

Specimen answer 4

June 14 BIOL5 10a

EITHER**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.

Plan.

respiration ✓

photosynthesis ✓

homeostasis — endotherms exotherms ✓

tissue fluid? ✓

diabetics — glucose conc. —



Homeostasis is defined as maintaining a constant internal environment, this includes heat regulation in an endotherm (organisms capable of producing their own heat). This is fairly simple as the core temperature rises the hypothalamus (heat centre) of the brain stimulates the capillaries nearest the skin to allow blood to pass through them. This is known as vaso-dilation causing the skin to heat up, the sweat glands release sweat and this evaporates, reducing the core temperature. Exotherms cannot do this, they are entirely dependant upon their environment ^{to provide for heat} to do this they will be an ectotherm and during summer they will be in the shade, moving towards and under rocks or up trees which is why many are found in warm countries.

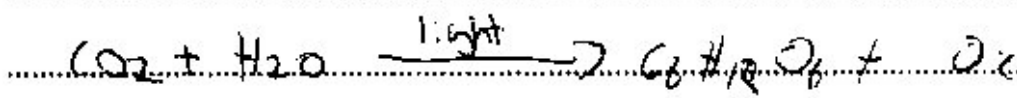
Respiration is another exchange organisms and cells do to maintain their internal environment. A by-product of respiration is heat, respiration produces ATP which is vital in maintaining a constant internal environment as it is used for movement and growth. Respiration has a number of processes, the first of which is glycolysis which involves breaking glucose down into pyruvate, each molecule of pyruvate produces one molecule of ATP and one molecule of NADH, pyruvate is then used in the link reaction to produce acetyl-CoA and then the

Turn over ►



Krebs cycle uses this to generate a 4 carbon molecule. This cycle also produces ATP. The last stage of respiration is the electron transport chain which relies on gaseous exchange between the lungs and the internal environment as respiration requires oxygen and produces CO_2 and through gaseous exchange CO_2 is expelled and O_2 diffuses into the blood.

in plants, which can also respire. There is another way of producing useful organic substances and this is photosynthesis. The equations of which is entirely opposite to that of respiration.



Through pores in the epidermis of the leaf (stoma) CO_2 diffuses into the leaf and O_2 diffuses out of the leaf. In the first stage of photosynthesis (the light dependent reaction) light is required and is absorbed by the leaf. This is another example of how cells and organisms are reliant on their external environment to maintain their internal environment as plants need light in order to carry out photosynthesis.

Cells within organisms (mostly animal cells) are surrounded in tissue fluid. Through diffusion the cell requires all it needs from the tissue fluid i.e. nutrients and O_2 .



and is able to get rid of waste like CO_2 ,
 without tissue fluid the cells would quickly die.⁰
 They could not respire, tissue fluid is found using
 the products absorbed via digestion, this is unique
 among that organisms and cells are carrying out working.⁰
 with this with internal environment in order to maintain
 the internal environment, food comes from the external
 environment i.e. crops, animals and the eating and
 digestion of these helps to maintain the blood-glucose
 concentration. To show the importance of working with the
 external environment it is vital to look and to compare
 of when this does not occur. Diabetics, who cannot produce
 insulin or have become almost immune to insulin, because
 of this the glucose from digestion cannot be stored and
 therefore is not absorbed, ~~and so is rejected in the urine~~
 because it does not diffuse into the epithelium.⁰
 as there is a high concentration of glucose in the
 blood and so the glucose is rejected in the urine.
 This can result in loss of limbs and even death.
 in conclusion the exchange of between external and internal
 environment can be seen is almost all living organisms,
 without which life would not be possible.¹¹

Senior examiner annotations				
#	Item	Page	Mark/symbol	Annotation
1	10	1	0	Pan noted.
2	10	2	0	Homeostasis topic noted, no detail.
3	10	2	0	T - Temperature topic noted, heat loss via sweating but no mention of heat energy being required for evaporation. Possible significant error – capillaries do not control blood flow to skin.
4	10	2	0	Respiration irrelevant.
5	10	3	0	G - Gas exchange noted.
6	10	3	0	Photosynthesis is irrelevant.
7	10	3	0	G - Gas exchange again, still not enough detail.
8	10	4	0	Tf - Tissue fluid topic noted and some weak A-level content.
9	10	4	0	D – Digestion topic noted but no detail.
10	10	4	0	B - Control of blood glucose concentration topic noted, insufficient detail.
11	10	4	11	Some superficial A-level content. Irrelevant topics. Does try to deal with number of topics - so elements of multistructural. Borderline between unistructural and multistructural - awarded 11 marks.