Guess the revision topic

Code breaker!

Translate the keywords for the lesson in the back of your book

a	b	c	d	e	f	g	h	i
♋	♌	♍	♎	♏	♐	♑	♒	♓
j	k	l	m	n	o	p	q	r
♾	&	●	○	■	□	◘	❑	❒
s	t	u	v	w	x	y	z	?
⬩	♦	◆	❖	⬩	☒	⛢	⌘	✍

1) ♑●◆♍□⬩♏

2) ♏■♏❒♑⛢

3) □☒⛢♑♏■

4) ⬩♋♦♏❒

5) ♍♏●●⬩

Exercise

Surface area

Anaerobic

B2.4 Respiration

Carbon dioxide

Lactic acid

Oxygen

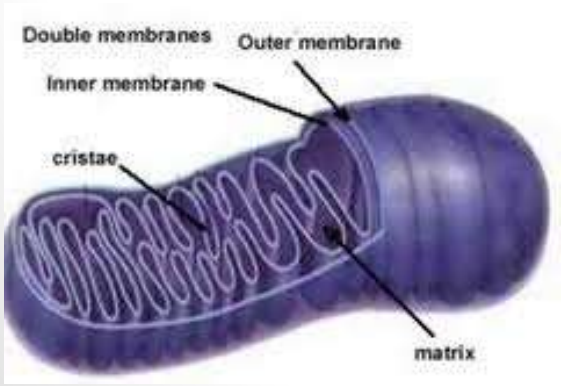
Energy

This is the equation for aerobic respiration:

Glucose + Oxygen ⟶ Carbon Dioxide + Water + Energy

$C_6H_6O_6 + O_2 \longrightarrow 6CO_2 + 6H_2O +$ Energy

Spot the mistake



Respiration occurs in every cell, in the mitochondria.
The matrix of the mitochondria increases the surface area for diffusion of gases.

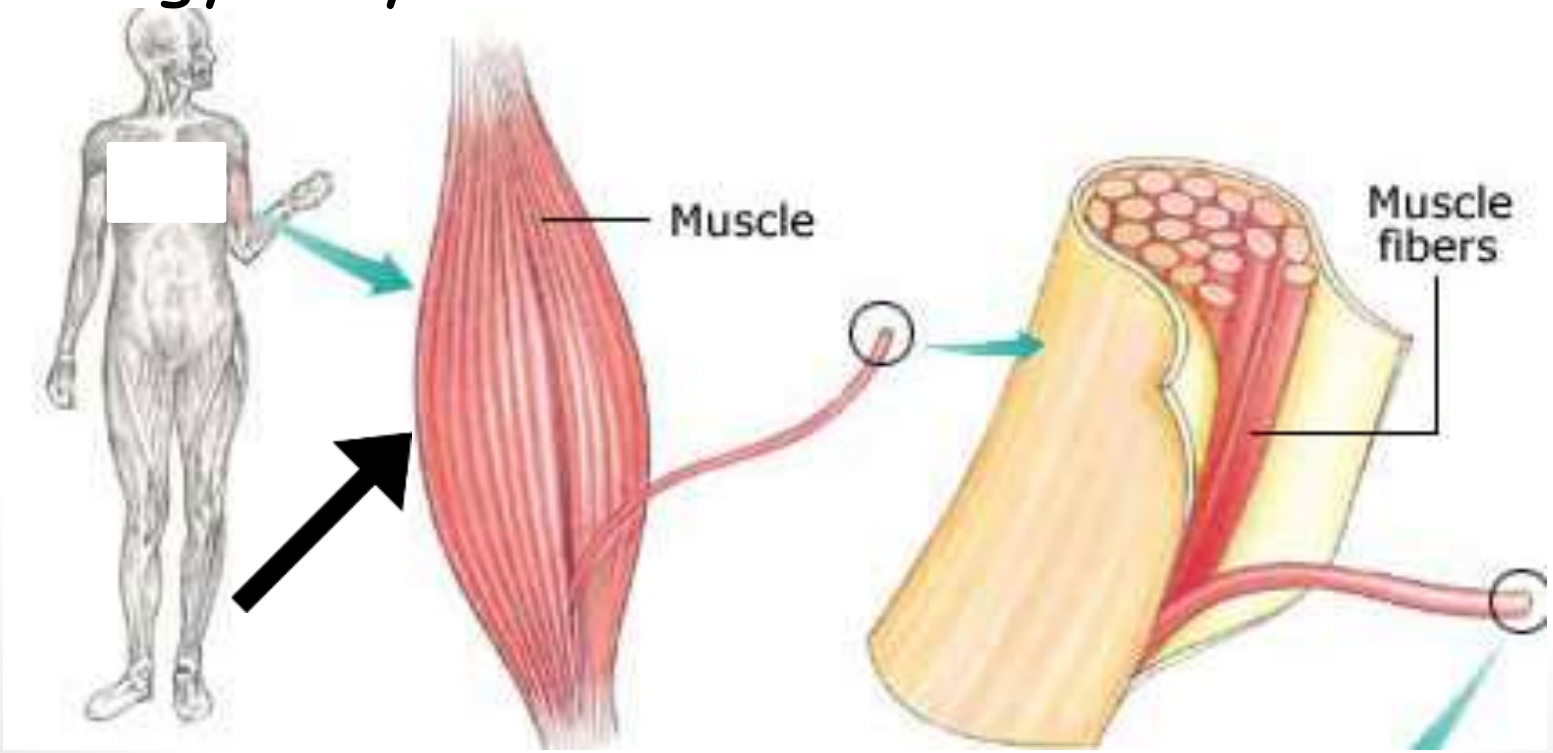
What's respiration used for?

Respiration is used for these key things:

- Use to make large molecules from smaller ones in plants e.g. sugars, nitrates and other minerals that are converted into amino acids. Amino acids are used to make proteins.
- Allow muscle contraction in animals
- Maintain a constant body temperature in birds and mammals

Effect of exercise on the body

- Muscles are made of protein fibres.
- Muscle fibres need a lot of energy to contract.
- The more the contract and work, the more energy they need.



Exercise

- Increased rate of contraction of the **muscles demands a higher supply of energy**.
- To provide this energy, the rate of respiration must increase. This requires more glucose and more **oxygen**.
- To supply more oxygen our **breathing rate increases**, causing more oxygen to diffuse from the alveoli into the capillaries around the lungs.
- As we increase the rate of respiration, more carbon dioxide is produced as a waste product and therefore increased ventilation also allows more carbon dioxide to diffuse out of the capillaries and into the alveoli to be exhaled.
- Once in the blood, the oxygen must be quickly transported to the muscle cells. The **heart rate increases**, to pump the blood more quickly around the body.

The body's response to low energy needs

During sleep, the body's energy needs are **low** and so the rate of aerobic respiration is **slow but steady**.

How does this affect the amount of glucose and oxygen needed?

low energy need → **low rate of aerobic respiration** → **low demand for glucose and oxygen** → **slow heart and breathing rates**

How does this affect the heart rate and breathing rate?

Under these resting conditions, the body has plenty of time to inhale oxygen and the blood is able to supply enough glucose and oxygen to the body's cells.

The body's response to high energy needs

During running, the body's energy needs are **high** and so the rate of respiration **increases** to meet this demand.

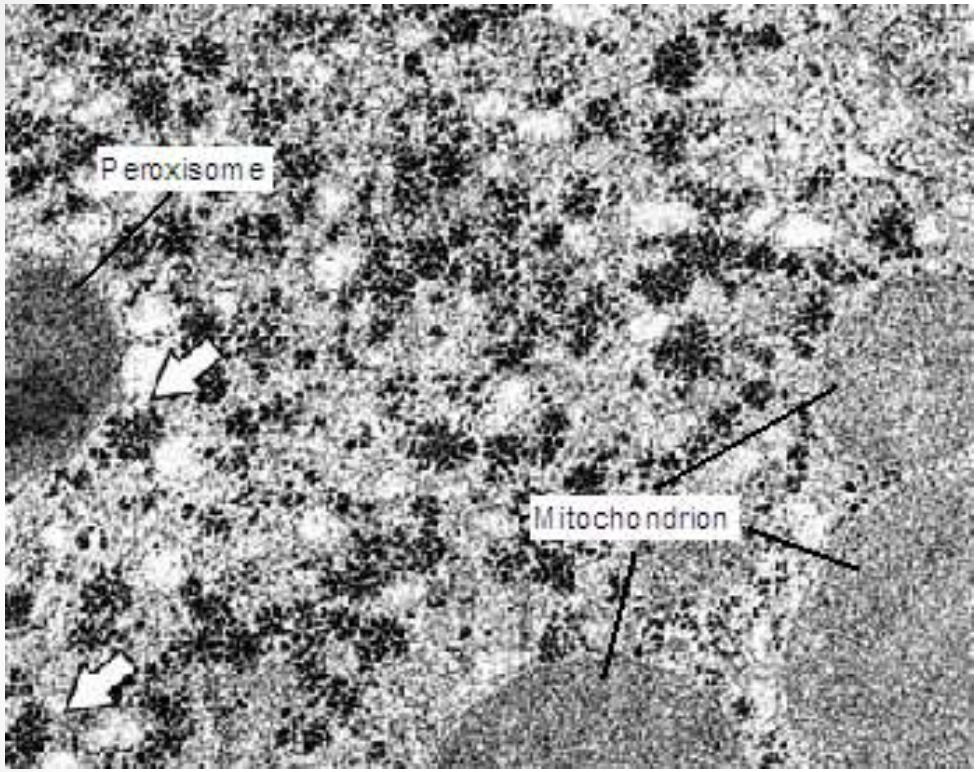
How does this affect the amount of glucose and oxygen needed?

high energy need → **high rate of aerobic respiration** → **high demand for glucose and oxygen** → **fast heart and breathing rates**

How does this affect the heart rate and breathing rate?

Under these tougher conditions, the body has to work hard to supply enough glucose and oxygen to the body's cells for aerobic respiration to produce enough energy.

Effect of Exercise on the Body



An electron micrograph showing a section of a liver cell. Glycogen deposits are shown by the arrows.

- Your muscles contain glycogen which is a stored carbohydrate.
- This can be converted quickly into glucose to supply the muscles with energy.

Anaerobic respiration

glucose → lactic acid + carbon dioxide + a little energy

When the demand for oxygen becomes too high, because the amount of energy required increases, the body respires anaerobically (without oxygen).

You are more likely to anaerobically respire if the exercise is:

- Longer
- More intense
- Without rest

Anaerobic respiration produces lactic acid, as the glucose cannot be broken down with oxygen, creating this waste product.

Lactic acid causes the muscles to feel fatigued and painful.