



WARNING: This Examination Paper **MUST** be returned with your answer book(s) at the end of the examination: otherwise marks will be lost.

STUDENT NAME 

SCHOOL 

TEACHER 

For Examiner's use only		
Sect.	Q.	Mark
Sect. A		
Sect. B		
Sect. C		
TOTAL		
%		

PRE-LEAVING CERTIFICATE EXAMINATION, 2018

BIOLOGY – HIGHER LEVEL

TIME: 3 HOURS

Section A Answer any **five** questions from this section.
Each question carries 20 marks.
Write your answers in the spaces provided on **this examination paper**.

Section B Answer any **two** questions from this section.
Each question carries 30 marks.
Write your answers in the spaces provided on **this examination paper**.

Section C Answer any **four** questions from this section.
Each question carries 60 marks.
Write your answers in the **answer book**.

Total: 400 marks.

It is recommended that you spend not more than 30 minutes on Section A and 30 minutes on Section B, leaving 120 minutes for Section C.

You must return this examination paper with your answer book at the end of the examination.

Section A
Answer any five questions.
Write your answers in the spaces provided.

1. From your knowledge of ecology, explain what is meant by **each** of the following terms:

(a) Scramble competition. _____

(b) Niche. _____

(c) Edaphic factor. _____

(d) Parasitism. _____

(e) Trophic level. _____

(f) Nutrient recycling. _____

2. (a) Give an example of a trace element in the human diet.

- (b) What name is given to the simplest unit of a carbohydrate?

- (c) Give an example of a structural carbohydrate.

- (d) Name the final product of the digestion of a protein.

- (e) Give an example of a structural protein.

- (f) Give a role for water in the human body other than as a solvent.

- (g) Name a disorder due to a dietary deficiency of a **named** water-soluble vitamin.

Vitamin: _____

Deficiency disorder: _____

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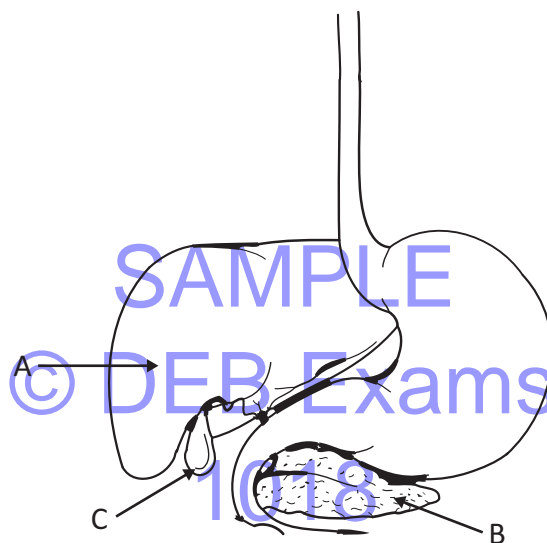
3. (a) Distinguish between *mechanical* and *chemical* digestion.

Mechanical: _____

Chemical: _____

- (b) Name **one** structure in the digestive system, other than the stomach, that is involved in mechanical digestion.

- (c) The diagram shows part of the human alimentary canal and associated structures.



- (i) Name the parts labelled A, B and C.

A _____

B _____

C _____

- (ii) Name the digestive liquid produced by the structure labelled A and stored in the structure labelled C.

- (iii) State **one** digestive function of the liquid referred to in (ii).

- (d) What is *peristalsis*?

4. (a) Distinguish between a *tissue* and an *organ*.

Tissue: _____

Organ: _____

- (b) Give a role of a **named** plant tissue.

Plant tissue: _____

Role: _____

- (c) (i) Explain the term *tissue culture*.

- (ii) State **two** applications of tissue culture.

1. _____

2. _____

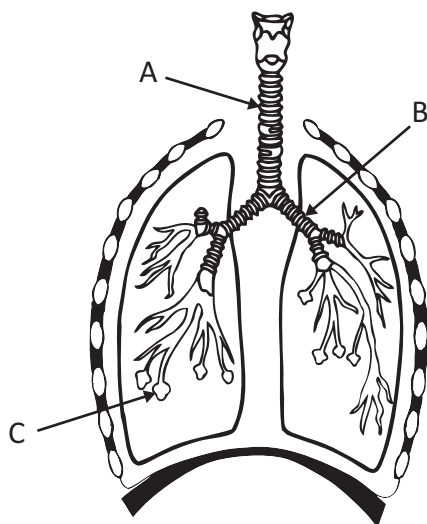
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5. Indicate whether the following statements are true or false by placing a tick (✓) in the appropriate box in **each** case.

- (a) Mitosis always gives rise to the haploid condition.
(b) Meiosis cannot take place in prokaryotic cells.
(c) Single-celled organisms use mitosis for reproduction.
(d) Following telophase in mitosis, plant cells separate by forming a cleavage furrow.
(e) Interphase is a period of non-division in the cell cycle.
(f) During anaphase in mitosis the chromatid pairs separate.
(g) The nuclear membrane remains intact during mitosis.

True	False

6. The diagram shows the human breathing system.



- (a) Name the parts labelled A, B and C.

A _____

B _____

C _____

- (b) What part of the brain is responsible for controlling breathing?

- (c) Give **two** ways in which the named part is adapted for efficient gas exchange.

(i) _____

(ii) _____

- (d) Name the process by which gas exchange occurs.

- (e) In which part does gas exchange take place?

Section B

Answer any two questions.

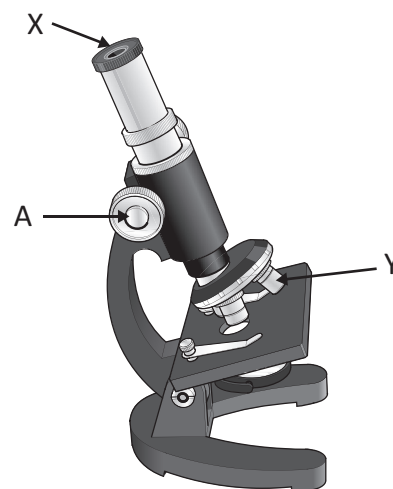
Write your answers in the spaces provided.

Part (a) carries 6 marks and part (b) carries 24 marks in each question in this section.

7. (a) The diagram shows a compound light microscope.

- (i) State the function of the part labelled A.

- (ii) Lens X is marked 10 \times and lens Y is marked 40 \times .
A cell is viewed through lenses X and Y.
The image of the cell is 1.2 mm in diameter.
What is the actual diameter of the cell?



- (b) Answer the following questions in relation to the procedures that you followed in the laboratory when preparing plant cells for examination with a compound light microscope.

- (i) What plant did you use for the purpose of obtaining a cell sample?

- (ii) Describe how you obtained sample cells.

- (iii) Name the stain you applied to the sample.

- (iv) How did you apply the stain to the sample?

- (v) Explain how you placed the cover slip on the sample.

- (vi) Why did you apply the cover slip in the manner explained in part (v) above?

- (vii) Draw a labelled diagram of a plant cell as seen at high power magnification.

8. (a) Yeast is used in the production of ethanol (alcohol) in a process called fermentation.

(i) Name the kingdom to which yeast belongs.

(ii) Yeast is a eukaryotic organism. Explain the underlined term.

(b) Answer the following in relation to an investigation to prepare and show the production of ethanol using yeast.

(i) Draw a labelled diagram of the apparatus that you used.

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(ii) Why did you sterilise all the glassware before the experiment?

(iii) Name the substrate you used in this experiment.

(iv) What product, other than ethanol, was formed during fermentation?

(v) How did you know when the fermentation process was finished?

(vi) How did you test for the presence of ethanol? Describe the result of this test if ethanol is present.

Test: _____

Result: _____

9. (a) (i) What is an *autotroph*?

(ii) State a precise role for carbon dioxide in photosynthesis.

(b) (i) When carrying out food tests, for which purpose did you use the following:

1. Alkaline copper sulfate or biuret solution?

2. Sudan III or brown paper?

(ii) When investigating the influence of light intensity **or** carbon dioxide concentration on the rate of photosynthesis:

1. How did you vary the light intensity **or** carbon dioxide concentration?

2. How did you measure the rate of photosynthesis?

(iii) When investigating the effect of exercise on pulse rate **or** breathing rate:

Explain why pulse rate **or** breathing rate increase with exercise.

(iv) When investigating digestive activity during seed germination:

1. What substrate did you use for the digestive enzymes?

2. How did you ensure that no digestive enzymes were available on the control plate?

Section C
Answer any four questions.
Write your answers in the answer book.

10. (a) (i) Explain the term *evolution*.
(ii) Name either of the scientists associated with the Theory of Natural Selection.

(9)

- (b) Write a short explanatory note on **each** of the following in relation to nucleic acids and protein synthesis. In each case your notes should contain three points. Do not give diagrams in your answers.
- (i) Complementary base pairs.
 - (ii) Transcription.
 - (iii) Translation.

(27)

- (c) The pair of alleles that determine fur colour in domestic cats is sex linked. In female cats the possible genotypes are:
- | | |
|------|---|
| XXGG | producing ginger fur |
| XXBG | producing a mixture of ginger fur and black fur (also called tortoiseshell) |
| XXBB | producing black fur |
- (i) What term is used to describe this inheritance pattern?
Give a reason for your answer.
- (ii) A male cat with ginger fur is crossed with a female cat with tortoiseshell fur.
1. Determine the possible genotypes of their offspring. Show clearly how you obtained your answer.
 2. What percentage of the male offspring will have black fur?
 3. What percentage of the female offspring will have black fur?

(24)

11. (a) (i) Explain the term *food chain*.
- (ii) State a reason why food chains tend to be short in length.
- (iii) From your study of an ecosystem construct a food chain consisting of three or more trophic levels.
- (9)

- (b) As part of your study of ecology you carried out a habitat study in an ecosystem. In the case of this **named** ecosystem answer the following questions.
- (i) Describe how you used a **named** piece of equipment to collect fauna in your ecosystem.
- (ii) Give an account of the procedure you followed for conducting a quantitative study of a **named** plant species.
- (iii) State **two** abiotic factors that may affect the distribution of the plant species referred to in (ii) above in the ecosystem.
- (iv) Suggest a means by which the abiotic factors referred to in (iii) above could be measured.
- (27)

- (c) The world's population was estimated to have reached 7.5 billion in April 2017.
- (i) State **three** factors that influence the size of the human population **and** state the effect of **each** factor on human population numbers.
- (ii) Humans have a vital role to play in the conservation and care of the Earth.
1. Explain the term *conservation*.
 2. Describe **three** benefits of practising conservation.
 3. Outline **one** practice from agriculture **or** fisheries **or** forestry which helps in this conservation role.
- (24)

12. (a) (i) Name the openings in the leaf which allow for gas exchange.
- (ii) Name the equivalent structures found in the stem.
- (iii) State the major factor which controls the opening and closing of the structures referred to in (i) above.

(9)

- (b) (i) Explain the term *respiration*.
- (ii) Name the biochemical pathway common to aerobic and anaerobic respiration.
- (iii) In which part of the cell does the pathway referred to in (ii) above take place?
- (iv) Name the three-carbon compound formed as an intermediate compound in both forms of respiration.
- (v) Describe the events that occur in aerobic respiration following the formation of the three-carbon compound referred to in (iv) above.
- (vi) Anaerobic respiration differs from aerobic respiration during the second stage. What substance is produced from the three-carbon compound referred to in (iv) above when oxygen is not available in muscle?

(27)

- (c) (i) Give the specific site in a plant cell where photosynthesis takes place.
- (ii) During the first stage of photosynthesis, energised electrons enter two pathways known as Pathway 1 and Pathway 2.
1. Where do these energised electrons come from?
 2. Briefly describe the events that take place in Pathway 2.
- (iii) What is the alternative name for the second stage of photosynthesis?
- (iv) Name the simple compound that provides the energy required for the reactions that take place in the second stage of photosynthesis.
- (v) Compounds of the general formula $C_x(H_2O)_y$ are formed during the second stage of photosynthesis.
1. What name is given to the group of compounds described by this general formula?
 2. Name the simple compound from which a plant obtains the H used to make these compounds.

(24)

13. (a) State a role for **each** of the following parts of a flower:

- (i) Anther.
- (ii) Receptacle.
- (iii) Sepal.

(9)

(b) (i) Explain the term *pollination*.

(ii) Describe how pollen grains develop from microspore mother cells.

(iii) Describe the further development of a pollen grain to form two male gametes.

(iv) What happens to the two male gametes during fertilisation?

(v) Following fertilisation what part of the flower becomes the seed?

(27)

(c) (i) Explain the term *dormancy* in relation to seeds.

(ii) Suggest **one** advantage of dormancy to a plant.

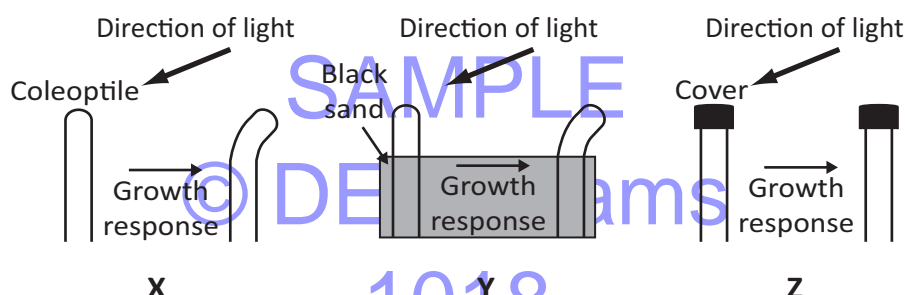
(iii) Mention **two** ways in which knowledge of seed dormancy is advantageous to horticulturists and farmers.

(iv) In your practical work you investigated the factors required in order for a seed to germinate. Outline the investigation you carried out to determine these factors and state the result.

(v) Describe the role in the process of germination of **two** of the factors referred to in part (iv) above.

(24)

- (a) (i) Distinguish between the *central nervous system* and the *peripheral nervous system* by writing a sentence about each.
- (ii) 1. Draw a large labelled diagram of a motor neuron.
2. Use an arrow on or near your diagram to indicate the direction of impulse transmission.
- (iii) Name another type of neuron, other than the motor neuron, **and** state its function.
- (iv) Name a disorder of the nervous system **and** give a possible treatment for it.
- (b) (i) Explain the term *tropism*.
- (ii) 1. What is a *plant growth regulator*?
2. Give **one** commercial use of a plant growth regulator.
- (iii) The diagrams show the results of an investigation into the growth of oat coleoptiles which were illuminated from one side only and set up in three different ways.



- Name the response shown by the bent coleoptiles.
 - Identify the hormone that regulates a plant's growth responses to light.
 - Based on the evidence from the diagrams, give a reason why you could conclude that this hormone is produced by cells at the tip of the coleoptile.
 - Explain how this hormone causes the control coleoptiles shown in X to bend towards the light.
 - Explain how this hormone can bring about apical dominance in plants.
- (c) (i) What is meant by the term *excretion*?
- (ii) The kidney is an organ of excretion in the human body.
Draw a large labelled diagram to show the structure of a vertical section of a human kidney, including its associated blood vessel and its ureter.
- (iii) Indicate with an X on your diagram the region where 1. reabsorption and 2. filtration take place.
- (iv) What term is used to denote the functional unit of the kidney?
- (v) What term is used to denote the dilute solution produced by this functional unit in the early stages of the process of urine formation?
- (vi) 1. Name the hormone which controls urine volume.
2. Where is this hormone produced?
3. Which precise area of the functional unit of the kidney does this hormone target?

- (a) (i) Draw a labelled diagram of the reproductive system of the human male.
 (ii) Name the part of the male reproductive system where **each** of the following occurs:
 1. Meiosis.
 2. Storage and maturing of sperm cells.
 3. Production of seminal fluid.
 (iii) Explain the term *secondary sexual characteristics*.
 (iv) Describe **one** secondary sexual characteristic of the human male.
 (v) One part of the human male reproductive system has both an exocrine and an endocrine function.
 1. What is its exocrine function?
 2. What is its endocrine function?
- (b) (i) Name the **two** circuits that make up the human circulatory system.
 (ii) In which of the circuits referred to in part (i) is blood pumped by the right ventricle of the heart?
 (iii) In **each** of the following cases name an artery **or** vein which fits the description:
 1. Has capillaries at both ends.
 2. Transports blood into the muscle of the heart.
 3. Transports oxygenated blood from the lungs.
 (iv) Explain **each** of the following terms:
 1. Pulse.
 2. Blood pressure.
 (v) Comment on the effect **each** of the following may have on the circulatory system:
 1. Diet.
 2. Exercise.
- (c) (i) Name the substances that help to maintain the shape of the eye **and** give the precise location of **each** in the eye.
 (ii) 1. Name the **two** types of light receptors found in the eye.
 2. In which part of the eye are these light receptors found?
 (iii) What is the *blind spot*?
 (iv) Describe the events that take place in the eye when a person moves from bright light to dim light.

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