

ACET Junior Academies'

Scheme of Work for Science

Big Idea – Living Things

Year 6 – Healthy Humans



About this unit:

PoS – Animals including humans

In this unit, students will be looking at the human body as a whole, and realising that the role of the blood is as a delivery service of food and oxygen for all the systems of the body. It is tempting to use this unit to try and teach the students the structure of the heart and the vessels involved with it, but students do not need to know these details – it's far more important that they understand the concepts involved. Many secondary students have not grasped what the role of the heart and the blood are in the body, and it makes trying to learn further biological concepts difficult. During this unit, students should learn that the heart beats twice – once to collect oxygen, and another time to deliver that oxygen all around the body. The heart beats faster to make this happen at a faster rate, when we are using our muscles, and there are health implications if the efficiency of the heart is affected.

In KS2 the students learn that we need food and air to stay alive. Students may know that humans need oxygen, but it's important that they don't think that oxygen 'turns in to' carbon dioxide. We *use up* the oxygen inside our bodies, and we *produce* carbon dioxide as a waste product (they should learn about substances changing in this way in Y5). This concept does not need to be taught to students – more important is that the food and air we need is delivered by the blood – but if they do discuss oxygen and carbon dioxide, it's important that it is in the this context. Focus on **the blood as a delivery service, and consider where it is going, and how quickly**, rather than what is actually happening to the oxygen and carbon dioxide – Y11 students can struggle with this.

There is a second unit later in the year – 'Nutrition and transport', where we will look at the digestive system and the kidneys.

Unit structure

This unit is structured around seven science enquiries:

1. What's inside?
2. How does the circulatory system work?
3. Have you got a motorway inside you?
4. Can you make it into a game?
5. What does exercise do to your heart?
6. How does lifestyle affect health?
7. Why did the Government ban smoking in public places?

Links to previous and future National Curriculum units

Y2 – health & hygiene
Y3 – nutrition, skeleton & muscles
Y6 – nutrition and transport

- KS3&4 - Biology

Enquiry 1: What's inside?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y2 Health & hygiene Y3 Nutrition, skeleton & muscles	EA – research Asking questions Making predictions Interpreting and communicating data	Can your children: - Locate the position of the principal organs in the body - Describe the role of some of the organs	Horizontal: Vertical:
	Key concepts:		
	There are many important organs and systems in the body. The systems in our bodies work together.		
Key terms		Common misconceptions	
Brain, heart, lungs, stomach, liver, kidneys, intestines, skeleton, muscles, circulatory system, nervous system, digestive system, skeletal system, muscular system,		<i>Students often don't realise that the 'nervous system' is all the nerves in the body, including the brain, which help us sense, think and respond. The skeletal and muscular systems can be combined into the musculoskeletal system</i>	
Suggested activities		Resources	Useful links
Draw outlines of each other on long rolls of paper, fill in all the organs that you can think of. Students should be encouraged to 'fill in the gaps' – muscles, brains, skeleton etc. Review Y3 & Y4. They should research the positions of the principal organs – see key terms – and try and name the system they are part of. Carry out an activity to review the systems – layer them on top of each other. Students are NOT expected to recall names of systems, which organs are in them, or how they work. This activity is to lead them towards a realisation that everything inside them works together, and that they will need energy. We will be looking at more of the systems later in the year. What parts of the body need food and air? <i>All parts, the food and air is delivered everywhere by the blood – but students should be encouraged to ask their own questions rather than just be 'taught' this.</i> Students are likely to have done something similar previously, but this activity should enable students to bring what they know about the body together, and start to think of it as a whole system . How does it all fit together? How do the different parts work together? What do they need? Does one system help another system? Start to develop the idea that the blood works as a delivery system for the rest of the body.		Long rolls of paper Information about the organs and systems in the human body – digestive, nervous, circulatory, musculoskeletal	https://www.youtube.com/watch?v=8fG5Pxr9ZQ0 https://www.bbc.co.uk/bitesize/clips/z7kq7nb Organs of the human body

Enquiry 2: How does the circulatory system work?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 – health & hygiene Y4 – nutrition, skeleton & muscles	EA – Problem solving Asking questions Making predictions	Can your children: <ul style="list-style-type: none">- State that the heart has two sides- Tell you that the heart pushes the blood to get oxygen gives it a second push around the body <i>GD – discuss collecting nutrients as it goes around the body</i>	Horizontal: Vertical: KS3&4 Biology
	Key concepts:		
	The heart pushes the blood to the lungs to get oxygen. When the blood has oxygen, the heart pushes it round the body to deliver oxygen.		
Key terms		Common misconceptions	
Heart, side, half, pump, lungs, oxygen, body <i>Oxygenated, deoxygenated</i>		<i>Most diagrams of the heart available online are far too complex for Y6 (and often for y11). They do NOT need to interpret a 'realistic' diagram of the heart – it's much more important that they understand the basic structure and function of the heart, as outlined below.</i> Oxygen does NOT get 'turned into' carbon dioxide. The oxygen we get is used up around the body.	
Suggested activities		Resources	Useful links
The key concepts are surprisingly hard for students to grasp and put into context. Focus on the students understanding this, and applying it in all the lessons to come, rather than on labelling parts of the heart. Students should be asking lots of questions to make sure they have understood what is going on. Circulatory system. 'Two halves' of the heart. One half pumps the blood to the heart to collect air from the lungs and take it back to the heart. The other half pumps the blood around the body (<i>GD students can look at how it collects nutrients from the digestive system on the way past</i>) and back to the heart. See diagrams in resources - and common misconceptions. Students can look at more 'realistic' diagrams of the heart, but should not be expected to learn them.		Simplified heart diagram – don't use a 'realistic' diagram of the heart as it's too confusing Heart jigsaw Heart dissection Red & blue straws or wool, to track the pathway of the oxygenated and deoxygenated blood	https://www.youtube.com/watch?v=WBwPhWAP394 Heart dissection – students don't need to know this level of detail, but it's useful for teachers background knowledge. Be aware that when you buy hearts from the butchers, the top is often cut off, and it can be difficult to identify the veins and arteries – although the students can help with problem solving! – and can lead to misconceptions that the atria are 'open' at the top.

<p>Students should learn/colour the simplified diagram of the heart, and only then try and compare it to a more realistic diagram.</p> <p>Heart dissection – opportunities for observation, for describing different parts, and for art. Students enjoy seeing string/straws being passed through the vessels in the order that the blood would flow. Red/blue can be used – <i>but how does this fit in with 'air'?</i></p>		
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Enquiry 3: Have you got a motorway inside you?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 – health & hygiene Y4 – nutrition, skeleton & muscles	EA – Pattern seeking	Can your children: <ul style="list-style-type: none">- State arteries, capillaries and veins are all types of blood vessels- Tell you that capillaries branch out to deliver blood to all parts of the body	Horizontal: Vertical: KS3&4 Biology
	Asking questions Making predictions Observing and measuring		
	Key concepts: Air/oxygen and food needs delivering to every part of the body. It is taken quickly along arteries, branches out through smaller capillaries, and returns to the heart through veins.		
Key terms		Common misconceptions	
Artery, vein, capillary, fast, slow, branch, delivery, food, air, oxygen			
Suggested activities		Resources	Useful links
<p>The blood vessels. Look at a motorway map of the UK. The motorways don't reach everywhere – they need to branch out into smaller roads in order to reach all the people. Use this to emphasise that we need blood vessels in order to carry blood (and therefore the air and food) to all parts of the body. The food & oxygen have been taken to the organs and limbs through arteries, the blood spreads out for 'delivery' through the capillaries, and the blood is returned to the heart through the veins.</p> <p>Look at arteries, veins and capillaries. They form a network throughout the body. <i>Beware of some images which show 'gaps' – students should be aware that the network of vessels extend throughout the whole body, just as every home in the UK has a road leading to it, even if it's a tiny track – and each road leads back to a bigger one until you get to the motorways.</i></p> <p>Collect earthworms from outside, and examine them through hand lenses. Can you see the food moving through the food channel? Can you see the blood moving through vessels? GD – compare vessels of worms and humans. GD ONLY – do you think a worm has lungs? How do you think it gets the air it needs?</p> <p>Students can look at the inside of their wrists. They can learn to take their pulse, and relate their pulse rate to their heart rate.</p>		<p>Go outside Hand lenses</p> <p>Y6 – 'Arteries and veins' – gives an overview, but doesn't show the full extent of the capillary network</p> <p>Stopwatches/timers for taking pulses</p>	<p>https://www.pinterest.co.uk/pin/243616661068240835/ Image shows the extent of the capillary network relatively realistically</p>
Enquiry 4: Can you turn it into a game?			

Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 – health & hygiene Y4 – nutrition, skeleton & muscles	Asking questions Making predictions Interpreting & communicating data Key concepts: The heart pumps twice – once to collect oxygen, and once to take deliver oxygen around the body. When the blood has been to the lungs it is <i>oxygenated</i> /has air in it, and when it has been around the body it is <i>deoxygenated</i> /has no air in it.	Can your children: <ul style="list-style-type: none"> - Tell you that the heart pushes the blood to get oxygen gives it a second push around the body - Describe where the blood is oxygenated and deoxygenated 	Horizontal: Art/D&T Vertical: KS3&4 Biology
Key terms		Common misconceptions	
Heart, pump, twice, lungs, body, <i>oxygenated</i> , <i>deoxygenated</i> , vessel, artery, vein, capillary			
Suggested activities		Resources	Useful links
Students can design and make a board game to illustrate what happens in the circulatory system. It should show that the heart 'pushes' blood to collect oxygen, and then returns to the heart for another push so it can deliver that oxygen around the body. <i>Greater depth – more things to consider:</i> <i>Where will the blood be moving fastest/slowest?</i> <i>Where does oxygen need delivering to?</i> <i>Should you consider collecting some food? - this happens during the journey past the intestines, there is no 'special trip' as to the lungs</i> <i>Your body produces carbon dioxide as waste – it needs picking up from around the body, and dropping off at the lungs</i>		Materials for making a board game – cardboard, paper, etc	http://www.collaborativelearning.org/bloodcirculation.pdf http://www.ellenjmchenry.com/homeschool-freedownloads/lifesciences-games/documents/CirculationGame.pdf - GD - this discusses picking up waste and delivering it to the lungs and kidneys http://www.st-marks.islington.sch.uk/home-learning/the-circulation-game/

Enquiry 5: What does exercise do to your heart?

Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 – health & hygiene Y4 – nutrition, skeleton & muscles	<p>EA – Pattern seeking</p> <p>Asking questions Making predictions Recording data</p>	<p>Can your children:</p> <ul style="list-style-type: none"> - State that when you exercise your heart beats faster - Identify the variables in their investigation 	<p>Horizontal: History – WW2 PE Maths – collecting data</p> <p>Vertical: KS3&4 Biology</p>
	Key concepts:		
	<p>When you use your muscles more, your heart beats faster GD - <i>and you breathe faster.</i></p> <p>Your heart beats faster because it needs to deliver oxygen to your muscles faster GD - <i>because they are using it up faster.</i></p>		

Key terms

Exercise, heart rate, pulse, fast, slow, deliver, variable, change, measure, constant

Suggested activities

Investigation – WW2 ‘boot camp’ – what **immediate** impact does exercise have on the body (link to Y3 – skeleton and muscles – muscles need oxygen/air to work). Soldiers in WW2 would have had boot camp/fitness training. Students can do the type of exercises soldiers would have done, and investigate what happens to your heart while you are doing that exercise.

Does it make your heart beat faster? You breathe faster? Students to plan their own investigation. What are their variables – Independent, dependent and control. They don't need to use these terms, but they do need to be able to tell you the one thing they'll change, the one thing they'll measure, and all the things they'll keep the same.

Students should record their data methodically, and draw graphs to help them interpret their results. They should be able to see relationships between their variables.

Students should draw definite conclusions from their investigations. Link the reasons why with the previous lessons (heart beats faster to deliver oxygen/food faster, breathe faster in order to deliver oxygen to the muscles faster).

Common misconceptions

Delivering oxygen 'faster' is not the same as delivering 'more oxygen'. No need to teach the students this, just avoid introducing/reinforcing the misconception.

Resources

Space to do star jumps/sprints/some other cardiovascular exercise

Stopwatches/timers

Students will need to be able to take their pulses

Useful links

[illegible]

Enquiry 6: How does lifestyle affect health?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 – health & hygiene Y4 – nutrition, skeleton & muscles	EA - Research	Can your children: <ul style="list-style-type: none">- Identify changes in lifestyle since WW2- Suggest a link between an aspect of lifestyle and health	Horizontal: Vertical: KS3&4 Biology
	Asking questions Making predictions Interpreting and communicating data		
	Key concepts:		
	Lifestyle involves the food you eat, how much you exercise, work, stress levels and how you spend any relaxation time. Different lifestyles have different impacts on health.		
Key terms		Common misconceptions	
Balanced diet, processed food, exercise, sleep, enough, too much, opportunity			
Suggested activities		Resources	Useful links

<p>Look at the difference between children during WW2 and children today. How are their lifestyles different? Consider food, exercise and lifestyle</p> <p>Watch the clip in links – the importance of a balanced diet, exercise and sleep. Now consider how these things have changed for children since WW2.</p> <p>Food – may have been more wholesome/natural/homegrown, but less available Activity – may have been more outdoors/fewer screens, but less opportunity for sports</p> <p>Present a comparison – as a poster, display, presentation.</p> <p>Students could research the development of penicillin, and how this not only improved outcomes for soldiers during the war, but for all hospital patients ever since.</p> <p>If you are reviewing a balanced diet, be sure to use the Eatwell guide as opposed to the eatwell plate. https://www.nhs.uk/live-well/eat-well/the-eatwell-guide/ </p>	<p>Information about children during wartime Information about food available during wartime</p>	<p>https://www.bbc.co.uk/bitesize/topics/zrffr82/articles/ztsqfcw Humans need a balanced diet, exercise and sleep</p>
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Enquiry 7: Why did the Government ban smoking in public places?			
Links to previous learning	Scientific skills	Assessment criteria	Curricular links
Y3 – health & hygiene Y4 – nutrition, skeleton & muscles	EA – Problem solving	Can your children: <ul style="list-style-type: none">- State that smoking can damage the heart- Tell you about something the Government has done to reduce the number of smokers	Horizontal: Vertical:
	Asking questions Making predictions		
	Key concepts: Amongst other effects, smoking can damage the heart and stop it from working effectively. The Government has introduced lots of measures to try and stop people from smoking.		
Key terms		Common misconceptions	
Smoking, tobacco, heart disease, law, ban, regulation			
Suggested activities		Resources	Useful links
Look at photos etc. of soldiers and others during WW2 – specifically at smoking. Compare how attitudes to smoking were different then and now. Look at Government advice – on cigarette packets etc – and regulations – smoking in bars, age restrictions, cost of cigarettes, support to stop smoking etc. Link the changes to discoveries that scientists have made. They could collate adverts from cigarette packets to make a comprehensive list of all the things that cigarette smoke can do to you. Greater depth – look into why the Government invests money on stopping people smoking – awareness of the cost of caring for them, loss of workforce etc.		Pictures of WW2 soldiers and civilians smoking	https://www.bhf.org.uk/informationsupport/risk-factors/smoking Risk factors – smoking https://www.bbc.co.uk/bitesize/clips/zrgvr82 Lungs and keeping them healthy