

Core questions – Biology - Unit 4 - Bioenergetics

No.	Question	Answer
1	What is the word equation for photosynthesis?	Carbon dioxide + water (+light) → glucose + oxygen
2	What is the balanced chemical symbol equation for photosynthesis?	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
3	Is photosynthesis an endo- or exothermic reaction?	Endothermic
4	What energy transfer occurs in photosynthesis?	Light energy to chemical energy
5	Where does photosynthesis occur in a plant or algal cell?	Chloroplasts
6	What are pigment are chloroplasts filled with?	Chlorophyll
7	What is the function of chlorophyll?	Captures light energy
8	Name the three factors which affect the rate of photosynthesis.	Temperature, light intensity, carbon dioxide concentration, amount of chlorophyll
9	What do the sketch graphs of limiting factors look like?	<p>The figure contains three separate line graphs. Each graph has 'Rate of photosynthesis' on the vertical y-axis. The first graph's horizontal x-axis is 'Light intensity'; the curve rises steeply and then levels off to a horizontal line. The second graph's x-axis is 'Temperature'; the curve rises to a peak and then falls. The third graph's x-axis is 'Carbon dioxide concentration'; the curve rises steeply and then levels off to a horizontal line.</p>
10	Why does increasing light intensity increase the rate of photosynthesis?	Light provides the energy the plants need to photosynthesise
11	Why does increasing temperature increase the rate of photosynthesis?	A higher temperature increases the rate of the chemical reactions
12	Why does increasing the temperature too far stop photosynthesis?	The enzymes in the plant become denatured and stop working
13	Why does increasing the concentration of carbon dioxide increase the rate of photosynthesis?	Carbon dioxide is a raw material that is needed for photosynthesis
14	How can we investigate the effect of light intensity on the rate of photosynthesis?	<ol style="list-style-type: none"> 1. Place pondweed in a test tube with water 2. Place a light source 10cm away from it 3. Turn light source on a measure the number of bubbles produced in 1 min 4. Move the light source back to 20cm and repeat 5. Repeat until there is a big enough range of results to see a pattern
15	What can be done to stop temperature affecting the rate of photosynthesis?	Use an LED light, or place the boiling tube into a beaker of water
16H	What is the inverse square law? (HT only)	Light intensity $\propto 1/d^2$
17H	How does the inverse square law apply to photosynthesis? (HT only)	The intensity of light is inversely proportional to the square of the distance from the light source.
18H	What does the inverse square law mean in practice when considering how plants grow? (HT only)	When the light is moved twice as far from the plant it will receive a quarter of the energy
19H	Why can't a commercial grower of plants just increase all three limiting factors of PHS to maximum levels to obtain optimum growth? (HT only)	Light, temperature and CO ₂ all cost money to supply – a balance between expenditure and income must be struck for a profit to be made.

20	Name three ways glucose produced in photosynthesis is used in plants.	<ul style="list-style-type: none"> • Respiration • Converted into insoluble starch for storage • To produce fat or oil for storage • To produce cellulose, which strengthens the cell wall • To produce amino acids for protein synthesis.
21	What else, other than glucose, do plants need to produce proteins?	Nitrate ions
22	Where are mineral ions absorbed from and through which plant organ?	From the soil, through the roots.
23	What is aerobic respiration and where does it occur in cells?	Respiration WITH oxygen, in the mitochondria
24	What is produced during aerobic respiration?	Carbon dioxide and water
25	What is anaerobic respiration and where does it occur in cells?	Respiration WITHOUT oxygen, in the cytoplasm
26	What is produced during anaerobic respiration in animals/humans?	Lactic acid
27	What is produced during anaerobic respiration in plants?	Ethanol and carbon dioxide
28	Is respiration an endo- or exothermic reaction?	Exothermic
29	What is the balanced chemical equation for aerobic respiration?	$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
30	What is the word equation for anaerobic respiration in animal cells?	Glucose \rightarrow lactic acid
31	What is the word equation for anaerobic respiration in plant and yeast cells?	Glucose \rightarrow ethanol + carbon dioxide
32	In which type of respiration is more energy released?	Aerobic
33	Why does anaerobic respiration release less energy than aerobic respiration?	The oxidation of glucose is incomplete in anaerobic respiration
34	What do organisms need energy for?	<ul style="list-style-type: none"> • Chemical reactions to build larger molecules • Movement (by enabling muscles to contract) • Keeping warm
35	What do humans manufacture, using anaerobic respiration in yeast?	<ul style="list-style-type: none"> • Bread and alcoholic drinks
36	Why is anaerobic respiration in yeast used when making bread?	The carbon dioxide makes the bread rise
37	Why is anaerobic respiration in yeast used when making alcoholic drinks?	Carbon dioxide can make the drinks fizzy, ethanol is what makes it alcoholic
38	How does the human body react to an increased demand for energy?	Heart rate, breathing rate and breath volume increase
39	Why does the breathing rate and breath volume increase during exercise?	To take in more oxygen
40	Why does heart rate increase during exercise?	<p>To supply the muscles with more oxygen and glucose in the blood</p> <p>To remove carbon dioxide</p> <p>To remove lactic acid</p> <p>To remove heat</p>
41	Why do muscles need more oxygen and glucose during exercise?	There is an increased rate of respiration
42	What does a build-up of lactic acid cause in muscles?	Muscle fatigue
43H	What is an oxygen debt? (HT only)	The amount of extra oxygen the body needs after exercise to react with the accumulated lactic acid and remove it from the cells
44H	Where is lactic acid converted back into glucose? (HT only)	The liver
45H	How is lactic acid transported to the liver? (HT only)	By the blood

46	What is produced when enzymes chemically break down carbohydrates?	Glucose (simple sugars)
47	What is produced when enzymes chemically break down lipids?	Fatty acids and glycerol
48	What is produced when enzymes chemically break down proteins?	Amino acids
49	What is "metabolism"?	The sum of all the reactions in a cell or the body
50	What is the energy released via respiration used for in cells?	The continual enzyme controlled processes of metabolism that synthesise new molecules.
51	Name three cellular reactions, which could be included under the term "metabolism".	<ul style="list-style-type: none"> • Conversion of glucose to starch, glycogen and cellulose • The formation of lipid molecules from a molecule of glycerol and three molecules of fatty acids • The use of glucose and nitrate ions to form amino acids which are used to synthesise proteins • Respiration Breakdown of excess proteins to form urea for excretion.