and polymers. Place the substances in the correct table column. (6)

Glucose **Nucleic acid** **Amino acid** **Sucrose** **Cellulose** **Enzyme**

Monomers	Polymers

4.2) An experiment was conducted by using an enzyme on a specific substrate at different temperatures. The following table shows the results of the experiment:

Temperature (°C)	Enzyme Activity (mg product/time)
10	0,5
20	1,5
30	2,8
40	3,2
50	1,3
60	0,2

4.2.1) Which two factors would need to be kept constant in the experiment? (2)

_____

_____

4.2.2) What conclusion can you draw from these results? (2)

_____

_____

_____

4.2.3) If this enzyme was used in a "biological washing powder", what conditions would you stipulate for it to be effective? (2)

_____

_____

_____

_____

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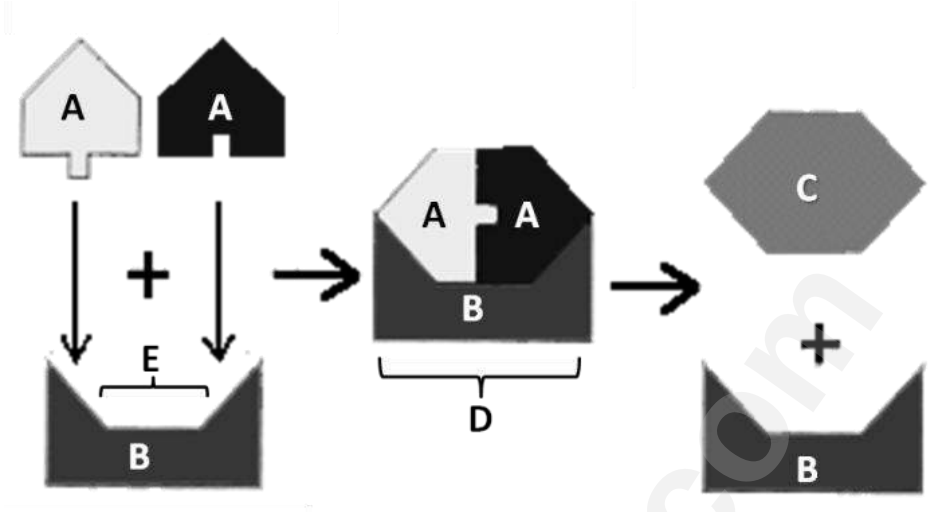
4.3) Examine the following diagram of an enzyme reaction and answer the questions that follow.



4.3.1) Provide labels for structures A, B, C, D and E. (5)

A: _____ **B:** _____

C: _____ **D:** _____

E: _____

4.3.2) Is the above an anabolic or catabolic reaction? (1)

_____

4.3.3) Provide an example of such a reaction that you have studied. (3)

_____

_____

4.3.4) Enzymes can be denatured or inactive. Explain what the difference is between the two terms and the conditions that would result in each condition. Link your answer to the structure of enzymes. (5)

_____

_____

_____

_____

_____

_____

[26 marks]

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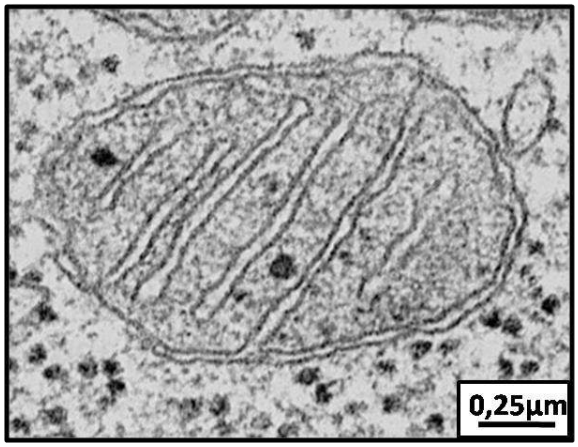
QUESTION 5 [17 marks]

5.1) Draw and fully label the organelle that is present in the electron micrograph below. Your drawing needs to be exactly **DOUBLE** the size of the micrograph. Use the rubric to assist you. (9)



Drawing Mark Rubric	Marks
Heading: below, underlined, detailed	/2
Labels: 3 correct labels, pen used, lowercase, lines in pencil and ruled	/3
Drawing: double size, proportion, accuracy, entire lines, no shading	/4
TOTAL	/9

5.2) Using the scale bar provided on the micrograph, calculate the actual length of the organelle. Show all your working. (3)

_____

_____

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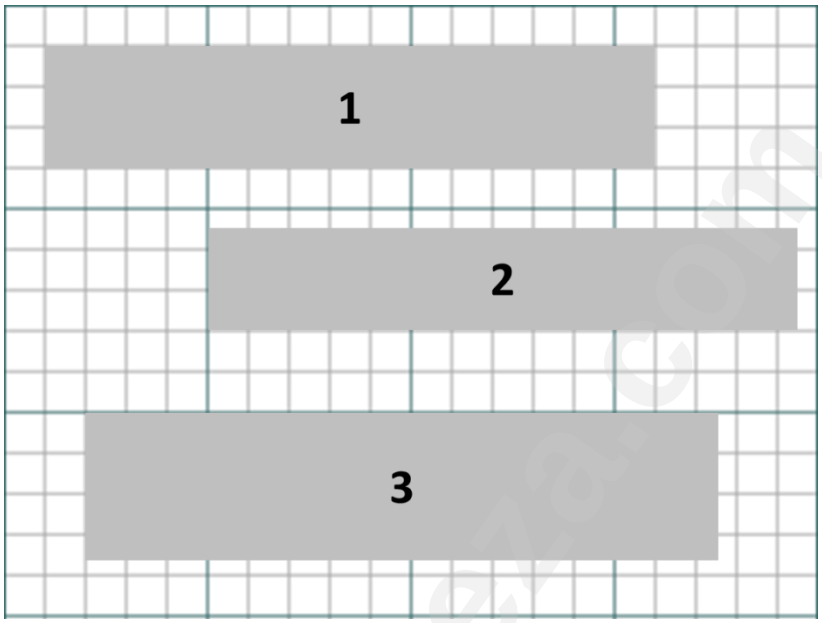
5.3) In an experiment to demonstrate osmosis, pieces of potato were used. Three pieces of potato were cut identically, so that they were each 15cm long and 3cm wide. One piece of potato was then placed in each of the following solutions: pure water, 10% salt solution and a 25% salt solution. After six hours, the pieces of potato were taken out of the solutions and dried. They were then placed on 1cm graph paper to measure their length, as shown below.



Three potato pieces placed on 1cm graph paper (not drawn to scale)

5.3.1) Identify which potato pieces (1 – 3) was placed in each solution. (3)

Pure water: _____

10% salt solution: _____

25% salt solution: _____

5.3.2) What are the dimensions (length and width) of potato piece 1? (2)

Length: _____

Width: _____

[17 marks]
TOTAL = 105 marks

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