

<p>MAY 2009 SESSION MARKING SCHEME IIB BIOLOGY</p>

- 1.
- i Ecosystem – the populations of living organisms occupying a given physical area together with the physical/non-living environment. 2 marks
- ii Habitat – the place where an organism lives 1 mark
 (if animal is mentioned award 0.5 marks)
- b
- (i) Biotic factors – the living component of the ecosystem 1 mark
 Abiotic factors – the non-living component of the ecosystem 1 mark
- ii Due to rain, the pool becomes less concentrated. 2 marks
 Due to evaporation of water, the pool becomes more concentrated. 2 marks
- c
- i The movement of water from a low to a high concentration of solute across a selectively permeable membrane. 2 marks
DO NOT ACCEPT movement of fluid /solvent/salts/molecules/substances
- ii The pool water becomes more concentrated than the organisms therefore water tends to move out. 3 marks
- d
- i Protist/Protoctista kingdom 1 mark
- ii Animal kingdom 1 mark
- e
- i Smooth/moist skin without scales (DO NOT ACCEPT vertebral column) 1 mark
- ii Long segmented body/digestive tract has mouth and anus 1 mark
 (DO NOT ACCEPT no vertebral column)
- f Arthropods have a segmented body. Molluscs have an unsegmented body. Arthropods are covered by a hard cuticle/exoskeleton. Molluscs do not have an exoskeleton. Molluscs may have an external/internal shell. Arthropods do not have a shell. Arthropods have jointed appendages, molluscs do not. (Any TWO) 1 mark for each difference – 2 marks
- g
- i Producers/first trophic level 1 mark
- ii Traps light energy and builds carbohydrates; make energy and food available for upper trophic levels. 2 marks
- h Needs to keep moist skin for efficient gas exchange/needs water to complete its lifecycle. 2 marks
- (Total: 25 marks)**

2a Complete histogram including title (1), labelled axis(1), correct scale (1), correct plotting of points (3). 6 marks

b 11.45% of 130 = 14.88 (15 ACCEPT 14 when working is given)

3 marks

c Well labelled diagram including the labels: trachea, bronchus, bronchioles, alveoli
Award 1 mark for each correct label 5 marks

d Avoid smoking and avoid being next to persons who smoke 4 marks
DO NOT ACCEPT reference to exhaust and air pollutants

e surfaces of alveoli are moist / alveoli very thin / each alveolus surrounded by a capillary network / exchange surfaces(alveoli) provide large surface area relative to volume of the body (Any TWO) 4 marks

f Tracheal system/tracheoles 1 mark

Tracheal system provides the insect with a large surface area for gas exchange 2 marks

(Total: 25 marks)

3 a

i Water – used as a reactant in photosynthesis to transport dissolved substances in xylem and phloem; acts as a solvent in cells allowing reactions to proceed; keeps plant cells turgid therefore giving support to plant. (Any ONE) 1 mark
DO NOT ACCEPT water needed for transpiration.

ii Carbon dioxide – used as a reactant in photosynthesis to build carbohydrate/biochemicals 1 mark

iii Nitrates – used to build amino acids (and proteins) therefore leading to growth 1 mark
OR used to build nucleotides/nucleic acids

iv Magnesium – used to form chlorophyll 1 mark

b

i Magnesium is absorbed from the soil by the roots by active transport. 2 marks

ii Carbon dioxide is absorbed from the atmosphere into the leaves through the stomata. 2 marks

c

i Water enters into the root by osmosis moving from a low concentration in the soil to a high concentration into the root epidermal cells across a selectively permeable membrane. 3 marks

ii Water moves from the roots to the leaves in the xylem vessels as it is pulled upwards by an upward force created when water is lost through the leaves. 3 marks

d

i Marram grass lives in sandy soil which has poor water retaining properties. 2 marks

- ii The cuticle is made up of a waxy substance that is impermeable to water therefore it reduces the rate of water evaporation from the leaf. 2 marks
- iii When leaves are rolled, water vapour is trapped in the spaces between the leaf consequently less water is lost 3 marks
(Accept: rolling reduces surface area over which water is lost.)

- e Artificial fertilisers are synthesised by humans in factories, while natural fertilisers are products of living organisms that are rich in nutrients e.g. manure. 2 marks
- ADVANTAGE: Artificial fertilisers: easy to apply/very effective/fast acting/not bulky
Natural fertilisers: cheap/maintain soil structure 1 marks

DISADVANTAGE: Artificial fertiliser: expensive/extensive use leads to eutrophication/can be leached by rainfall

Natural fertiliser: foul-smelling/slow acting 1 mark
(Total: 25 marks)

4a

- i Osmoregulation – the control of the water content and concentration of salts in the body of an organism. 2 marks

Award 1 mark if concentration of salts is not mentioned

- ii Excretion – the removal of waste products that arise from metabolic activity. 2 marks
Award 1 mark if metabolic activity is not mentioned.

- b Diagram of cross section of the kidney including labels of cortex, medulla, pyramids, pelvis, ureter, renal artery and renal vein. 5 marks

c

- i Ultra filtration is the movement of plasma and solutes of the blood from the blood to the Bowman's capsule as a result of glomerular blood pressure. 2 marks

- ii Any THREE of the following: water, glucose, salts, urea, amino acids, hormones
1 mark for each constituent

- iii Plasma proteins, platelets red/white blood cells Any TWO 2 marks
DO NOT ACCEPT haemoglobin

These are not filtered because these molecules are too large to pass across the capillary membrane. 1 mark

d

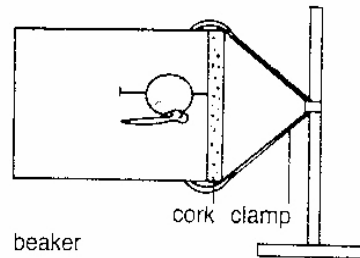
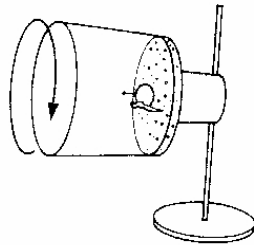
- i urea 1 mark
- ii From the ureter to the bladder, to the urethra and finally to the outside. 3 marks
(Do not award any marks if pathway is not given in the right way throughout)

- iii Urine output decreases. 2 marks

- iv The student will sweat and therefore lose water from the body. Water is reabsorbed in the nephron to replace lost water. 2 marks

(Total: 25 marks)

5a
i



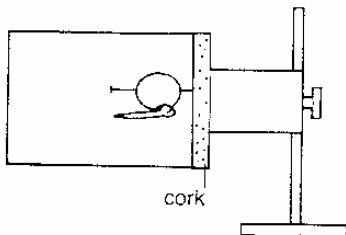
4 marks

Method: For the control pin a few of the seedlings with the plumule/tip of shoot horizontal on a piece of cork. Place the cork in a beaker and leave the beaker in a fixed position for about 2 days. Put moist cotton wool in beaker.

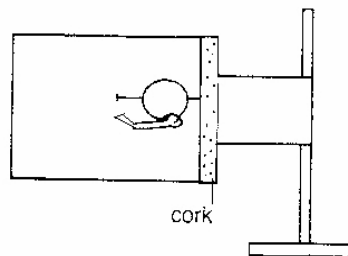
3 marks

Pin the same number of seedlings again with the plumule in a horizontal position to the cork of the clinostat. Place some moist cotton wool in beaker. Switch the clinostat. 2 marks

Results:



Horizontal growth



plumule grows upwards

1 mark each – 2 marks

Precaution: Seedlings left in the dark in order to vary one factor only

2 marks

b

i A seedling with large radicle is chosen for the experiment and plumule is cut off. 2 marks

ii Radicles grow downwards towards gravity 2 marks

iii Roots are positively geotropic. 2 marks

c

i The shoots are positively phototropic 2 marks

ii Leaves are in a good position to absorb light energy necessary for photosynthesis/2 marks
Flowers are lifted into a position most likely to receive pollen. (They will be held out into the wind or may be visible to visiting insects) 2marks

(Total : 25 marks)

6a

i Streamlined body helps fish to move quickly and smoothly through the water 2 marks

ii Gills are efficient gas exchange surfaces used for breathing underwater. 2 marks

iii Fins help with the movement and keep the body stable. Help fish to swim/move 2 marks

iv Waterproof scales reduce/prevent the water uptake by osmosis. 2 marks

b

i Dry skin (with keratin) limits water loss /serves to protect the body 2 marks

ii This is because they are ectothermic/poikilothermic – this means that reptiles change their body temperature according to that of their surroundings. They bask in the sun to raise their body temperatures in the morning hours and hide under stones during midday to cool down their body temperature during midday. 3 marks

c

i No chlorophyll present since Pin mould does not photosynthesise 2 marks

ii to ensure propagation/survival 2 marks

iii to be carried away by light air movements 2 marks

iv They need a moist environment, so that they can absorb the soluble products of digestion of their food source in solution. 2 marks

d. Good camouflage when hunting for prey (to blend in with the surrounding snow) and less radiation of heat. 4 marks

(Total: 25 marks)

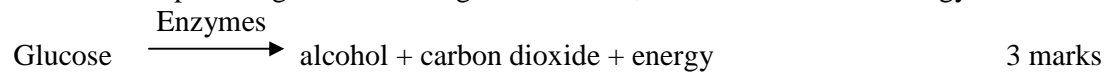
7a

i reduction in particulate matter present in the atmosphere, reduction in smoke; reduction in gases such as sulphur dioxide. (Accept *less air pollution* but award 1 mark only) Any TWO 4 marks

ii reduction in excessive discharge of nitrates and phosphates in sea water that could result in eutrophication and biochemical oxygen demand/prevention of the spread of solids floating on the surface of the sea forming an unsightly slick/prevention of the spread of disease/prevention of the pollution of beaches with unpleasant odour and pathogenic microorganisms/production of biogas(methane)
treated water re-used/irrigation; sludge used for fertiliser Any TWO 4 marks
(If student mentions just prevents water pollution award 1 mark)

- iii conservation of habitat/conservation of species biodiversity. 4 marks
- b
- i sulphur dioxide 1 mark
- ii carbon monoxide/oxides of nitrogen 1 mark
- iii carbon dioxide/nitrogen oxides 1 mark
- c
- i Melting of ice caps due to higher temperatures. 2 marks
- ii. impairment of flight; reduction in the insulating properties of feathers thus making birds more vulnerable to suffer of hypothermia. Any ONE 2 marks
- iii Pesticides will persist and will not break down quickly into harmless substances/pesticide residues accumulate in the tissues of organisms/bioaccumulation of pesticide residues along the food chain; affect harmless organisms; can be poisonous to other organisms; some pests become resistant. 2 marks
- iv Depletes the soil of a specific nutrient (e.g phosphorus)/reduces humus soil content/exposes crop plant to increased risk of damage from herbicides/creates conditions that favour the spread of weeds, insect pests, pathogens/exposes farmer to greater risk from economic fluctuations. 2 marks
- DO NOT ACCEPT soil erosion
- v Recycling saves in energy costs/helps to conserve raw materials/less land pollution/recovery of certain metals such as mercury helps to conserve supplies of non-renewable materials/production of methane. 2marks
- (Total: 25 marks)**
- 8.
- a **VASODILATION** – the arterioles/blood vessels/capillaries widen/expand/dilate and move blood towards the skin surface 3 marks
- such that more blood flows in capillaries and more heat is lost from the body. 2 marks
- b **GAMETE FORMATION** in humans – Gamete formation takes place by means of meiosis ; the testes in males produce spermatozoa while the ovaries in females produce eggs. 3 marks
- Gametes carrying genetic information from the mother and father join and fuse in the process of fertilisation forming the zygote; variation /formation of diploid zygote. 3 marks
- c **VASECTOMY** –the sperm ducts in the male reproductive organs are cut and tied in a surgical operation 2 marks
- to prevent pregnancy in a relatively permanent manner/birth control mechanism. 2 marks
- d **SEED DISPERSAL** – seeds are spread/dispersed away from the parent plant by various methods such as water/animal/wind. 2 marks
- This limits competition for water/light/carbon dioxide and helps plant to establish itself within new environments. 3 marks

e **FERMENTATION in a bakery** – flour, sugar, water and salt are mixed with yeast. In the fermentation process glucose is changed to alcohol , carbon dioxide and energy.



The yeast ferments the sugar and the bubbles of carbon dioxide are trapped in the dough.
This makes the dough expand/rise. 2 marks

DO NOT ACCEPT yeast raises dough, bread rises

(Total: 25 marks)