STANMORE SECONDARY SCHOOL

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MARKS: 120

DURATION: 2 HOUR

LIFE SCIENCES

CONTROLLED TEST

NOVEMBER 2022

GRADE 11

N.B. This question paper consists of 3 QUESTIONS and 10 PAGES.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Present your answers according to the instructions of each question.
5. ALL drawings must be done in pencil and labelled in blue or black ink.
6. Write neatly and legibly.

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the LETTER (A to D) next to the question number (1.1.1. to 1.1.5.) in the ANSWER BOOK, for example 1.1.6 D.

1.1.1. Energy is released during . . .

A. photosynthesis
B. cellular respiration
C. transpiration
D. digestion

1.1.2. The carbon dioxide is transported in the blood mainly in the form of .

A. urea
B. carboxylic acid
C. bicarbonate ions
D. lactic acid

1.1.3. Which ONE of the following blood vessels carries oxygen from the lungs to the heart?

A. Pulmonary artery
B. Renal artery
C. Hepatic vein
D. Pulmonary vein

1.1.4. An investigation was performed to calculate the number of locusts in a maize field: Fifty locusts were caught in little cages, marked with little dots and then released again. Two weeks later 96 locusts were caught and 8 of them had dots on them.
The estimated number of locusts in the maize field was: $P = \frac{MxC}{R}$

A. 600
B. 16
C. 4
D. 154

1.1.5. The form in which excess glucose is stored as in the body.

A. starch
B. fats
C. proteins
D. glucagon

(5 x 2) **(10)**

1.2 Give the correct biological term for each of the following descriptions. Write only the term next to the question number (1.2.1. – 1.2.5.)

1.2.1. The hormone released by the pancreas that decreases the blood glucose concentration.

1.2.2. The structure in the human respiratory system that closes the larynx when food is swallowed.

1.2.3. The chewing process that breaks food molecules up mechanically.

1.2.4. The type of competition between members of different species.

1.2.5. Measurement of the total amount of carbon dioxide emissions of an individual per year.

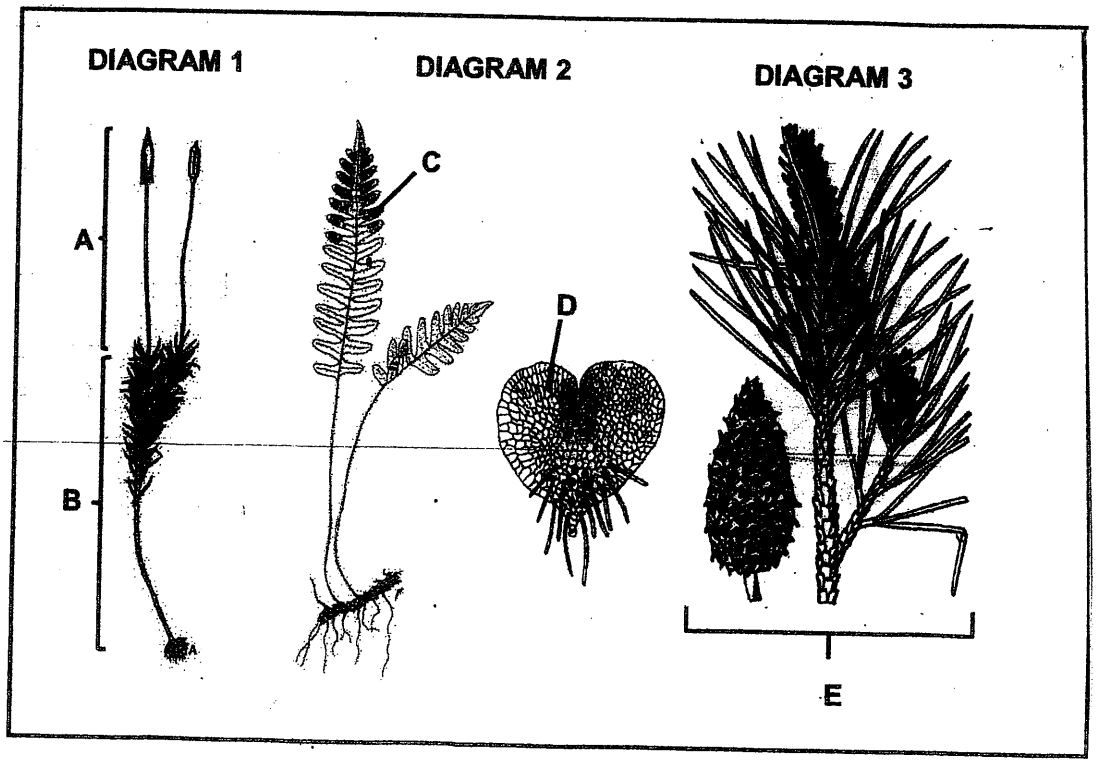
(5 x 1) **(5)**

1.3. Indicate whether each of the descriptions in Column I apples to **A only, B only, both A and B or none** of the items in Column II. Write **A only, B only, both A and B** or **none** next to the question number (1.3.1. to 1.3.3.) in the ANSWER BOOK.

Column I	Column II
1.3.1. Site of cellular respiration	A. Chloroplast B. Mitochondrion
1.3.2. Transport of digested nutrients from the small intestine to the liver.	A. Renal vein B. Hepatic vein
1.3.3. Hormone involved in the reabsorption of water.	A. ADH B. Glucagon.

(3 x 2) **(6)**

1.4. Study the diagrams below.



1.4.1. Name the kingdom to which the above organisms belong. (1)

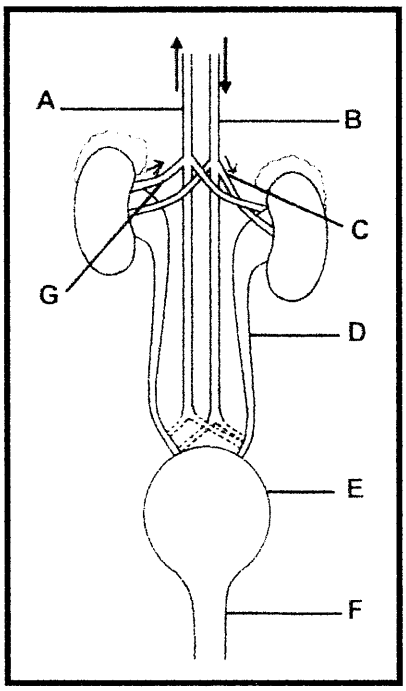
1.4.2. Name the Division/Phylum to which the organism in DIAGRAM 1 belongs. (1)

1.4.3. Give the letters that represent the gametophyte. (2)

1.4.4. Give the DIAGRAM NUMBER of the group that DOES NOT rely on water for reproduction. (2)

1.4.5. Give the DIAGRAM NUMBER of the group that produces seeds. (2)
(8)

1.5. The diagram below represents the human urinary system.



1.5.1. Label parts:
a) **G** (1)
b) **E** (1)
c) **F** (1)

1.5.2. Name that main blood vessel that:

a) Transports deoxygenated blood back to the heart. (1)
b) Is under highest blood pressure. (1)

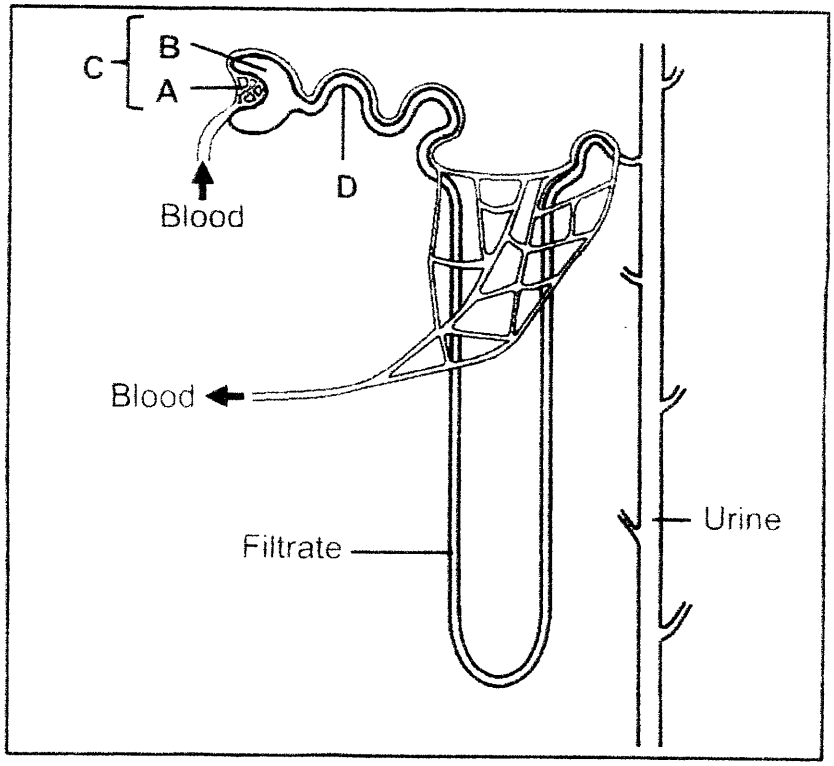
1.5.3. Give the **LETTER** and **NAME** of the :
a) Part that collects and stores urine temporarily. (2)
b) Blood vessel that transports oxygenated blood directly into the kidney. (2)
c) Tube that transports urine from the kidney to part E. (2)
(11)

SECTION A: 40 MARKS

SECTION B

QUESTION 2

2.1 The diagram below represents the structure of a nephron.



2.1.1. Identify the parts labelled:

a) **A** (1)

b) **B** (1)

c) **C** (1)

2.1.2. Name the process that takes place at **C**. (1)

2.1.3. The concentration of various substances in the blood, filtrate and urine are given below.

	SUBSTANCES			
Location	**Urea g/100cm^3**	**Glucose g/100cm^3**	**Proteins g/100cm^3**	**Salts g/100cm^3**
Blood at part **A**	0.03	0.10	8.00	0.72
Filtrate	003	0.10	0.00	0.72
Urine	2.00	0.00	0.00	1.50

Which of the substances shown in the table ....

a) Did not move from the part labelled **A** to **B**? (1)

b) Is present in the filtrate, but is completely reabsorbed at the part **D**? (1)

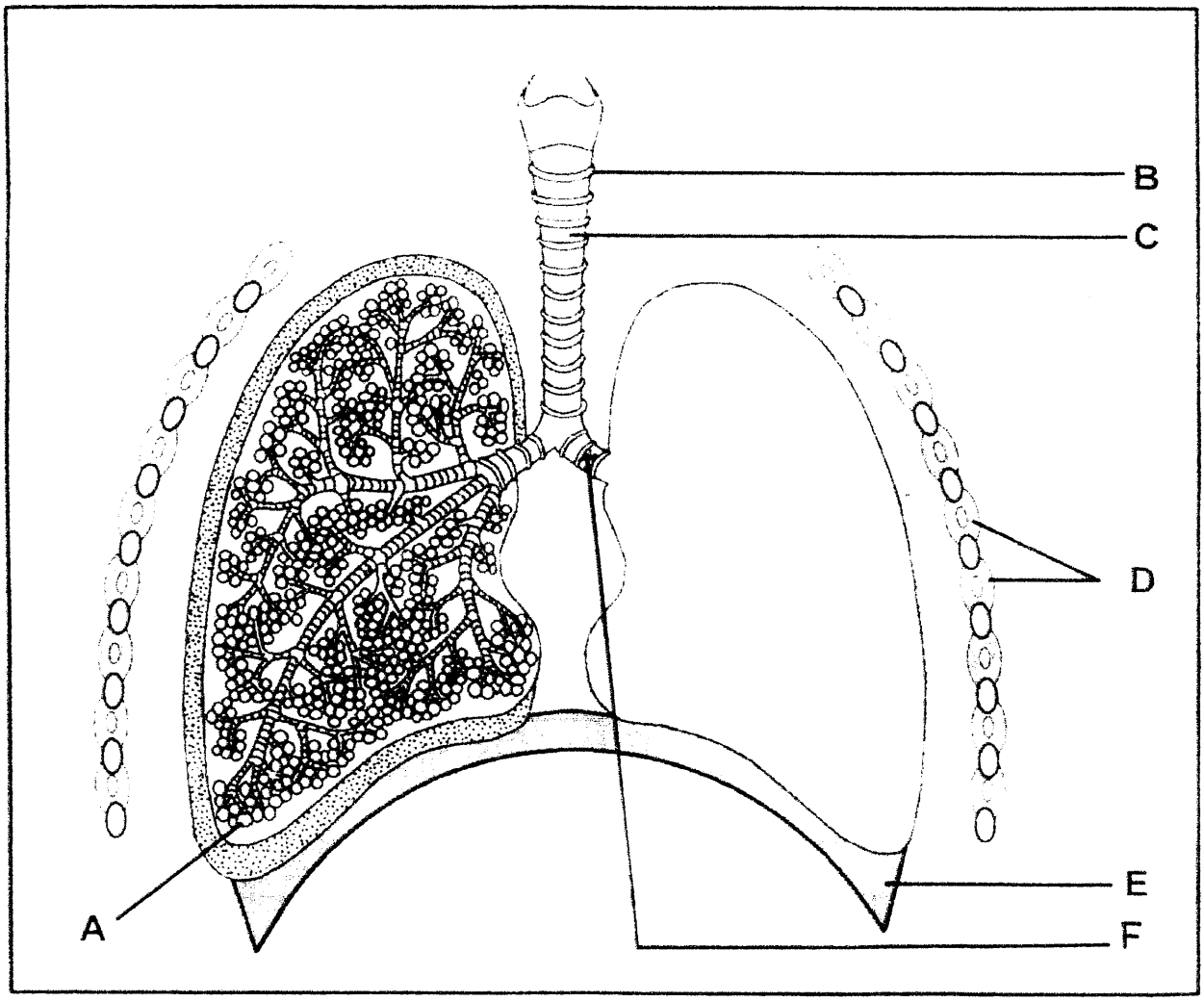
c) Reaches the highest concentration in the urine? (1)

2.1.4. Explain TWO structural adaptations of the part labelled **D**. (4)

2.1.5. List ONE way in which the information in the table would differ if it were applicable to a patient suffering from diabetes mellitus before any treatment was given. (2)

(13)

2. 2 Study the diagram below and answer the questions.



2.2.1 Identify parts:
a) **D** (1)
b) **E** (1)
c) **F** (1)

2.2.2. Name the epithelial tissue that lines the inside of part **C**. (1)

2.2.3. State the function of the part labelled **B**. (1)

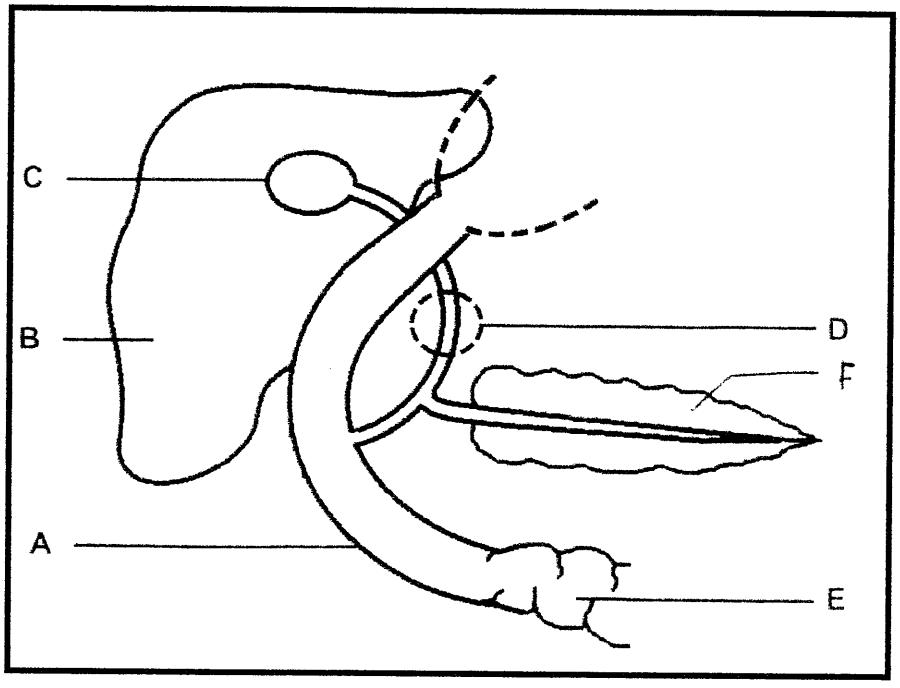
2.2.4. Describe the process of inhalation. (5)

2.2.5. The corona virus, responsible for Covid-19, infects the lower respiratory passages. This causes the accumulation of fluids in the pulmonary tubes and in the parts labelled **A**. Furthermore, the tissues that line part **A** become scarred and thickened. This may lead to the dead of a patient.

a) Name the part labelled **A**. (1)

b) Explain why the infection of lower respiratory pathways leads to possible death. (4)
(15)

2.3. The diagram below represents a certain section of the human alimentary canal (digestive canal).



2.3.1. Identify parts:
a) **A** (1)
b) **C** (1)
c) **F** (1)

2.3.2. State THREE functions of the part labelled **B.** (3)

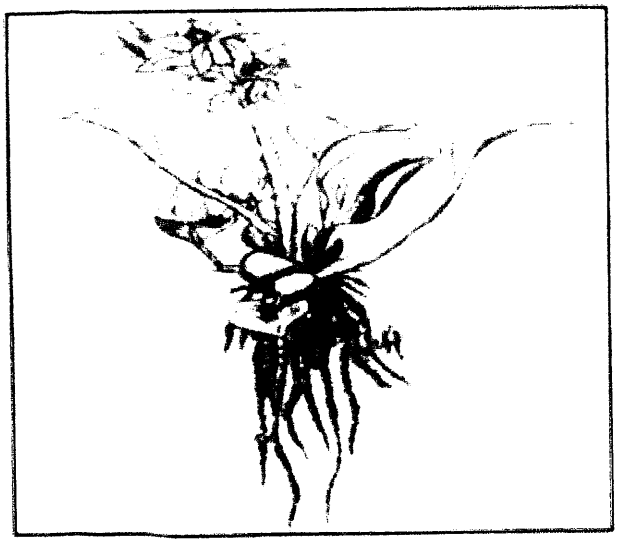
2.3.3. Explain how fat digested would be affected if the duct labelled **D** were blocked. (2)

2.3.4. Explain TWO ways in which the part labelled **E** is structurally suited for the efficient absorption of digested nutrients. (4) **(12)**

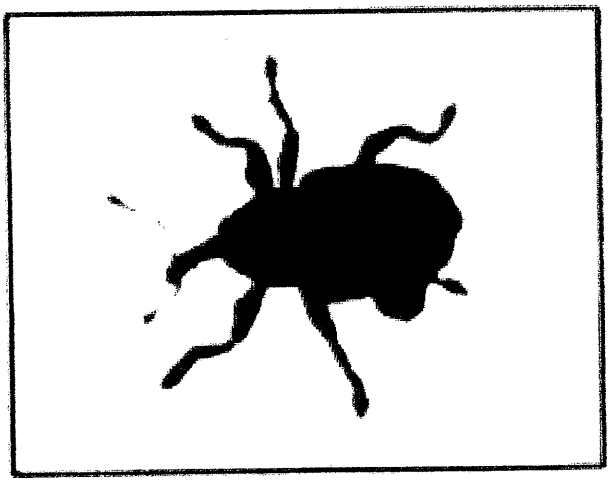
QUESTION 2: 40 MARKS

QUESTION 3

3.1. Read the extract below.



The **Water Hyacinth** is an invasive alien plant that has taken over South African rivers, dams and lakes.
If left uncontrolled, Water Hyacinth grows and forms a thick layer that covers the surface of the water.



The **weevil, Neochetina eichhorniae**.has been very effective in controlling the Water Hyacinth. The weevil feeds on the soft parts of the plant, preventing the plant from reproducing and causing it to break up.

Researchers wanted to determine the optimum number of weevils to release per plant.

- They grew Water Hyacinth in six large water tanks.
- They placed a different number of weevils in each tank.
- They then recorded the number of days it took the weevils to control the Water Hyacinth.

The results are recorded in the table below.

Number of weevils per plants placed in tank	Days taken to control water hyacinth
4	50
8	40
12	30
16	20
20	20
Control (no weevils)	No change in Water Hyacinth

3.1.1. Name the method used when a natural pest is released to control an alien invasive species. (1)

3.1.2. List TWO other ways, besides the method mentioned in QUESTION 3.1.1. to control alien invasive plants. (2)

3.1.3. What would the optimum number of weevils be to introduce per plant? (1)

3.1.4. Explain ONE reason for your answer in QUESTION 3.1.3. (2)

3.1.5. Give ONE way how you would improve the reliability of this investigation. (1)

3.1.6. For the above investigation, give the:

a) Dependent variable (1)

b) Independent variable (1)

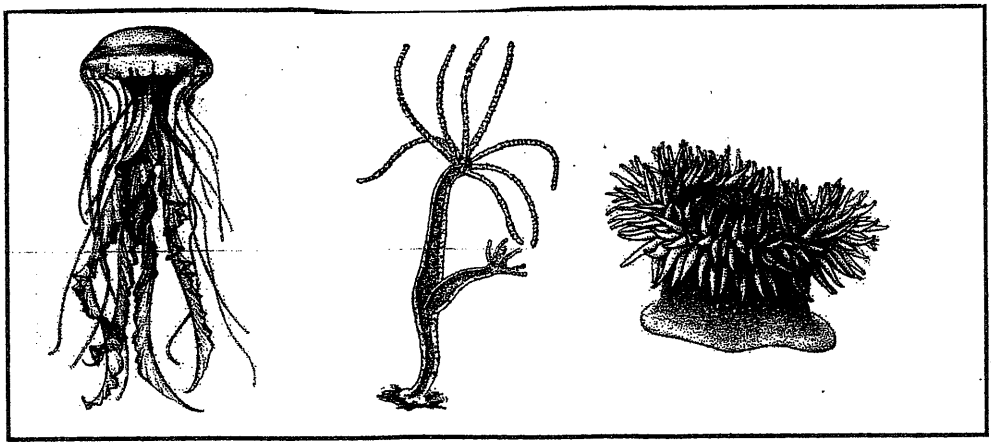
3.1.7. Give TWO factors that need to be controlled to ensure that the investigation is valid. (2)

3.1.8. Explain the negative impact that Water Hyacinth will have for:

a) A farmer (2)

b) A sportsman who enjoys swimming and canoeing. (2)
(15)

3.2 **The diagrams below show animals that belong to the same phylum.**



3.2.1. Name the phylum to which the above organisms belong. (1)

3.2.2. What type of symmetry is shown by members of the phylum above? (1)

3.2.3. Draw a simple labelled diagram of a cross section through the body wall of tissue layers found in this phylum. (4)

3.2.4. Explain how the body plan/symmetry of this phylum of animals is suited to their sedentary mode of living. (2)
(8)

3.3. **The table below shows the global carbon dioxide emissions from fossil fuels combustion and the burning of fossil fuels and some industrial processes in 2014.**

COUNTRY	CARBON DIOXIDE EMISSION (%)
China	30
European Union	9
USA	15
Indian and Russian Federation	12
Japan	4
Other	30

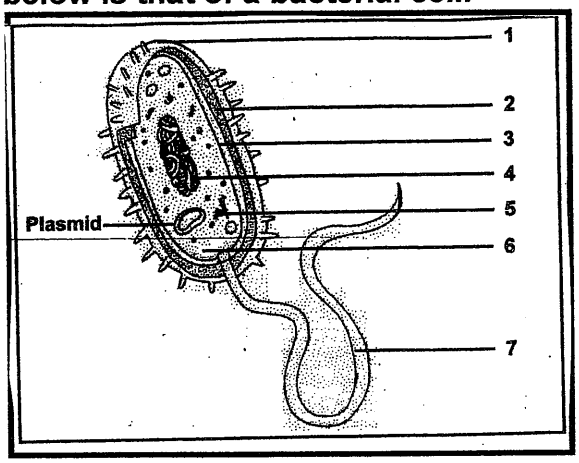
3.3.1. Which single country emitted the most carbon dioxide to the environment? (1)

3.3.2. Explain the impact of the increased carbon dioxide emissions on the environment. (3)

3.3.3. Each country has been given a mandate to reduce its carbon dioxide emissions to reach a certain target. This is reviewed annually by the Conference of Parties (COP), a United Nations organization comprising of 195 countries that meets to assess progress in dealing with climate change.

Explain TWO reasons why some countries are against reducing the carbon dioxide emissions by their industries. (4)
(8)

3.4 **The diagram below is that of a bacterial cell.**



3.4.1. Identify parts labelled **5** and **7**. (2)

3.4.2. State the function of the part labelled **1** and **7**. (2)

3.4.3. Microorganisms can be used in the production of medicines such as insulin and antibiotics.

Describe how the bacterium *E. coli* is used in the production of insulin for the treatment of diabetes. (5)
(9)

QUESTION 3: 40 MARKS

TOTAL: 120 MARKS

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1.1.1. B ✓✓
1.1.2. C ✓✓
1.1.3. D ✓✓
1.1.4. A ✓✓
1.1.5. B/D ✓✓ 10

1.2.1 Insulin ✓
1.2.2. epiglottis ✓
1.2.3. mastication ✓
1.2.4. interspecific ✓ 5
1.2.5. carbon footprint ✓

1.3.1. Bonly ✓✓
1.3.2. None ✓✓
1.3.3. Aonly ✓✓ 6

1.4.1. Plantae ✓
1.4.2. Bryophyta ✓
1.4.3. B/D ✓
1.4.4. E/3 ✓✓
1.4.5. 3. ✓✓ 8

1.5.1 a) G- renal vein ✓
b) E- bladder ✓
c) F- urethra ✓

1.5.2. a) inferior vena cava ✓
b) aorta.

1.5.3 a) E ✓ bladder
b) C ✓ renal artery
c) D ✓ ureter. 11

2.1.1. a) A - glomerulus ✓
b) B - Bowman's capsule ✓
c) C - Malpighian body ✓

2.1.2. Glomerular Filtration ✓ / ultra filtration.

2.1.3 a) Proteins ✓
b) glucose ✓
c) urea ✓

2.1.4. long and convoluted (coiled) — allows enough time for effective reabsorbtion ✓
- Cubadal epithelium cells with microvilli increase surface area for reabsorbtion ✓
- Cell have many mitochondrion - supply the energy for reabsorbtion ✓
- The thin walled villi - faciliates easy absorbtion ✓

2.1.5. There will be glucose in the urine ✓

2.2.1 a) D - Intercostal muscle ✓
b) E - diaphragm ✓
c) F - bronchi ✓

2.2.2. ciliated columnar epithelium ✓

2.2.3. Keeps the trachea open and strengthens the trachea.

2.2.4. The diaphragm contracts ✓ Air flows into the lungs ✓
It becomes flat ✓
External intercostal contract ✓
Rib cage moves up and outwards ✓
Volume of chest cavity increases ✓
Pressure on the lungs decreases ✓

5

2.2.5 a) alveolus / air sac

b) The corona virus infection causes the squamous epithelium to become scarred and thickened
This prevents gaseous exchange between the alveolus and surrounding blood capillaries
The accumulation of fluids in the pulmonary tubes (bronchioli) prevent air flow to the alveolus
Therefore less oxygen is made available for cellular respiration
- resulting in organ failure - due to lack of energy

2.3.1 a) A - duodenum / small intestine
b) C - gall bladder
c) F - pancreas. 3

2.3.2 - Secrets bile
- Convert excess glucose to glycogen 3
- Stores mineral eg iron
- Stores vitamins A, D, B_{12}
- Deamination of excess amino acids
- detoxify harmful substances.

2.3.3 The bile will not be released into the duodenum no emulsification is possible
Enzyme lipase cannot digest fats into fatty acids and glycerol

2, 3, 4.

- very long - intestine ensures that food remains in the alimentary canal for a long period for maximum absorbtion
- Millions of villi — increases the surface area for absorbtion
- walls of villis made up of a single row of columnar epithelial cells (thin walls) easy absorbtion of digested nutrients.
- the lacteal and capillaries transport the absorbed food away quickly.
- Columnar cells have microvilli — increase surface area for absorbtion.
- Columnar cells have a high conc of mitochondria to produce energy for active absorbtion.

4

3.1.1. Biological control/biocontrol.

3.1.2. • Mechanical control/physical removal of plants.
• Chemical control/use of herbicides

3.1.3. 16

3.1.4. 16 weevils control the Water hyacinth in the least number of days (20)/fastest.
If you add more weevils the number of days will not decrease / 16 weevils is the least number of weevils to use to do the job the fastest. 2/

3.1.5. Repeat the experiment
Increase the sample size

3.1.6. a) Days taken to control water hyacinth
b) Number of weevils per plant

3.1.7. number of plants in each tank.
Size of plants used.
size of tank used.
Environmental conditions - amount of light
temp.
amount of water 2/

3.1.8. a) Water Hyacinths will block irrigation channels preventing crops getting sufficient water
b) - will cover the water making it impossible to swim through and very difficult to paddle in so they could not use the dam/river

3.2.1. Cnidaria ✓

3.2.2. Radial ✓

3.2.3.

Heading ✓
Correct drawing ✓
Labels ✓✓ (4)

Body plan of Cnidaria showing tissue layers

3.2.4 They are radially symmetrical ✓
Therefore they can sense danger/food equally well in all directions ✓ (8)

3.3.1. Ching ✓

3.3.2. Leads to enhanced "greenhouse effect" ✓ and thus global warming ✓
Global warming influences weather patterns ✓
which can destroy habitats ✓ any 3 ✓
Leading to a decrease in biodiversity ✓

3.3.3. It will be expensive ✓ to change to machinery that produce less CO_2 ✓
Too expensive to purchase or develop ✓ systems that remove excess CO_2 from outlet gases ✓
This will reduce profit ✓ that will lead to job losses ✓ 4

3.4.1. 5 - ribosomes ✓
7 - flagellum.

3.4.2. 1 - Protects the bacterium against dehydration / or harmful substances ✓
7 - Aids in movement.

3.4.3.
A plasmid (ring shape DNA) is removed from the bacterium E. Coli ✓
Special enzymes are used to cut the plasmid DNA of E. Coli.
A human gene for insulin is inserted into the plasmid ✓
The plasmid and human gene for insulin join to form recombinant DNA.
The E. Coli bacterium start to reproduce producing many insulin producing bacteria.
The insulin is extracted. ✓ max (5)
purified and sold to treat diabetes.

(9)