

Keywords: Artery, vein, capillary, heart, red blood cells, haemoglobin, plasma, platelets, inhalation/exhalation, ventilation, diffusion, lactic acid, aerobic, anaerobic, oxygen debt.

Yeast Cell

Bigger than Bacteria

As I exercise my heart and breathing rate will increase. Glycogen stores will be broken down into glucose. My blood will pump faster.

If you're using your muscle you'll need more glucose and oxygen, you'll produce more CO₂.

After long periods of exercise muscles will tire. Without sufficient oxygen they will respire anaerobically. Once exercise is over the oxygen debt will have to be repaid to break down the lactic acid made.

Respiration

Aerobic	Anaerobic
Glucose + O ₂ = CO ₂ + H ₂ O + Energy	Just Glucose (No Oxygen) = Lactic Acid + Energy (less energy)
Occurs in Mitochondria	Occurs in Cytoplasm

Why respire? Energy to build big molecules from small ones, move muscles and keep you warm.

What is the formula for aerobic respiration?

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + ATP$$

Glucose Oxygen Carbon Dioxide Water Energy

What is the role of mitochondria in respiration?

Respiration, the chemical reaction that releases energy from glucose, happens in mitochondria.

What is anaerobic respiration?

Anaerobic respiration is a type of respiration that does not use oxygen. It is used when there is not enough oxygen for aerobic respiration.

Why do organisms respire?

It is the way that energy is released from glucose so that all the other chemical processes needed for life can happen.

How does it cause muscle fatigue?

The waste product, lactic acid, builds up in the muscles causing pain (muscle fatigue and tiredness).

What is oxygen debt?

This is the amount of oxygen needed to oxidise lactic acid to carbon dioxide and water.

Y8 Circulation & Respiration

The Breathing System:

- Takes air into and out of your body.
- O₂ diffuses into your bloodstream and CO₂ diffuses out.
- Alveoli=large surface area, moist, thin walls.

Exhalation - diaphragm relaxes and moves up, intercostal muscles relax - ribs move down and in. Volume of thorax decreases, pressure rises air rushes out

The Circulatory System:

- The body transport system consists of blood vessels, the heart and blood.
- Human beings have a double circulation.
- the heart works as a pump moving blood around the body.
- the 3 main types of blood vessel are the Arteries (Away from heart), veins (INto heart) and capillaries.

Inhalation - diaphragm contracts and flattens, intercostal muscles contract - ribs move up and out. Volume of thorax increase, pressure falls air rushes in

The Blood

WHITE BLOOD CELLS- fights infections
PLATELETS- help blood to clot
PLASMA- holds dissolved substances, glucose (taken from the small intestine to the body organs), CO₂, waste products (urea from the kidneys)
RED BLOOD CELLS- No nucleus- more room for Haemoglobin
 Special shape with a lowered Centre- greater surface area to absorb gas
HAEMOGLOBIN- substance which gains oxygen from the lungs to form **OXYhaemoglobin**. Then releases oxygen into cells.

FIT & HEALTHY REVIEW – WHAT DO YOU KNOW?

Complete the equation for respiration:



Why do breathing rate and pulse rate increase when you exercise?

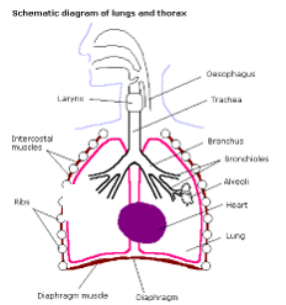
Your heart speeds up to pump extra food and oxygen to the muscles. Breathing speeds up to get more oxygen and to get rid of more carbon dioxide.

Fit people tend to have a lower resting pulse rate. Following exercise their pulse rate may return to normal faster than an unfit person. This is because your heart undergoes a training effect as you exercise and becomes more efficient in pumping out necessary oxygen. One of the benefits of exercise training is that your heart pumps out more blood with each beat, so it does not have to beat as often as it did when you were untrained. This causes your training heart rate to be lower, so your return time to your resting level will be shorter.

What is **aerobic** respiration?

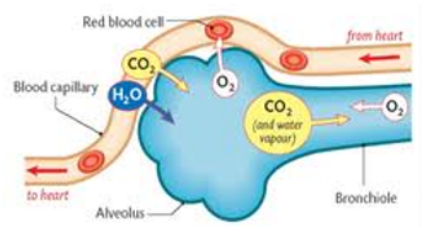
Respiration releases energy for cells from glucose using oxygen.

Label the diagram of the Breathing system



Breathing in or out	Ribs move in or out?	Diaphragm: up or down?	Air: more or less CO ₂ ?
Inhaling	out	down	less
Exhaling	in	up	more

The diagram shows gas exchange between a capillary and an air sac (alveolus).



Oxygen diffuses into the capillary. Carbon dioxide and water diffuse out of the capillary.

- What are the 6 main functions of the skeleton?
- 1) Protection
 - 2) Support
 - 3) Mineral storage
 - 4) Movement
 - 5) Producing red blood cells
 - 6) Endocrine regulation

FIT & HEALTHY REVIEW – WHAT DO YOU KNOW?

DEFINE:

RESPIRATION: A series of reactions in which energy is released from glucose.

BREATHING: A complex process where air travels into and out of the lungs.

INHALE: The drawing of air or other substances into the lungs.

EXHALE: The expelling of air or other substances out of the nose or mouth.

ALVEOLI: Tiny sacs within our lungs that allow oxygen and carbon dioxide to move between the lungs and bloodstream.

GAS EXCHANGE: The diffusion of gases from an area of higher concentration to an area of lower concentration

GLUCOSE: The main type of sugar in the blood and is the major source of energy for the body's cells.

BREATHING RATE: The number of breaths per minute.

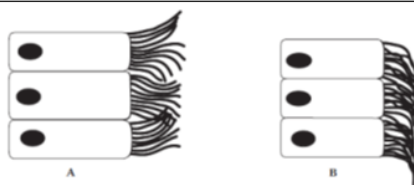
HEART RATE: The number of heartbeats per unit of time, usually per minute.

DRUG: substances that change chemical reactions in the body.

MEDICINAL DRUGS: Drugs relieve disease and illness, and are extensively tested before being used.

RECREATIONAL DRUGS: drugs such as alcohol and tobacco are taken by people because they like the effects they have on their bodies

ANTAGONISTIC PAIR: pairs of muscles create movement when one (the prime mover) contracts and the other (the antagonist) relaxes.



What are these 'hairs' called? cilia

Which diagram shows cells in a smoker's lungs? B

What effects might this have?

Normally these cilia move to push mucus out of the lungs. Damaged cells cannot do this, leading to a build-up of mucus and a smokers' cough.

What are the four factors?

- 1) speed
- 2) stamina
- 3) suppleness
- 4) strength

Suggest a sport which might improve all 4 boxing

Poison found in cigarette smoke	Effect
Nicotine	Causes addiction
Tar	Contains cancer causing chemicals (carcinogens)
Carbon monoxide	Decreases the ability of your blood to carry oxygen

Emphysema can damage the air sacs. How would this affect gas exchange?

The alveoli walls break down and join together, forming larger air spaces than normal. This reduces the efficiency of gas exchange, so people with the lung disease emphysema (a type of COPD or chronic obstructive pulmonary disease) carry less oxygen in their blood

Alcohol is a depressant. This means that it slows down the nervous system e.g. it increases reaction times.

Caffeine is a stimulant. This means that it speeds up the nervous system e.g. it reduces reaction times.

Muscles can only contract. They work in antagonistic pairs. This means that when one relaxes (gets longer & thinner), the other contracts (get shorter & fatter).