

Specimen answer 2

June 14 BIOL5 10a

10

Write an essay on one of the following topics.

EITHER

→ PLANTS
- CO₂
- water
- O₂

→ ORGANISMS
- O₂
- CO₂
- water
- urea

10 (a)

How cells and organisms carry out exchanges with their external environment to maintain their internal environment.

[25 marks]

OR

10 (b)

How energy is transferred within and between organisms.

[25 marks]

If you want to make a plan write it here.

10 (a) PLANTS

phloem

ANIMALS

- CO₂ stomata- O₂ respiration

- water xylem

- CO₂ chemoreceptors

- ions phloem

- urea in urine

- O₂ stomata

- mutualistic bacteria

- nitrogen

CELLS:

- how? diffusion
active transport

- insects - holes in body

- glucose levels

- fish - lamellae

- water levels

counter current system



2 2

Homeostasis is very important for ^{organisms} cells and many exchanges are carried out between the external environment of cells and organisms and their internal environment to maintain their internal environment this may include getting rid of harmful substances to keep a constant internal environment, or it may include taking in necessary substances.

Cells are able to make several exchanges ~~thru~~ to their external environment via their membranes, the most common being the semi-permeable membrane consisting of phospholipids with hydrophilic heads and hydrophobic tails this allows only certain substances to be exchanged. By consisting of intrinsic proteins, protein channels can be used to transport substances such as sodium ~~thru~~ from the inside of

Turn over ►

the cell to the outside other methods of exchange include diffusion ^{which is the movement} from a high concentration to a low concentration such as ~~the~~ ⁰ in the lungs, ~~the~~ ⁰ the movement of O_2 and CO_2 , osmosis ^{which is} ~~to~~ stop cells from bursting or shrinking, water molecules move down a

⁰ concentration gradient such as ^{due to} in fish through the lamellae, ~~the counter current system means a gradient is during~~

⁰ cholera ^{where a} ~~due to~~ ⁰ ~~the~~ release of chloride ions ^{lowers} ~~lowering~~ the water potential and finally active transport which requires energy, mainly in the form ATP, to pump ~~so~~ molecules from a low concentration to a high concentration ^{such} ~~as~~ as in the axon membrane where sodium ions are, via the sodium-potassium pump, ^{are} pumped out of ⁰ the axon membrane to maintain a negative charge on the inside.

Plants also have lots of exchangers with their ~~outside~~ external environment to maintain their internal environment. For example, in photosynthesis plants need CO_2 to combine with RuBP in the Calvin cycle ^{in the light independent reaction} to eventually produce useful substances such as glucose which is needed for respiration. The plants have stomata which are controlled by guard cells and these control the opening of closing the stomata so not too much water is lost. The CO_2 diffuses in to the stomata whilst O_2 is diffused out. They maintain their internal environment as they need to keep photosynthesising to grow so need to keep exchanging gases. ~~Plants~~

Plants also need to exchange with the soil for water ^{needed for photosynthesis} and nutrients. The water is moved into

the roots via osmosis and then transported up the plant by the xylem, this movement is helped by the root pressure and cohesive properties of water. Plants also need mineral ions from the soil which are carried around the plant by the phloem. These ions are needed to produce proteins and amino acids.

Insects also make exchanges to their external environment as gas exchange occurs through tiny holes on the outer surface of their bodies. This keeps a constant concentration gradient.

Animals ~~off~~ are constantly carrying out exchanges with their external environment as respiration is a continuous process to keep us alive. We require O_2 the constant gas exchange of O_2 and CO_2 to



keep a diffusion gradient in the ~~the~~ capillaries in the lungs we need the O_2 to ~~be~~ as the final acceptor of the electron transport chain on the membrane of the mitochondria. This aerobic respiration ~~causes~~ produces lots of ATP needed in our internal environment for active transport and muscle contraction. These internal environments are very important to keep.

~~the~~ Endotherms ~~also~~ ~~are~~ need to maintain a constant body temperature, when they're too hot, they sweat so the heat from the water is evaporated away. This exchange cools down the mammal so they do not overheat which could possibly cause the positive feedback ~~of~~ of hyperthermia.

To conclude, cells and organisms

Turn over ►

create many exchanges with their external environment, mainly consisting of gas exchange for respiration or photosynthesis, which are very important for the cells and organisms to stay alive and function effectively

15



Senior examiner annotations				
#	Item	Page	Mark/symbol	Annotation
1	10	2	0	H – Concept only.
2	10	2	0	Re-stating title only.
3	10	2	0	C – Some knowledge but very low level and not addressing title. Not quite enough detail.
4	10	2	0	Significant error. Sodium – not ions. Channels let sodium ions in but they are actively transported out.
5	10	3	0	Lungs mentioned. Not enough to credit L yet.
6	10	3	0	No mention of water potential. Water concentration is poor terminology.
7	10	3	0	Cholera = D. Very little detail so not enough.
8	10	3	0	Chloride ions released but no indication of where to.
9	10	3	0	Reference to Nerves = N.
10	10	4	0	Entire paragraph about photosynthesis is irrelevant.
11	10	4	0	G – But superficial.
12	10	4	0	W – Passage of water through a plant. Mention only, very superficial.
13	10	5	0	Continuation of W but no additional relevant detail.
14	10	5	0	Continuation of W but no additional relevant detail. Combined with earlier G now just about A-level content.
15	10	5	0	G – Superficial.
16	10	6	0	L – Mention only not enough.
17	10	6	0	Could be irrelevant but candidate is trying to link to title so ignore.
18	10	6	0	T – A bit superficial but just enough.
19	10	7	15	A-level content in some topics but no real attempt to relate to theme. Lacking detail in some topics. One irrelevant topic area. Multistructural - awarded 15 marks.