
Specimen answer 6

June 14 BIOL5 10b

EITHER

- 10 (a) How cells and organisms carry out exchanges with their external environment to maintain their internal environment. — homeostasis

[25 marks]

OR

- 10 (b) How energy is transferred within and between organisms. — trophic levels — ATP — ADP + P_i — plants — animals — microorganisms

[25 marks]

If you want to make a plan write it here.

Trophic levels — consumption

Sun →

loss energy

etc

ATP produced during

via coenzymes — respiration → energy for muscle (in back)

chemical energy — receptors

Nitrogen cycle

death of cells → saprobites

bury of fossil fuels → energy — waste

photosynthesis via

coenzymes release

pacemaker
corpuscle etc

Intake output



Energy transfer is the movement of energy. Energy can be in multiple form such as mechanical energy, food energy, light energy.

Energy from the sun / light energy is absorbed by the chloroplast in the process of photosynthesis. Energy is then transferred from light energy to chemical energy. Food chains and food webs result in energy transfer between different trophic levels. For example energy transfer can take place between producer (plants) and primary consumers. The consumption of energy via eating means energy is transferred from 1 trophic level to the next. However, it is the process of digestion and enzymes such as salivary amylase that break down the energy within our body so it can be transferred around the body as glucose in the blood stream to provide energy. Energy transfer can also be transferred between trophic levels, primary consumer to secondary consumer and secondary consumer to tertiary consumer. All of this energy transfer takes place due to digestion.

The ^{carbon} cycle and other cycles in biology transfer energy. Death of ^{organisms} ~~plants~~ ^{equates} ~~which~~ ^{are} taken consumed by saprobiotic microorganism therefore results in energy being transferred to the microorganism. However

Turn over ►

Energy can also be transferred due to an absence of saprobiotic microorganisms and damp conditions. Dead plants and animals become fossil fuels. The process of combustion releases the energy stored in fossil fuels. This can be used as energy for vehicles or warmth being transferred to heat energy which would then be transferred to humans to keep them warm.

ATP produced during respiration is a way energy is transferred in the body. The ^{breaking} release of a phosphate bond ^{by ATPase} from ATP provides energy such as for muscle contraction. However this energy is produced due to respiration during the final stage of respiration the electron transport chain due to the movement of H^+ ions down the concentration gradient $ADP + P_i \rightarrow ATP$ combine to form ATP. ATP is then transferred around the body and used as an immediate energy store for cells to carry out metabolic processes. To produce ATP energy transfer occurs from the ~~respiratory chain~~ glucose and oxygen. Photosynthesis also transfers energy however in photosynthesis energy is transferred from

originally
from light
energy

photosynthesis
requires light
energy to
take place

substances such as ~~glucose~~ Glucose is used for energy transfer and also for



respiration the consumption of plants by humans provides them with glucose which provides them with chemical energy. Within the body coenzymes transfer energy eg ^{carriers} NAD produces 3 ATP molecules compared to FAD which produces 2 ATP molecules during respiration.

Other organisms can stimulate each other. For example if a dog wants to bite a human chemical pressure receptors on the skin would detect pressure. Pacinian corpuscles detect mechanical energy therefore another organism stimulates an action potential to be generated which involves the conversion of the mechanical energy stimulus to chemical energy in the body.

As previously mentioned with the body energy is transferred to the cells via ATP. However after consumption of energy food and its breakdown energy is transferred in the blood as glucose molecules. Glucose enables respiration to take place. However the rate of transfer within the body of glucose is dependent on its rate eg. insulin decreases the rate of glucose available for transfer around the body. As it has detected a high level of glucose hence glucose is converted to glycogen limiting the availability.

and between processes such as from the nucleus of the mitochondria to the cytoplasm

of energy transfer.

Overall there are multiple methods of energy transfer some are similar in plants and animals and microorganisms such as ATP and the process of respiration⁰. The transfer of energy also results in conversion of energy from one form to another between organisms to a more¹² useful form for the receiver of energy eg. light to chemical energy in the process of photosynthesis.

Senior examiner annotations				
#	Item	Page	Mark/symbol	Annotation
1	10	2	0	Idea of energy transfer through ecosystems just about enough, but would look for more detail.
2	10	3	0	Idea of carbon cycle and fossil fuels here considered relevant.
3	10	3	0	Use of ATP in energy transfer just about enough.
4	10	3	0	Idea of respiration energy transfer just about enough.
5	10	3	0	Significant error – idea that ATP is transferred around the body.
6	10	3	0	Idea of energy transfer light to chemical in Photosynthesis.
7	10	4	0	Idea of mechanical energy transferred to chemical energy noted under stimulus response for breadth, but not enough detail.
8	10	4	0	Significant error again energy transferred into cells as ATP.
9	10	5	0	Nothing irrelevant in this section, but nothing to credit either.
10	10	5	12	A-level detail and mostly suitable topics. However, significant errors and one irrelevant passage. Multistructural - awarded 12 marks.