

Transport and exchange surfaces

Why must oxygen be transported to cells?

Transport and exchange surfaces

Why must carbon dioxide be transported away from cells?

Transport and exchange surfaces

What is urea and why is it transported?

Transport and exchange surfaces

Why are dissolved food molecules transported to cells?

Transport and exchange surfaces

Name six substances that need to be transported into or out of cells.

Transport and exchange surfaces

How do you calculate surface area : volume ratio?

Transport and exchange surfaces

What is the surface area : volume ratio of a 2 cm cube?

Transport and exchange surfaces

What happens to the surface area : volume ratio as an organism gets larger?

It is a waste product of respiration and must be removed from the body.

It is used in aerobic respiration to release energy.

To provide energy (from respiration) and materials for growth and repair.

A waste product. It is carried in the blood to the kidneys and removed in urine.

Surface area $\div$ volume, usually written as x : 1.

Oxygen, carbon dioxide, water, dissolved food molecules, mineral ions and urea.

It gets smaller.

$24 \text{ cm}^2 : 8 \text{ cm}^3 = 3 : 1$.

Transport and exchange surfaces

Why do single-celled organisms not need a transport system?

Transport and exchange surfaces

Why do multicellular organisms need exchange surfaces and a transport system?

Transport and exchange surfaces

What are alveoli?

Transport and exchange surfaces

Which way do oxygen and carbon dioxide diffuse at the alveoli?

Transport and exchange surfaces

Why do alveoli have walls only one cell thick?

Transport and exchange surfaces

Why is a good blood supply important for the alveoli?

Transport and exchange surfaces

How does breathing help gas exchange?

Factors affecting the rate of diffusion **Triple only**

Name three factors that affect the rate of diffusion.

They have a small surface area : volume ratio and long diffusion distances, so diffusion alone is too slow.

They have a large surface area : volume ratio and a short diffusion distance, so diffusion is fast enough.

Oxygen from the alveoli into the blood.
Carbon dioxide from the blood into the alveoli.

Tiny air sacs in the lungs where gas exchange takes place.

It carries oxygen away and brings carbon dioxide, maintaining a steep concentration gradient.

To give a short diffusion distance, so gases diffuse quickly.

Surface area, concentration gradient and diffusion distance.

Ventilation keeps oxygen high and carbon dioxide low in the alveoli, maintaining the concentration gradient.

Factors affecting the rate of diffusion **Triple only**

How does a larger surface area affect the rate of diffusion?

Factors affecting the rate of diffusion **Triple only**

How does a steeper concentration gradient affect the rate of diffusion?

Factors affecting the rate of diffusion **Triple only**

How does a greater diffusion distance affect the rate of diffusion?

Factors affecting the rate of diffusion **Triple only**

State Fick's law.

Factors affecting the rate of diffusion **Triple only**

What does the symbol $\propto$ mean?

Factors affecting the rate of diffusion **Triple only**

In Fick's law, what happens to the rate if the membrane thickness doubles?

Blood and blood vessels

What is the function of red blood cells?

Blood and blood vessels

What is haemoglobin?

It increases the rate of diffusion.

It increases the rate of diffusion.

Rate of diffusion is proportional to surface area $\times$ concentration difference $\div$ thickness of membrane.

It decreases the rate of diffusion.

The rate halves, if the other factors stay the same.

Is proportional to.

The red substance in red blood cells that combines with oxygen to form oxyhaemoglobin.

To carry oxygen from the lungs to the cells.

Blood and blood vessels

Why do red blood cells have a biconcave shape?

Blood and blood vessels

Why do red blood cells have no nucleus?

Blood and blood vessels

What do phagocytes do?

Blood and blood vessels

What do lymphocytes do?

Blood and blood vessels

What is plasma and what does it carry?

Blood and blood vessels

What are platelets?

Blood and blood vessels

How is an artery adapted to carry blood at high pressure?

Blood and blood vessels

How is a vein adapted to its function?

To make more room for haemoglobin.

It gives a large surface area for absorbing oxygen.

They produce antibodies that destroy pathogens.

They engulf pathogens and digest them.

Small fragments of cells with no nucleus that help the blood to clot.

The liquid part of blood. It carries blood cells, carbon dioxide, urea, digested food, mineral ions and hormones.

Thinner wall, wide lumen and valves to stop backflow of blood at low pressure.

Thick muscular wall, elastic fibres and a narrow lumen.

Blood and blood vessels

How is a capillary adapted for exchange?

Blood and blood vessels

Which direction does blood flow in arteries, veins and capillaries?

The heart and circulation

What is a double circulatory system?

The heart and circulation

What does the vena cava do?

The heart and circulation

What does the pulmonary artery do?

The heart and circulation

What does the pulmonary vein do?

The heart and circulation

What does the aorta do?

The heart and circulation

How do you calculate heart rate from cardiac output and stroke volume?

Arteries away from the heart, veins towards the heart, capillaries between them through the tissues.

Walls one cell thick for a short diffusion distance, and a large network for a large surface area.

Carries deoxygenated blood from the body to the right atrium.

One circuit takes blood from the heart to the lungs and back, the other from the heart to the body and back.

Carries oxygenated blood from the lungs to the left atrium.

Carries deoxygenated blood from the right ventricle to the lungs.

Heart rate = cardiac output $\div$ stroke volume.

Carries oxygenated blood from the left ventricle to the body.

The heart and circulation

What is the function of the heart valves?

The heart and circulation

Why is the left ventricle wall thicker than the right?

The heart and circulation

Why are the ventricle walls thicker than the atrium walls?

The heart and circulation

What is the equation for cardiac output?

The heart and circulation

What is stroke volume?

The heart and circulation

What is cardiac output?

The heart and circulation

What are the units of cardiac output?

Respiration

What does exothermic mean?

It pumps blood at higher pressure around the whole body. The right ventricle only pumps blood to the lungs.

To prevent backflow so that blood flows in one direction.

Cardiac output = stroke volume $\times$ heart rate.

The ventricles pump blood out of the heart, further than the atria pump it.

The volume of blood pumped out of the heart per minute.

The volume of blood pumped out of the heart in each beat.

A reaction that transfers energy to the surroundings.

cm³ per minute, if heart rate is in beats per minute and stroke volume in cm³.

Respiration

What is cellular respiration?

Respiration

Write the word equation for aerobic respiration.

Respiration

Write the symbol equation for aerobic respiration.

Respiration

What is anaerobic respiration in animal cells?

Respiration

What is anaerobic respiration in plant cells and yeast?

Respiration

Which releases more energy per glucose, aerobic or anaerobic respiration?

Respiration

Which type of respiration needs oxygen?

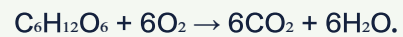
Respiration

What does a respirometer measure?

Glucose + oxygen → carbon dioxide + water.

An exothermic reaction which occurs continuously in living cells to release energy for metabolic processes.

Glucose → lactic acid, without oxygen.



Aerobic respiration, because glucose is completely broken down.

Glucose → ethanol + carbon dioxide, without oxygen.

The rate at which a living organism takes in oxygen, shown by the movement of coloured liquid in a capillary tube.

Aerobic respiration.

Respiration

Why is soda lime used in a respirometer?

Respiration

In a respirometer, which way does the coloured liquid move and why?

Respiration

Name two control variables in the respirometer investigation.

Towards the organisms, because the volume of gas falls as oxygen is used up.

To absorb the carbon dioxide produced, so the change in gas volume is due to oxygen used up.

Any two of: mass of organisms, type of organism, time, volume of soda lime.