

Transition work

Read through all of the pages and answer all of the answers

Respiration in terms of energy

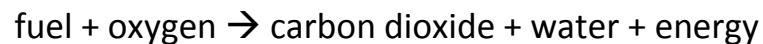
What I should know	☺	☹	☹
State the equation for respiration (anaerobic and aerobic)			
State the equation for burning			
Compare respiration to burning			
Explain why respiration is important			
State what ATP is needed for			

Fire fighting and...

Fire fighters love to put fires out. When fire fighters are at a fire they know that energy is being given off, this is usually in the form of light, heat and sound. Carbon dioxide and water are also produced; often fire fighters wear oxygen masks in order to breath. Oxygen is always needed for something to burn as well energy as to start it going and a fuel.



http://www.dot.gov/ost/et/images/montana_fire/MontanaFire.jpg

**Fire fighters.**

Fire fighters are also into burning. They 'burn' glucose in their food to create energy for their body to use when they are fighting fires. In fact, we all burn the glucose that is found in our food to produce ATP. ATP is needed for us to do anything. Our bodies can 'burn' glucose with or without oxygen. When anything reacts with oxygen it is called **oxidation**.

Aerobic respiration**Anaerobic respiration**

Why two forms of respiration?

Sometimes we cannot get enough oxygen in to our cells for them to respire and produce the needed energy. When this happens the cells anaerobically respire, however, this form of respiration doesn't produce as much energy. It also creates a build up of lactic acid (which causes us to have a 'stitch') so we can't do this type of respiration for long.

Why do we need to respire?

Don't confuse respiration with inhaling and exhaling. Respiration happens in cells and does so to create the energy needed for all things (including the seven life processes).

When we respire our energy comes in the form of ATP this is needed for:

- Muscle contraction
- Active transport
- Nerve impulses
- Sperm swimming
- Metabolism

Revision technique

You know 'MRS GREN', you could also learn 'MANS metabolism'

Movement
Respiration
Sensitivity

Growth
Reproduction
Excretion
Nutrition

Questions

1. Respiration continuously occurs in every cell of the human body.
 - a. State 2 things that energy is needed for.
 - b. Explain the importance of respiration
2. Compare burning and respiration (both types)
3. Complete the following:
 _____ occurs in every cell. When there isn't enough oxygen _____ respiration occurs; a product of this is _____. Stored energy (in the form of _._._) is produced through this type of respiration. Aerobic respiration uses _____ as well as glucose and produces _____, _____ and ATP.

Cellular respiration

What I should know	😊	😐	😞
Know where the substrates of respiration come from			
Know where the products of respiration go to			
Understand the process of respiration			
Understand how both the respiratory system and the circulatory system are used in this process			

What's really happening?

Respiration, in short, is the process by which the glucose in food is broken down in order to release energy. This can happen with oxygen (aerobic respiration) but also without oxygen (anaerobic respiration). Both ways will always produce the energy our body needs.

Can you remember the equations for respiration??

Aerobic:



Anaerobic:

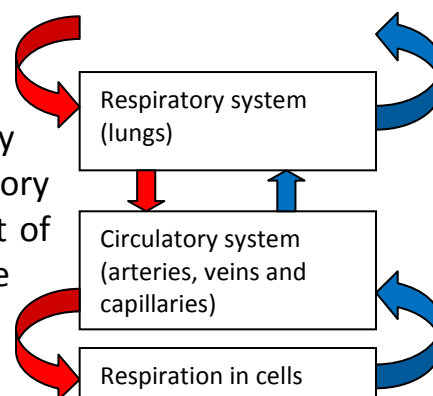


But respiration isn't quite as simple as that, this reaction is more complex than it first looks:

Simplification	Reality
Glucose is the only substance broken down	Our body also oxidises proteins and fats to release energy
The energy is released in a single step	Respiration occurs in small steps, releasing small bits of energy at a time. This is controlled by enzymes.
Glucose is fully broken down	When the respiration process occurs without oxygen the glucose is not always broken down and so less energy is produced

It's all about team work...

Cellular respiration occurs because there are two systems working together; the respiratory system and the circulatory system. The respiratory system gets oxygen in to and carbon dioxide out of the body and the circulatory system gets the substances around the body to get to or away from the cells.



If these are not working properly than there will be issues with cellular respiration and the amount of energy that is produced.

Asthma

During an asthma attack the lungs become severely restricted; this means that there is not as much oxygen getting into the respiratory system or into the circulatory system. The cells struggle to respire aerobically. They respire anaerobically which doesn't produce as much energy. Inhalers work by decreasing the restriction and increasing the air flow to restore aerobic respiration.

Chronic Obstructive Pulmonary Disorders (COPD) bronchitis or emphysema

These diseases restrict the respiratory system and will reduce the amount of oxygen getting into the body to be used by cells for respiration.

Anaemia

Anaemia causes there to be a lack of haemoglobin in the red blood cells. This does not reduce the amount of oxygen getting into the body through the respiratory system but it does mean that not as much oxygen gets around the body in the circulatory system. The cells constantly function and respire with a lack of oxygen and so do not produce as much energy. People with anaemia often feel incredibly tired.

Research

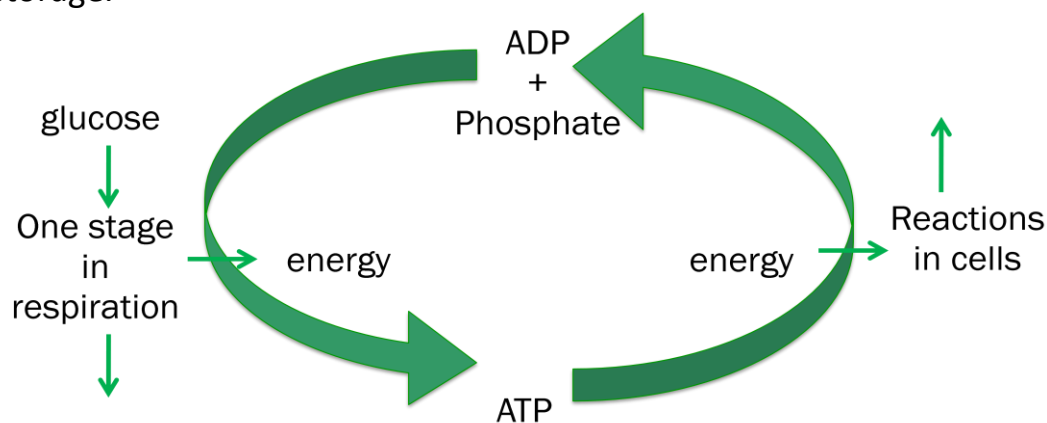
Look up some other problems which can affect either the respiratory or circulatory system. Describe how it affects the system and what this causes.

A deeper look at cellular respiration

What I should know	😊	😐	😞
Know what is A.T.P.			
Describe the process that A.T.P. goes through to be made			
State where A.T.P. is produced			
Describe how oxygen debt is created and what is done to pay it back			

A.T.P. – the mini energy packet

A.T.P. (Adenosine triphosphate) is the form in which energy is made available to the cells to use (it acts like tiny packets of energy). Energy is released when the A.T.P. breaks down to form A.D.P. (Adenosine Diphosphate and an extra phosphate). The energy released can then be used throughout our bodies. During respiration the energy created in the breakdown of glucose is used to turn the A.D.P. back into A.T.P. for storage.



The A.T.P. is made in the mitochondria in the cells but once made it is stored in the cytoplasm. The mitochondria contain enzymes which can break down the glucose and release energy to change the A.D.P. into A.T.P.

Remember the respiratory and circulatory systems get the oxygen into and around the body to reach all the cells. The oxygen is then used in the break down of glucose. The more oxygen that can reach the cells the more aerobic respiration can occur which speeds up the breakdown of glucose. More A.T.P. is produced and stored ready to produce energy to use. Without oxygen anaerobic respiration occurs which does not produce as much A.T.P.

	Aerobic respiration	Anaerobic respiration
Substrate	Glucose Oxygen	Glucose
Products	Carbon dioxide Water	Lactic acid
Amount of A.T.P. per molecule of glucose	38	2

Oxygen Debt

Oxygen Debt occurs when the demand for oxygen is greater than the supply – your body has to work hard and even though a lot of oxygen is getting into your body it is not always enough. Your body then begins to use anaerobic respiration, building up lactic acid – you can only anaerobically respire for approximately 60 seconds. To get rid of the build up of lactic acid you need oxygen. This debt is paid back once you finish the exercise. This is why your breathing and heart rate remains higher than normal for a while after you have finished the exercise.

Questions

1. State who would have the most oxygen debt to pay back; a sprinter or a marathon runner? Explain why this is.
2. Draw out the A.D.P. \leftrightarrow A.T.P. diagram. Then describe what is happening in your own words.
3. Describe and explain what happens to the following during and just after exercise:
 - a. Breathing rate
 - b. Heart rate
 - c. Blood glucose levels
 - d. Blood oxygen levels
 - e. Oxygen debt

Cellular Respiration Revision

What I should know (from the scheme of work)	😊	😐	😞
compare cellular respiration to the burning of fuels			
outline why humans need to respire, with reference to muscle cell contraction, nerve impulse transmission, active transport and metabolic reactions			
state that ATP provides the immediate source of energy for biological processes			
describe how the circulatory and respiratory systems both play a part in the process of respiration			
state the differences between aerobic and anaerobic respiration in terms of their location within cells, substrates, products and quantity of energy made available to a respiring cell			
relate cellular respiration to what happens in a muscle cell during various levels of physical activity			

But how do I revise?!?

There are lots of different ways to revise and you have to find the way that works best for you – that is the way that helps you remember the most (this may not be the most fun!). You could try:

1. Looking back through all your notes for this section and writing down all the facts that you need to learn. Have a go at learning them off by heart and get a friend to test you.
2. Write a quiz for all the facts you just need to know.
3. Draw out a spider diagram that covers all the areas from this topic.
4. For each section of the module write down 10 points that you need to understand. Find a way of simplifying them to learn – then get someone to test you.
5. Draw out the two diagrams from this topic (plus any others you may have drawn in class). Describe and explain them using words.

Exam Questions

1. Describe how the respiratory system and the circulatory system work together.

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..... (4)

2. Complete the table

	Anaerobic respiration	Aerobic respiration
Substrates	1.	1. 2.
Products	1. 2. ATP	1. 2. 3. ATP
No. of ATP molecules per molecule of glucose		
Example of activity		

(10)

3. Compare respiration and burning

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..... (5)

4. State two uses of respiration.

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..... (2)

5. State and explain what happens to the concentration of glucose during exercise

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6. State and explain what happens to the amount of ATP during exercise

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7. State and explain what happens to the amount of lactic acid during exercise such as sprinting

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