ITEM 1 (a) (M = 1 sand : 9 clay; L = 2 sand : 3 clay).

Malibano is a known maize farmer residing in Kijabijjo village, Kijabijjo district. He owns two plots of land; plot A and plot B located in different areas. In march 2023, He grew maize in each plot and after 1 month, the ~~too~~ one month, the two areas where his plots are located stopped recieving rainfall. He decided to lrigate the two gardens on a weekly basis. In plot A, after every week of applying water, the soils were still moist and the crops were looking healthy. In plot B, after every week of applying water, the soils appeared dry and crops were seen wilted. At the end of the growing season, he obtained high yields from plot A and low yields from B. You are provided with Soil samples M and L from two gardens. Plan and carry out investigations on soil samples M and L to determine the cause of low crops yields from plot B.

Aim: To Investigate/Compare/determine the water holding capacity/ drainage of two soil samples M and L.

Hypothesis: - Soil sample obtained from plot A retains more water than Soil sample obtained from plot B.
- Soil sample obtained from plot B ~~de~~ drains out faster than Soil sample from plot A.

Variables:

Independent variables: Soil sample M and L

Dependent variables: ✓ Amount of water retained/drained after a given time
✓ Amount of water collected/passed through.

Controlled variables: ✓ Volume of soil samples and water used.
✓ Time given for standing/settling.

Apparatus and materials:

Soil samples M and L, Filter funnel, 2 measuring cylinders, 2 beakers, piece ~~of~~ cotton wool, stop clock, clean water, Masking tape.

Procedure:

  A) Soil sample, M was obtained.

a) # one measuring cylinder was labelled as M using marking tape

b) # A filter funnel was lined with cotton wool in it's hole.

c) # A filter funnel was Inserted on top of the measuring cylinder labelled M

d) A 30/35/40 cm³ of soil sample M was measured and poured on to the funnel Inserted on the measuring cylinder labeled M

e) # 30/35/40 cm³ of clean water was measured and poured into
  Sample M and Immediately started the stop clock.

f) # The set up was left to stand for 20 minutes.

g) A After 20 minutes, the amount of water collected in the measuring was recorded.

h) # The above procedures were repeated with soil sample L.

i) Volume of water retained = Volume of water used - Volume of water collected after 20 minutes

Table of results / data presentation / Result treatment.

Soil sample	Volume of soil Sample used (cm³)	Volume of water used (cm³)	Volume of water collected after 20mins (cm³)	Volume of water retained after 20mins (cm³)
M	30.0	40.0	12.0	38.0
L	30.0	40.0	34.0	16.0

Data analysis

  Soil sample M retained high amounts of water; because it had small Particles that were loosely packed leaving tiny/small pore spaces that allowed very little water to pass through it; therefore, soils in plot A did not easily lose water thus could stay moist for along period of time

  Soil sample L retained low amounts of water; because it had large particles that were loosely packed leaving large pore spaces that allowed more water to pass through it easily; Therefore, the soils in plot B easily lose water thus ~~could stay~~ dried within a short period of time.

Conclusion:

Soil sample M retained more water; therefore it was obtained from plot A.

Soil sample L retained low water; therefore it was obtained from plot B.

Recommendation

Soil sample M can Improved by Application of organiz manure to Improve water Infiltration.

Marling l addition of sand to widen the pore spaces hence better Infiltration.

Application of organic lime to make the soil easy to cultivate.

Soil sample L can be Improved by; Addition of organic manure to modify the soil structure thus holding more water.

Application of agricultural lime to modify soil structure thus holding more water.

Addition of clay to narrow the pore spaces thus retaining more water.

ITEM 1 (b)

Joan is a single mother who feeds her child on Solution N (Food Sample N) due to lack of money to buy other food stuffs. After 1 year from birth time, Her child started falling sick frequently, developed potty belly and longer healing of wounds. She became worried and took her child to the hospital where the doctor said; the disease of the child is due to poor feeding. Joan reported to the ~~school~~ village chairperson about the doctor's communication who became concerned to know why food sample N is bad for children. He has presented to you food sample N commonly used in their village.

Task: Carry out an Investigation to find out what is wrong with food sample N.

Aim: To Investigate the nutrient composition of solution/food sample N.

OR. To Investigate the Nutrients lacking in solution N

Hypothesis: Food sample N lacks Important Nutrients to benefit the child.

Variables:
Independent Variables: Nature of food substance present
Dependent variables: Colour change of test solution.
Controlled variable: The volume of reagents/food sample added eg $1 cm^3$ or drops.

Materials and reagents: Food solution N, Iodine solution, DCPIP, Benedict's solution, Copper(II) sulphate, Sodium hydroxide Solution, Dilute hydrochloric acid, Dropper, Test tubes, Heat source and Test tube holders.

Procedure, observation and conclusion.

...ts	Procedures.	observations	Deductions
Starch test.	To 1cm³ of solution N in a test tube was added 3 drops of Iodine solution.	Colourless solution turned to brown solution.	starch absent
protein test	To 1cm³ of solution N in a test tube was added 1cm³ of sodium hydroxide solution; then added 4 drops of copper(II) sulphate solution and Shaken.	Colourless solution turned to blue precipitates.	proteins absent
Reducing Sugar test.	To 1cm³ of solution N in a test tube was added 1cm³ of Benedict's solution and boiled.	Colourless solution turned to blue solution and remained blue on boiling.	Reducing sugars absent.
Non-reducing sugar test.	To 1cm³ of solution N in a test tube, was added 1cm³ of dilute hydrochloric acid and boiled for 1 min, cooled, added 1cm³ of sodium hydroxide solution followed by 1cm³ of Benedict's solution then boiled.	Colourless solution turned to blue solution, green solution solution to Yellow precipitates.	Non-reducing sugars present
Vitamin C test.	To 1cm³ of DCPIP in a test tube, was added solution N drop by drop until further change.	Deep blue solution turns to pale blue solution.	vitamin C absent.

Data analysis

From the above observations, Food solution N contains carbohydrates (Non-reducing sugars) which can be oxidized to provide energy in the body; However it can not build a strong immunity for defence against infections due to lack of vitamin C and repair worn out body tissues. due to lack of proteins.

Conclusion

Food sample N does not contain all the neccesary food nutrients

Recommendation

Mothers should supplement their children with Vitamin C from fruits, proteins from Beans and more carbohydrates from pasho to maintain good health of their children.

ITEM 2 A- TICK, B-soldier termite C- Housefly.

a) Identify specimens A, B and C giving a reason for your answer.

Specimens	Phylum	Class.	ORDER
A	Arthropoda Reasons. • Has segmented body • Jointed legs. • Hard exoskeleton.	Arachnida Reasons. • 4 pairs of limbs • 2 main body divisions.	
B	Phylum: Arthropoda Reasons. • Has segmented body. • jointed legs, • Exo skeleton.	Class. Insecta Reasons • 3 pairs of jointed limbs. • 3 main body parts.	order Isoptera Reason
C	Phylum. Arthropoda Reasons. as above	Class Insecta Reasons • 3 pairs of jointed limbs. • 3 main body parts.	order Diptera Reason

b) Adaptations of Insects;

i. specimen A to it's mode of life
- Has two strong, pointed sharp madibles for piercing predators.
- posses brightly coloured head to scare away predators.
- Has a large head to provide strong biting force.
- Has segmented body for increased flexibility during locomotion.

PG 1

Control measures of specimen A

- Regular dipping of cattle in acaricides to kill the specimens.
- Introducing natural enemies of the specimen in to the of specimen in to the farm like wasps to reduce on parasite population
- spraying acaricides to kill the parasites
- use of Integrated pest management approach.

(ii) Specimen B. to it's mode of life/habitat.

- Has 2 strong, pointed mandibles for piercing predators.
- Posses brightly coloured head to scare away predators.
- Has large head to provide strong biting force.

To wood destruction

- Has sharp, hard mandibles for easy cutting of wood.
- Has a large head to provide strong biting force.

Control measures

- spraying with Insecticides
- oiling poles/Timber
- wrapping poles/Timber with plastic sheet
- using repellents to repel off specimen B.
- Applying soil barriers to prevent access of specimen B to poles

(iii) Specimen C; To it's mode of life/habitat.

- 2 large compound eyes to provide a wide field of view.
- Hairly pair of antennae for Increased sensitivity
- spongy proboscis expanded at the tip to Increase surface area for sucking fluids.
- pair of membraneous wings to reduce weight for easy flight to escape from enemies.
- segmented body for Increased flexibility during locomotion.
- Hairly body for easy carriage of germs to other areas.

Adaptations as a vector

- Hairly body for attachment of germs.
- A pair of wings for quick locomotion by flight to spread germs.
- Has expanded proboscis tip to Increase area for absorption of germs in to saliva.
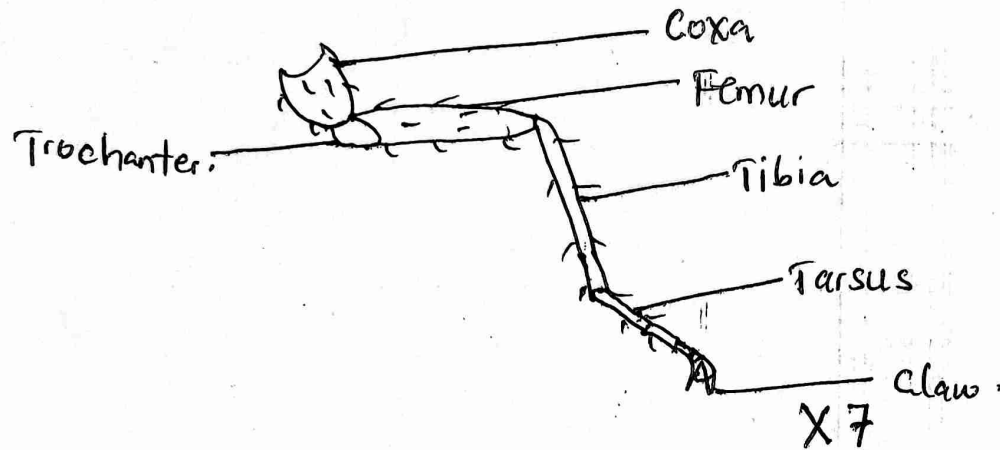
Control measures

- Spraying with Insecticides.
- Covering holes of pit latrines to prevent specimen C from picking germs from pit latrines
- Covering all the food to prevent specimen C from walking on it
- Boiling drinking water and milk to kill the germs
- Food eaten in raw form like fruits should be washed first to remove the germs.
- washing hands with clean running water and soap after Visiting latrines and before eating food.
- proper dispersal of wastes so that houseflies do not reach them by covering them in dust bins

c) Drawing skills

A drawing showing the head of specimen B in dorsal view

mandible
Antenna
Maxillary pulp
Head.

X 7
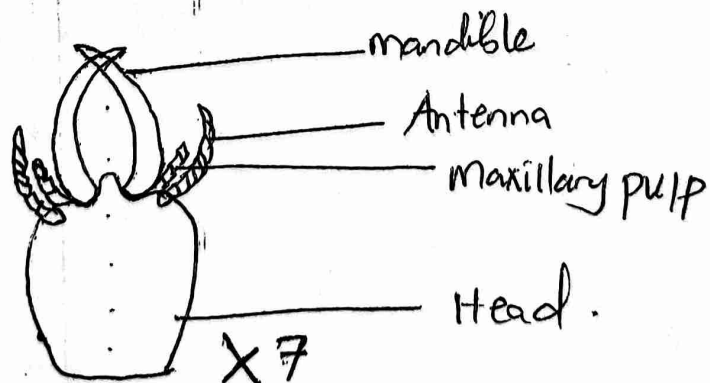
A drawing showing the hind limb of specimen C

Coxa
Femur
Trochanter:
Tibia
Tarsus
Claw.
X 7

N.B: if they ask for a dichotomous key of specimens A, B and C.

1   a) specimen with 2 main body parts -------- A

     b) Specimens with 3 main body parts ----- go to 2

2   a) specimen with wings ---------- C

     b) specimen with out wings ------- B.

— END —