

Chapter 9: Respiration

Knowledge organiser

Cellular respiration

Cellular **respiration** is an _____ reaction that occurs continuously in the _____ of living cells to supply the cells with energy.

The energy released during respiration is needed for all living processes, including

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-
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Respiration in cells can take place _____ (using oxygen) or _____ (without oxygen).

Type of respiration	Oxygen required?	Relative amount of energy transferred
aerobic	_____	complete _____ of glucose – large amount of _____ is released
anaerobic	_____	_____ oxidation of glucose – much _____ energy is released per glucose molecule than in aerobic respiration

Aerobic respiration

_____ + _____ → _____ + _____

$C_6H_{12}O_6 + _O_2 \rightarrow _CO_2 + _H_2O$

Anaerobic respiration in muscles

_____ → _____

$C_6H_{12}O_6 \rightarrow _C_3H_6O_3$

Fermentation

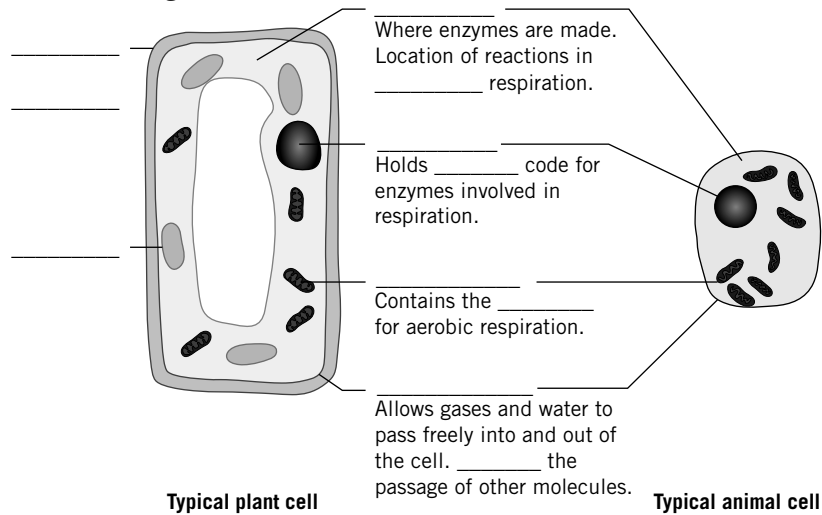
Anaerobic respiration in plant and _____ cells is represented by the equation

_____ → _____ + _____

Anaerobic respiration in yeast cells is called _____.

The products of fermentation are important in the manufacturing of _____ and _____.

Label the diagram.



Key terms

Make sure you can write a definition for these key terms.

aerobic amino acids anaerobic carbohydrates cellulose exothermic fermentation

fatty acid glycerol glycogen lactic acid lipids metabolism mitochondria

oxidation oxygen debt proteins respiration starch

Response to exercise

During exercise the human body _____ to the increased demand for energy.

To supply the muscles with more _____ blood, _____ rate, _____ rate, and breath _____ all increase.

If insufficient oxygen is supplied, _____ respiration takes place instead, leading to the build-up of _____.

During long periods of vigorous exercise, _____ become fatigued and stop contracting efficiently.

rest exercise recovery

blood levels of oxygen and lactic acid

time in minutes

No lactic acid builds up since there is enough oxygen for _____ respiration.

oxygen

lactic acid

This is the shortfall in _____ – making lactic acid builds up an oxygen debt.

This is the 'extra' oxygen required to pay off the _____.

Oxygen debt (HT only)

After exercise, the lactic acid accumulated during anaerobic respiration needs to be _____.

Oxygen debt is the amount of oxygen needed to react with the lactic acid to remove it from _____.

Removal of lactic acid

lactic acid in the _____

↓

transported to the _____ in the blood

↓

lactic acid is converted back to _____

Metabolism

Metabolism is the _____ of all the reactions in a cell or the body.

The energy released by _____ in cells is used for the continual enzyme-controlled processes of _____ that produce new molecules.

Metabolic processes include the synthesis and breakdown of:

Carbohydrates

• synthesis of larger _____ from _____ (starch, glycogen, and cellulose)

• breakdown of glucose in respiration to release energy

Lipids

• synthesis of _____ from one molecule of _____ and three molecules of _____

Proteins

• synthesis of _____ from _____ and _____ ions

• amino acids used to form _____

• excess proteins broken down to form _____ for excretion

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Retrieval questions

Answer the following questions using the information from the knowledge organiser.

B9 questions		Answers
1	Define the term cellular respiration.	
2	What do organisms need energy for?	<ul style="list-style-type: none">•••
3	What is the difference between aerobic and anaerobic respiration?	
4	Write the word equation for aerobic respiration.	
5	Write the word equation for anaerobic respiration in muscles.	
6	Write the balanced symbol equation for aerobic respiration.	
7	Why does aerobic respiration release more energy per glucose molecule than anaerobic respiration?	
8	What is anaerobic respiration in yeast cells called?	
9	Write the word equation for anaerobic respiration in plant and yeast cells.	
10	How does the body supply the muscles with more oxygenated blood during exercise?	
11	What substance builds up in the muscles during anaerobic respiration?	
12	What happens to muscles during long periods of activity?	
13	What is oxygen debt?	
14	How is lactic acid removed from the body?	
15	What is metabolism?	