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SCHOOL:

PROPOSED GUIDE

SIGNATURE

M. EMMAR

553/1

BIOLOGY

Paper 1

APRIL 2025

2hrs

STAYEB EXAMINATIONS

Uganda Advanced Certificate of Examinations

BIOLOGY

Paper 1

INSTRUCTIONS: Attempt all questions

Item 1

Abacus pharmaceuticals limited deals with production of the drugs. The industry manufactures Dextrose tablets for treating hypoglycemia since it contains glucose, BCAA tablets that boost growth due to amino acids used and Omega-3 capsules containing lipids that reduce heart diseases. New personnel are under recruitment to work in the molecular drug designing sector before production process. Maltase containing syrups are also made and administered to patients suffering from digestive disorders like diarrhea and abdominal discomfort on advice that they should take enough water.

Task

- (a) Identify the elemental composition of the each medicine made by the industry

Dextrose tablets - Glucose contains Carbon, hydrogen and Oxygen

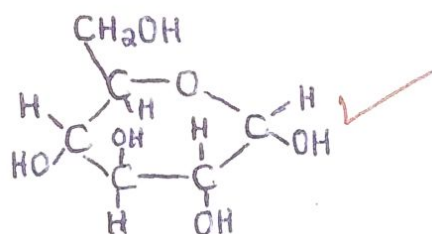
BCAA tablets - Amino acids contain Carbon, hydrogen, Oxygen, nitrogen, sulphur and Phosphorus

Omega capsules (Lipids) contain Carbon, hydrogen and Oxygen

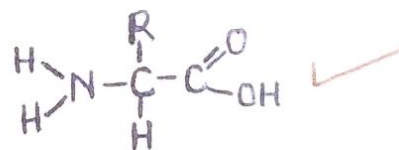
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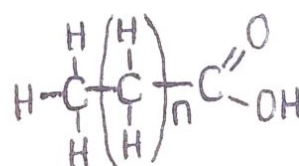
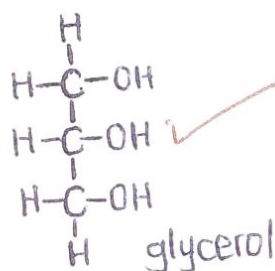
- ## Glucose in Dextrose



Amino acids in BCAA



Glycerol and fatty acids in Omega



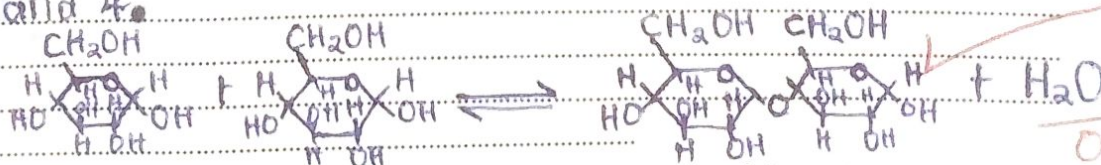
fatty acid

@1 sure

04

- (c) Describe the process leading to formation of the digestive disorder syrup.

Syrup contains maltose, formed by condensation reaction of two α -glucose molecules. The hydroxide group from one glucose molecule combines with the hydrogen atom from another glucose molecule, to form water leading to formation of 1,4-glycosidic bond between carbon atoms 1 and 4.



- (d) Explain the mechanism of the syrup in the treatment process of the patient.

The Syrup contains maltase enzyme, this works by lock and key mechanism; Active site on maltase is like a key while maltose is like the lock; the maltase binds into the active site of the maltase forming maltase-maltose complex; the maltose is broken into glucose molecules; absorbed from alimentary canal reducing osmotic influx of water into the canal hence preventing diarrhoea.

Item 2

James is a great coffee farmer in Katanga town council. He has been growing coffee cash crops over 5 years with a lot of coffee harvests each year. Recently the coffee plants were attacked by a bacterial disease-coffee blight damaging mostly the leaves. David a fellow coffee farmer has advised him to invite Katanga town council agricultural officer so that a quick solution can be put forward. Upon invitation, the agricultural officer picks samples of the infected leaves and takes for laboratory analysis. The figures below are ultrastructure views as he observed them under the compound microscope.



Figure A

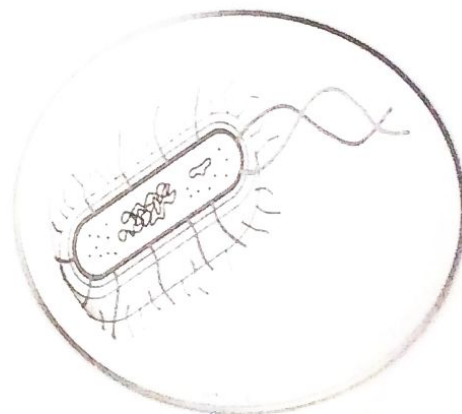


Figure B

Task:

- (a) Identify the organelles that were damaged in the plant structures analyzed.

Nucleus ✓
Mitochondria ✓
Cytoplasm ✓
Chloroplasts ✓
Food Vacuoles ✓
Golgi apparatus ✓
Endoplasmic reticulum ✓

(a) 1
04

- (b) Describe how the physiological processes were affected in the analyzed plant organ due to the disease attack leading to poor yields recently.

Bacteria damaged the food vacuoles that could store food used in respiration; thus plant leaves lacked energy for growth thus poor yields.

Chloroplasts were destroyed removing the chlorophyll molecules which trap light; energy source in photosynthesis.

slowing its rate hence low yields

Cytoplasm a site for chemical reactions was distorted affecting protein synthesis that would form enzymes, hormones and others for plant metabolism

Nucleus was damaged resulting into loss of DNA material a template for transcription thus general control of cellular activities affected

Mitochondria was affected hence inhibiting respiration an energy source for faster growth through cell division of plants

(c) Comparing officer's observation, identify which one causes a disease to the other giving its suitability.

(i) Identification of the view..... View in Figure A caused disease

(ii) Suitability

Has elongated flagellum to increase surface area for propulsion to cause faster locomotion within the coffee plant body.

It possesses numerous pilli to increase chances of survival (protection) against chemicals

Capsulated to ensure protection of the inner structures against any harm.

(d) Advice Mr. James on what can be done to ensure faster regeneration of his plants.

Application of organic fertilizers to supply nitrogen, phosphorus, and magnesium needed in chlorophyll synthesis

Spraying using recommended pesticides to kill the bacterial infection.

Pruning to remove damaged structures that cause spread.