

Cambridge **TECHNICALS LEVEL 3**

# **APPLIED SCIENCE**

Cambridge  
**TECHNICALS**  
**2016**

Unit 4 – Human physiology  
**DELIVERY GUIDE**

Version 2



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# INTRODUCTION

This Delivery Guide has been developed to provide practitioners with a variety of creative and practical ideas to support the delivery of this qualification. The Guide is a collection of lesson ideas with associated activities, which you may find helpful as you plan your lessons.

OCR has collaborated with current practitioners to ensure that the ideas put forward in this Delivery Guide are practical, realistic and dynamic. The Guide is structured by learning outcome so you can see how each activity helps you cover the requirements of this unit.

We appreciate that practitioners are knowledgeable in relation to what works for them and their learners. Therefore, the resources we have produced should not restrict or impact on practitioners' creativity to deliver excellent learning opportunities.

Whether you are an experienced practitioner or new to the sector, we hope you find something in this guide which will help you to deliver excellent learning opportunities.

If you have any feedback on this Delivery Guide or suggestions for other resources you would like OCR to develop, please email [resources.feedback@ocr.org.uk](mailto:resources.feedback@ocr.org.uk).

## OPPORTUNITIES FOR ENGLISH AND MATHS SKILLS DEVELOPMENT AND WORK EXPERIENCE

We believe that being able to make good progress in English and maths is essential to learners in both of these contexts and on a range of learning programmes. To help you enable your learners to progress in these subjects, we have signposted opportunities for English and maths skills practice within this resource. We've also identified any potential work experience opportunities within the activities. These suggestions are for guidance only. They are not designed to replace your own subject knowledge and expertise in deciding what is most appropriate for your learners.



English



Maths



Work

### Please note

The activities suggested in this Delivery Guide **MUST NOT** be used for assessment purposes. The timings for the suggested activities in this Delivery Guide **DO NOT** relate to the Guided Learning Hours (GLHs) for each unit.

Assessment guidance can be found within the Unit document available from [www.ocr.org.uk](http://www.ocr.org.uk). The latest version of this Delivery Guide can be downloaded from the OCR website.

## UNIT AIM

This unit aims to enable learners to understand why the essential processes such as the digestive, musculoskeletal, cardiovascular and respiratory systems are so important in maintaining health, and how organs and body systems have to interact to ensure that the body can provide the conditions necessary for movement and growth and protection.

Unfortunately things do go wrong and each system has well-known associated malfunctions. This unit will target some of the more common ones that relate to each system allowing learners to appreciate the effects on individuals and what has to be done, on possibly a daily basis, to enable them to lead as full and independent life as possible.

At the end of the unit, you will have knowledge and understanding of how body systems are structured, how they function and how they are inter-related. You will also gain practical skills in measuring using cardiovascular and respiratory monitoring equipment on human volunteers.

### Unit 4 Human physiology

<b>LO1</b>	Understand the structure and functions of the digestive system
<b>LO2</b>	Understand the role and function of the musculoskeletal systems
<b>LO3</b>	Be able to assess how the cardiovascular system functions in the body
<b>LO4</b>	Be able to assess how the respiratory system functions in the body
<b>LO5</b>	Understand how homeostasis maintains balance within the body
<b>LO6</b>	Understand the role and function of the immune system

To find out more about this qualification, go to: <http://www.ocr.org.uk/qualifications/vocational-education-and-skills/cambridge-technicals-applied-science-level-3-certificate-extended-certificate-foundation-diploma-diploma-extended-diploma-05847-05849-05879-05874-2016-suite/>

Cambridge  
TECHNICALS  
2016

### 2016 Suite

- New suite for first teaching September 2016
- Externally assessed content
- Eligible for Key Stage 5 performance points from 2018
- Designed to meet the DfE technical guidance

# RELATED ACTIVITIES

The Suggested Activities in this Delivery Guide listed below have also been related to other Cambridge Technicals in Applied Science units/Learning Outcomes (LOs). This could help with delivery planning and enable learners to cover multiple parts of units.

This unit (Unit 4)	Title of suggested activity	Other units/LOs	
<b>LO1</b>	Enzyme practical 1: effects of pH	Unit 7 Human nutrition	LO1 Understand human nutritional requirements in the maintenance of health
	Enzyme practical 2: effects of temperature		
	Enzyme practical 3: how the gut works	Unit 17 Food technology	LO1 Understand the main features of food manufacturing operations
	Enzyme practical 4: lactose-free milk		
<b>LO2</b>	Microscope work on bone and striated muscle	Unit 8 Cell biology	LO2 Be able to use cytological techniques
<b>LO3</b>	Microscope work on cardiac muscle	Unit 8 Cell biology	LO2 Be able to use cytological techniques
<b>LO4</b>	Microscope work on tissues of gas exchange	Unit 8 Cell biology	LO2 Be able to use cytological techniques
<b>LO5</b>	The concept of homeostasis 3: effects of salt concentration on stability of red blood cells	Unit 8 Cell biology	LO1 Understand the functions of the plasma membrane and endomembrane systems
<b>LO6</b>	Components of the immune system card sort	Unit 8 Cell biology	LO2 Be able to use cytological techniques

# KEY TERMS

## Explanations of the key terms used within this unit, in the context of this unit

Key term	Explanation
<b>Absorption</b>	Soluble molecules are moved into the blood from the lumen of the intestine into the bloodstream.
<b>Antibodies</b>	Proteins made by plasma cells. They have variable regions, which give them an immense range of shapes. Each antibody recognises and binds with a specific shape of antigen.
<b>Antigen</b>	A molecule which stimulates an immune response.
<b>Artery</b>	Vessel which takes blood away from the heart.
<b>Assimilation</b>	A molecule becomes an integral part of the body's processes.
<b>Atrium</b>	Small chamber on each side at the top of the heart.
<b>Autonomic</b>	Means 'self-governing'. The conscious part of ourselves has little control over the autonomic section of our nervous system.
<b>Bacteria</b>	Are single living cells.
<b>Bronchoconstriction</b>	The smooth muscles in the walls of the bronchioles contract, narrowing the lumen.
<b>Bronchodilation</b>	The smooth muscles in the walls of the bronchioles relax, widening the lumen.
<b>Capillaries</b>	Very narrow vessels which supply blood to tissues, and which connect arteries to veins.
<b>Chemical receptor</b>	A molecule in a cell's surface membrane which will bind with a messenger molecule, such as a hormone. This is not the same as the 'receptor' in the nervous system.
<b>Complementary</b>	The shape of one molecule fits exactly around the shape of a second molecule.
<b>Coronary arteries</b>	Arteries which supply the heart muscle with blood.
<b>Differentiate</b>	Cells become specialised for a particular job, changing in features and abilities.
<b>Digestion</b>	Large, insoluble molecules are broken down into much smaller, soluble molecules.
<b>Effector</b>	A muscle, gland or organ which can make a response when it is stimulated by an electrical impulse from a neuron.
<b>Elastic</b>	Can stretch, and then return to its original size and shape.
<b>Emulsification</b>	When the surface tension of a mass of lipid in watery surroundings is broken down, splitting it into smaller droplets which mix more easily with the water.
<b>Enzyme</b>	A protein which acts as a catalyst. Each one makes a particular chemical reaction happen at the temperatures found in the body, and at a much faster rate. Enzymes are not used up, so an enzyme molecule catalyses its reaction many millions of times.
<b>Glycogen</b>	An insoluble polysaccharide carbohydrate which is chemically similar to starch, made from monomers of glucose. Animals and fungi use glycogen as an energy store.
<b>Homeostasis</b>	Keeping the conditions in the environment around each cell constant, and at the levels that the cell needs to work effectively.
<b>Hormones</b>	Chemical messengers made by glands and carried in the bloodstream.
<b>Hypothalamus</b>	A region at the base of the brain.
<b>Immune</b>	Resistant to a particular infection.

### Explanations of the key terms used within this unit, in the context of this unit

Key term	Explanation
<b>Immune response</b>	The reaction of the body to something which is not recognised as part of the body itself.
<b>Inflammation</b>	In inflammation, capillaries become more permeable, more fluid and more white blood cells than usual escape and the tissues become swollen.
<b>Joint</b>	The structure where bones meet.
<b>Lever</b>	A rigid bar with a pivot, used to transmit a force.
<b>Lipids</b>	Fats and oils, mostly composed of three fatty acid molecules bonded with one glycerol molecule.
<b>Lymphocyte</b>	A family of white blood cells with large nuclei found in the lymph system. Types of lymphocyte include T cells, B cells and natural killer cells.
<b>Maltose</b>	Disaccharide composed of two glucose molecules.
<b>Metabolism</b>	The chemical reactions going on inside the body.
<b>Negative feedback</b>	Mechanism to control an internal condition. In negative feedback, a condition changes from its optimum value.
<b>Nerve</b>	Many neurones bundled together. For example, nerves cause the smooth muscles in the bronchioles to relax (bronchodilation).
<b>Neuron</b>	Very long threadlike cells that carry information from place to place quickly around the body in the form of electrochemical impulses.
<b>Pathogen</b>	A bacterium, virus, or other microorganism that can cause disease.
<b>Pituitary</b>	A pea-sized gland on a stalk of tissue below the hypothalamus.
<b>Pressure</b>	Force exerted over an area of surface. For example, $10\text{N/m}^2$ is 10 newtons of force exerted over every $1\text{m}^2$ of surface. An alternative unit, mmHg, is often used in medicine.
<b>Receptor</b>	A cell which converts a change in the environment into an electrical impulse in a neuron. For example, a touch receptor in the skin.
<b>Sinoatrial node</b>	Specialised muscle cells in the wall of the right atrium.
<b>Smooth muscle</b>	A type of muscle over which we have no conscious control.
<b>Specific</b>	When a molecule will bind to only one shape of a second molecule.
<b>Starch</b>	An insoluble polysaccharide carbohydrate. Its monomers are glucose molecules. Found in foods made from plants, such as bread and rice.
<b>Striated muscles</b>	Muscles which are under conscious control. Viewed under a microscope, they appear striated, meaning 'stripey'.
<b>Target organ</b>	The organ which will make a response when it encounters a hormone.
<b>Tissue fluid</b>	Is the internal environment that the cell lives in.
<b>Vaccination</b>	A person's immune system is presented with the antigen without the risk of being harmed by the pathogen.
<b>Vein</b>	Vessel which takes blood towards the heart.
<b>Ventricle</b>	Large lower chamber at each side of the heart.
<b>Viruses</b>	They are strands of genetic material surrounded by protein coats.

# MISCONCEPTIONS

## Some common misconceptions and guidance on how they could be overcome

What is the misconception?	How can this be overcome?	Resources which could help
<p><b>Cystic fibrosis (CF) is usually fatal</b></p>	<p>The genetic nature of cystic fibrosis means it has stayed in the population in the UK throughout history. The disease is caused by a recessive allele which presents the disease when two copies are present. However, because the allele is recessive it remains hidden in people (carriers), masked by the dominant normal allele. Therefore a significant number of people carry this allele without realising it. It only presents itself in the chance meeting of two carriers who have a 25% chance of having an affected child. In the past, CF was always fatal early in life, but modern treatments such as medication and physiotherapy can improve a sufferer's prospects. An interesting development is the use of somatic gene technology to overwrite the recessive allele with the normal version.</p>	<p>What is CF? Cystic Fibrosis Trust <a href="https://www.cysticfibrosis.org.uk/what-is-cystic-fibrosis?gclid=CK3MnMz9qc4CFQgq0wodcrkDWg">https://www.cysticfibrosis.org.uk/what-is-cystic-fibrosis?gclid=CK3MnMz9qc4CFQgq0wodcrkDWg</a> National charity website.</p> <p>Cystic fibrosis: which babies are at highest risk of the most severe disease? Action Medical Research <a href="https://www.action.org.uk/our-research/cystic-fibrosis-which-babies-are-highest-risk-most-severe-disease?gclid=CJOI2dv9qc4CFYQy0wodrzYB3w">https://www.action.org.uk/our-research/cystic-fibrosis-which-babies-are-highest-risk-most-severe-disease?gclid=CJOI2dv9qc4CFYQy0wodrzYB3w</a> Another charity with an informative website.</p> <p>Cystic fibrosis NHS Choices <a href="http://www.nhs.uk/Conditions/cystic-fibrosis/Pages/Introduction.aspx">http://www.nhs.uk/Conditions/cystic-fibrosis/Pages/Introduction.aspx</a> Plenty of information from the NHS.</p> <p>Welcome to the UK CFGTC website The UK Cystic Fibrosis Gene Therapy Consortium <a href="http://www.cfgenetherapy.org.uk">http://www.cfgenetherapy.org.uk</a> Gene therapy website.</p>
<p><b>Dissections are unethical</b></p>	<p>The use of animals in research is a sensitive and controversial subject. There is a misconception that all biologist do is 'cut things up'. However, there is no substitute for the real thing when studying anatomy or linking structure to function in physiology. It is important that any animals used in learning and research should be used with respect and care. There is no ethical dilemma in asking a local butcher to supply hearts for a class or for a tutor to buy some chicken portions for their students to study. These are already parts of an established industry.</p>	<p>Understanding Animal Research <a href="http://www.understandinganimalresearch.org.uk">http://www.understandinganimalresearch.org.uk</a> Explore this important topic with this excellent website.</p> <p>Ethics Guide: Experimenting on animals BBC <a href="http://www.bbc.co.uk/ethics/animals/using/experiments_1.shtml">http://www.bbc.co.uk/ethics/animals/using/experiments_1.shtml</a> An interesting article from the BBC.</p> <p>Leaping Bunny product search Cruelty Free International <a href="https://www.crueltyfreeinternational.org/LeapingBunny">https://www.crueltyfreeinternational.org/LeapingBunny</a> This organisation helps consumers find ethically sourced products.</p> <p>People for the Ethical Treatment of Animals (PETA) Foundation <a href="http://www.peta.org.uk">http://www.peta.org.uk</a> This is PETA, a long established anti-cruelty pressure group.</p>

Some common misconceptions and guidance on how they could be overcome		
What is the misconception?	How can this be overcome?	Resources which could help
<b>Coronary heart disease is only linked to a poor diet</b>	There is no doubt that coronary heart disease (CHD), one of the biggest killers in the UK, is linked to a poor diet. A diet high in salt and animal (saturated) fats will cause much of the pathology and symptoms of CHD. However, as with many lifestyle diseases, it is multifactorial in its cause. Smoking, a sedentary lifestyle with a lack of exercise and certain genetic factors combine to increase the risk of CHD.	<p>Coronary heart disease NHS Choices <a href="http://www.nhs.uk/Conditions/Coronary-heart-disease/Pages/Introduction.aspx">http://www.nhs.uk/Conditions/Coronary-heart-disease/Pages/Introduction.aspx</a> The NHS has all the facts here.</p> <p>Coronary heart disease British Heart Foundation <a href="https://www.bhf.org.uk/heart-health/conditions/coronary-heart-disease">https://www.bhf.org.uk/heart-health/conditions/coronary-heart-disease</a> The British Heart Foundation has a good website.</p> <p>Coronary heart disease Age UK <a href="http://www.ageuk.org.uk/health-wellbeing/conditions-illnesses/coronary-heart-disease/">http://www.ageuk.org.uk/health-wellbeing/conditions-illnesses/coronary-heart-disease/</a> The Age UK website is also informative.</p>
<b>Only old people suffer from arthritis</b>	Arthritis is an autoimmune disease that can strike both old and young. Although associated with age, other risk factors include diet, being overweight, occupation and infectious disease.	<p>Diet and arthritis Arthritis Research UK <a href="http://www.arthritisresearchuk.org/arthritis-information/arthritis-and-daily-life/diet-and-arthritis.aspx?gclid=CNKMnePyqc4CFYYW0wodyMwPdw">http://www.arthritisresearchuk.org/arthritis-information/arthritis-and-daily-life/diet-and-arthritis.aspx?gclid=CNKMnePyqc4CFYYW0wodyMwPdw</a> UK charity Arthritis Research UK has a good site.</p> <p>Arthritis Centers for Disease Control and Prevention <a href="http://www.cdc.gov/arthritis/basics/risk-factors.htm">http://www.cdc.gov/arthritis/basics/risk-factors.htm</a> This is a good website from the US government.</p> <p>Recent research into risk factors for developing RA National Rheumatoid Arthritis Society <a href="http://www.nras.org.uk/recent-research-into-risk-factors-for-developing-ra">http://www.nras.org.uk/recent-research-into-risk-factors-for-developing-ra</a> The National Rheumatoid Arthritis charity has a lot of information.</p>

Some common misconceptions and guidance on how they could be overcome		
What is the misconception?	How can this be overcome?	Resources which could help
<b>Only women suffer from osteoporosis</b>	Osteoporosis is the gradual loss of bone density usually related to age. This misconception comes about because the bone loss is accelerated in many women after menopause. The level of the hormone oestrogen falls in a woman's blood which is linked to weakening of the bones. There are many other risk factors and indeed men do suffer from it.	<p>Osteoporosis Age UK <a href="http://www.ageuk.org.uk/health-wellbeing/conditions-illnesses/osteoporosis/">http://www.ageuk.org.uk/health-wellbeing/conditions-illnesses/osteoporosis/</a> A good perspective from Age UK.</p> <p>About Osteoporosis National Osteoporosis Society <a href="https://nos.org.uk/about-osteoporosis/">https://nos.org.uk/about-osteoporosis/</a> Excellent resource from the National Osteoporosis Society.</p> <p>Osteoporosis NHS Choices <a href="http://www.nhs.uk/conditions/osteoporosis/Pages/Introduction.aspx">http://www.nhs.uk/conditions/osteoporosis/Pages/Introduction.aspx</a> Information on osteoporosis from the NHS.</p>
<b>Diabetics have to inject themselves with insulin</b>	The most common form of diabetes, type 1, is usually controlled with regular insulin injections. This type of diabetes is caused by a lack of insulin production in the pancreas and is genetic in origin. However, there are an increasing number of people suffering from type 2 diabetes, which is not linked to insulin levels but due to an increasing insensitivity to the hormone's actions. There are many risk factors including body mass, age and lifestyle.	<p>What is the difference between type 1 and type 2 diabetes? Juvenile Diabetes Research Foundation <a href="https://jdrf.org.uk/about-type-1-diabetes/understanding/what-is-the-difference-between-type-1-and-type-2-diabetes/?gclid=CPLCuOP0qc4CFYIW0wodKfsLBA">https://jdrf.org.uk/about-type-1-diabetes/understanding/what-is-the-difference-between-type-1-and-type-2-diabetes/?gclid=CPLCuOP0qc4CFYIW0wodKfsLBA</a> A good account on this website.</p> <p>Diabetes UK homepage <a href="https://www.diabetes.org.uk">https://www.diabetes.org.uk</a> Plenty of information is available from this UK group.</p>
<b>Only obese people get diabetes</b>	Type 1 diabetes is largely a genetic disorder, so its onset is not related to whether a person is overweight or not. Whilst there is evidence that the onset of type 2 diabetes is linked to being overweight or obese it is not the only factor that can cause this disorder. Type 2 diabetes is linked to other factors such as how much exercise is taken, age and racial/ethnic background.	<p>Type 1 diabetes NHS Choices <a href="http://www.nhs.uk/Conditions/Diabetes-type1/Pages/Introduction.aspx">http://www.nhs.uk/Conditions/Diabetes-type1/Pages/Introduction.aspx</a> NHS information on type 1 diabetes.</p> <p>Differences Between Type 1 and Type 2 Diabetes.co.uk <a href="http://www.diabetes.co.uk/difference-between-type1-and-type2-diabetes.html">http://www.diabetes.co.uk/difference-between-type1-and-type2-diabetes.html</a> Very good charity website distinguishing between the two disorders.</p> <p>Type 2 diabetes guide WebMD UK Limited and Boots UK Limited <a href="http://www.webmd.boots.com/diabetes/type-2-diabetes-guide/type-2-diabetes">http://www.webmd.boots.com/diabetes/type-2-diabetes-guide/type-2-diabetes</a> Useful site from high street retailer.</p>

# SUGGESTED ACTIVITIES

LO No:	1		
LO Title:	Understand the structure and functions of the digestive system		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>Enzyme practical 1: effects of pH</b>  	<p>Effects of pH on the activity of trypsin.</p> <p>Trypsin is a proteolytic enzyme, important for the digestion of proteins. In humans, the protein is produced in its inactive form, trypsinogen, within the pancreas. Trypsinogen enters the small intestine via the common bile duct, where it is converted to active trypsin.</p> <p>In this experiment learners will examine the effect of varying pH on trypsin using a preparation of trypsin enzyme in a 5% solution (they can vary the pH of the enzyme using pH buffers in a constant volume). Learners will:</p> <ul style="list-style-type: none"> <li>• Add the enzyme to a standard volume of milk (made up from a powdered source). Trypsin will digest the milk protein, making the milk sample go from milky to clear.</li> <li>• Measure the time taken (and so the rate of reaction) of clearance of milk protein.</li> <li>• Calculate a rate of reaction and prepare a graph of rate against pH.</li> <li>• Determine the optimum pH of trypsin and compare their value with a published value.</li> </ul>	1–2 hours	Unit 7 LO1
<b>Enzyme practical 2: effects of temperature</b>  	<p>Effects of temperature on the activity of trypsin.</p> <p>The above experiment can be varied by incubating the enzyme with milk at different temperatures in a water bath to investigate the effects of temperature on enzyme activity.</p> <p>Suggested temperatures to investigate would be from 15°C to 80°C. The clearance of the milky test tubes should speed up as temperature increases until around 60°C where it should slow down. This is due to the enzyme denaturing. Learners will:</p> <ul style="list-style-type: none"> <li>• Discuss the implications of this in terms of optimum conditions for enzymes.</li> <li>• Measure activity around 37°C, human body temperature.</li> <li>• Plot a graph of rate of reaction against temperature, identifying the optimum temperature of trypsin.</li> <li>• Report on the protein nature of enzymes and how they can become inactivated (and denatured) by extremes of pH and temperature.</li> </ul>	1–2 hours	Unit 7 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>Enzyme practical 3: how the gut works</b>	<p>Digestion of starch by amylase in a model visking tubing gut.</p> <p>Amylase is one of the principal digestive enzymes in the gut. It is made in the pancreas and salivary glands and breaks down the complex polysaccharides in starch into simple sugars. In this experiment, learners will:</p> <ul style="list-style-type: none"> <li>• Set up a series of visking tubing model guts containing starch alone or mixed with amylase, suspended in a beaker of distilled water.</li> <li>• Test for the presence of starch with a few drops of iodine.</li> </ul> <p>Starch is digested by amylase into mono-/disaccharides, which will diffuse out of the gut and into the external liquid. Learners can test:</p> <ul style="list-style-type: none"> <li>• The presence of the sugars in the exterior water using Diastix or the Benedict's test.</li> <li>• The protein nature of amylase can be confirmed by performing a biuret test on the amylase.</li> </ul> <p>Learners could prepare a report on how enzymes in the gut digest large molecules and the products of digestion leave the gut.</p>	1 hour	Unit 7 LO1
<b>Enzyme practical 4: lactose-free milk</b>	<p>Formation of lactose-free milk.</p> <p>Lactose intolerance is an increasingly common condition in people and pet cats. Food manufacturers use the enzyme lactase to remove lactose from milk and other food. Lactase breaks the indigestible lactose into simple sugars such as glucose, which can be detected using Clinistix or the Benedict's test. In this experiment, learners will:</p> <ul style="list-style-type: none"> <li>• Mix lactase with sodium alginate to form beads by adding the mixture, drop by drop, to calcium chloride (the beads contain the immobilised lactase).</li> <li>• Load beads into a column, e.g. an upturned syringe barrel in a stand; cow's milk is eluted through, left a few minutes, then samples are collected.</li> <li>• Using Clinistix before and after eluting can confirm the lactose being digested into glucose.</li> </ul> <p>Detailed instructions for this practical can be found in the following document.</p> <p>Better milk for cats National Centre for Biotechnology Education <a href="http://www.scienceinschool.org/sites/default/files/teaserPdf/issue10_catmilk.pdf">http://www.scienceinschool.org/sites/default/files/teaserPdf/issue10_catmilk.pdf</a></p>	1 hour	Unit 17 LO1

Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>Peristalsis study</b>	<p>Peristalsis demo/models.</p> <p>Learners can make their own digestive system referring to this web page:</p> <p>Digestive System Demonstration Home Schoolroom <a href="http://www.homeschoolroom.com/digestive-system-demonstration/">http://www.homeschoolroom.com/digestive-system-demonstration/</a></p> <p>Among other interesting ideas on this web page is the model of peristalsis, where a mush of bread and peanut butter is prepared and squeezed through a nylon stocking to show how a bolus is squeezed along the gut. Learners could take photographs or short videos of this activity to place on social media or the centre's intranet.</p>	1 hour	
<b>Digestive disorders</b>	<p>Research task. Learners work in groups to find facts about one of these given illnesses:</p> <ul style="list-style-type: none"> <li>• an infection e.g. gastroenteritis</li> <li>• inflammation e.g. colitis</li> <li>• irritable bowel syndrome (IBS).</li> </ul> <p>They could compile their findings and give a presentation (PowerPoint) to their group on the condition ensuring they describe symptoms and how they come about.</p> <p>Useful web links:</p> <p>Ulcerative colitis NHS Choices <a href="http://www.nhs.uk/conditions/Ulcerative-colitis/Pages/Introduction.aspx">http://www.nhs.uk/conditions/Ulcerative-colitis/Pages/Introduction.aspx</a></p> <p>Ulcerative Colitis Crohn's and Colitis UK <a href="https://www.crohnsandcolitis.org.uk/about-inflammatory-bowel-disease/ulcerative-colitis">https://www.crohnsandcolitis.org.uk/about-inflammatory-bowel-disease/ulcerative-colitis</a></p> <p>Irritable bowel syndrome (IBS) NHS Choices <a href="http://www.nhs.uk/Conditions/Irritable-bowel-syndrome/Pages/Introduction.aspx">http://www.nhs.uk/Conditions/Irritable-bowel-syndrome/Pages/Introduction.aspx</a></p> <p> What is IBS? The IBS Network <a href="https://www.theibsnetwork.org/have-i-got-ibs/what-is-ibs/">https://www.theibsnetwork.org/have-i-got-ibs/what-is-ibs/</a></p>	1–2 hours or as homework	

# SUGGESTED ACTIVITIES

LO No:	2		
LO Title:	Understand the role and function of the musculoskeletal systems		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>The bones of the human body colouring exercise</b>	<p>Working in pairs, learners could be given a biology textbook (see link below) and an outline picture of a human skeleton on A3 paper. They label the main regions of the skeleton (appendicular, head, thorax and abdomen) and then the major bones, using the textbook or online resources. Use of a real skeleton or a good model would be a great resource.</p> <p>Wright, D. (2007) <i>Human Physiology and Health</i>, Heinemann  <a href="https://www.amazon.co.uk/Human-Physiology-Health-David-Wright/dp/0435633090">https://www.amazon.co.uk/Human-Physiology-Health-David-Wright/dp/0435633090</a>                      A textbook that could be used for this activity.</p> <p>Skeletal System                      InnerBody  <a href="http://www.innerbody.com/image/skelfov.html">http://www.innerbody.com/image/skelfov.html</a>                      This is a good interactive website.</p> <p>Human Skeleton                      Enchanted Learning  <a href="http://www.enchantedlearning.com/subjects/anatomy/skeleton/">http://www.enchantedlearning.com/subjects/anatomy/skeleton/</a>                      This website is packed with activities (subscription required).</p>	1 hour	
<b>Structure of bone and muscle</b>	<p>Bone ashing technique. This demonstrates the composite nature of bone as a material with rigid salts combined with tough, flexible protein fibres.</p> <p>In this experiment, learners will:</p> <ul style="list-style-type: none"> <li>• Take cleaned chicken bones and place in a kiln or similar hot oven to reduce to ash (the minerals form the ash left over after the protein has burnt off the bone).</li> <li>• Take another bone and steep in dilute HCl overnight to remove all the minerals (the bone will be flexible and bendy, showing the nature of the protein).</li> <li>• Take photographs for a PowerPoint presentation.</li> </ul>	1 hour	

Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>Relationship between bone in the skeletal system</b>	<p>Investigative dissection of a chicken wing to reveal the relationship between bone and muscle.</p> <p>Learners could:</p> <ul style="list-style-type: none"> <li>• Relate structures found with diagrams and relate these to function.</li> <li>• Undertake a deeper, careful dissection; this will reveal the presence of the blood vessels and the fibrous nature of the muscle.</li> <li>• Cut open long bones and locate the bone marrow.</li> <li>• If chicken feet are accessible, learners could study the action of the tendons.</li> </ul> <p>Learners can then:</p> <ul style="list-style-type: none"> <li>• Research the role of marrow in the skeletal system.</li> <li>• Make annotated drawings of the bone and muscle.</li> </ul> <p>How to Dissect a Chicken Leg Krieger Science <a href="https://kriegerscience.wordpress.com/2010/10/24/how-to-dissect-a-chicken-leg/">https://kriegerscience.wordpress.com/2010/10/24/how-to-dissect-a-chicken-leg/</a> This blog is a good website to work from.</p>	1 hour	
<b>Components of a synovial joint</b>	<p>Further dissection of chicken legs to reveal structures present in the synovial joints and how they interrelate.</p> <p>Learners could make detailed annotated drawings of the knee and hip joints. Research from textbooks can allow further work.</p> <p>How to Dissect a Chicken Leg Krieger Science <a href="https://kriegerscience.wordpress.com/2010/10/24/how-to-dissect-a-chicken-leg/">https://kriegerscience.wordpress.com/2010/10/24/how-to-dissect-a-chicken-leg/</a> This blog is a good website to work from.</p> <p>Chicken Leg Dissection PowerPoint, Muscular System, Skeletal System Sciencepowerpoint.com <a href="http://www.slideshare.net/sciencepowerpointcom/chicken-leg-dissection-powerpoint-muscular-system-skeletal-system">http://www.slideshare.net/sciencepowerpointcom/chicken-leg-dissection-powerpoint-muscular-system-skeletal-system</a> This is an authoritative account.</p>	1–2 hours	

Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>Microscope work on bone and striated muscle</b> 	<p>Microscopic examination of striated muscle and compact bone using prepared slides of striated muscle and compact bone.</p> <p>Learners could examine:</p> <ul style="list-style-type: none"> <li>• Examine muscle fibres and, at high power, the striations.</li> <li>• Examine the structures present including haversian canals and blood vessels in compact bone.</li> <li>• Make large outline drawings with annotations.</li> </ul> <p>This activity could be helped by using atlases of histology.</p> <p>Atlas of Human Histology: A Guide to Microscopic Structure of Cells, Tissues and Organs Robert L. Sorenson <a href="http://www.histonano.com/atlass/Atlas_of_Human_Histology.pdf">http://www.histonano.com/atlass/Atlas_of_Human_Histology.pdf</a> There are many books called 'Atlas of Histology', which vary in price. This is an excellent free resource.</p>	1 hour	Unit 8 LO2
<b>Common disorders of the musculoskeletal system</b> 	<p>Research task. Problem-based learning on arthritis and osteoporosis.</p> <p>Learners could be given case studies of patients including background and symptoms. They can use the information prompts from the cases such as age, gender, dietary and exercise background and occupation, along with their own research, to diagnose and distinguish the two conditions.</p> <p>Good examples would illustrate that while both conditions worsen with age, arthritis can strike the young and osteoporosis is a particular problem for older women.</p> <p>Case 10.11 Sjögren's syndrome Essentials of Clinical Immunology <a href="http://www.immunologyclinic.com/case.asp?chap=10&amp;case=11">http://www.immunologyclinic.com/case.asp?chap=10&amp;case=11</a> Excellent case studies are available from this website for medical students.</p>	1 hour then homework	

# SUGGESTED ACTIVITIES

LO No:	3		
LO Title:	Be able to assess how the cardiovascular system functions in the body		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>The components and function of the cardiovascular system</b>	<p>Heart dissection to reveal the internal structure, valves, relationship of blood vessels and pathway of blood in the cardiac cycle. In this experiment learners will:</p> <ul style="list-style-type: none"> <li>• Relate the internal structures to diagrams to build up a description of double circulation.</li> <li>• Describe the significance of one-way flow and how this is helped by the valves.</li> </ul> <p>Many textbooks describe the structure and function of the heart.</p> <p>Human heart structure TutorVista <a href="http://www.tutorvista.com/content/biology/biology-ii/transportation/heart.php">http://www.tutorvista.com/content/biology/biology-ii/transportation/heart.php</a> An excellent website from TutorVista.</p>	1–2 hours	
<b>Microscope work on cardiac muscle</b>	<p>Microscopic examination of cardiac muscle using prepared slides of cardiac muscle. Learners can be guided to see:</p> <ul style="list-style-type: none"> <li>• Striations, like in skeletal muscle, but that it is branched (allowing contraction in more than one plane).</li> <li>• The presence of smooth muscle (KT) in the airways to allow bronchoconstriction (KT) and bronchodilation (KT).</li> </ul> <p>Learners could make a large outline drawing with annotations. This exercise could be helped using atlases of histology.</p> <p>Atlas of Human Histology: A Guide to Microscopic Structure of Cells, Tissues and Organs Robert L. Sorenson <a href="http://www.histonano.com/atlass/Atlas_of_Human_Histology.pdf">http://www.histonano.com/atlass/Atlas_of_Human_Histology.pdf</a> There are many books called 'Atlas of Histology', which vary in price. This is an excellent free resource.</p> 	1–2 hours	Unit 8 LO2

Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>Structure and functions of blood vessels</b>	<p>Card sort activity where learners are given two sets of cards. Set 1 has pictures of different blood vessels in cross section on them (check the KT list for artery, vein, coronary arteries and capillaries). Set 2 has information such as lumen size, wall thickness, location etc.</p> <p>Learners can note the presence of smooth muscle (KT) in arteries and veins which is responsible for constriction and dilation.</p> <p>Working in pairs learners match up the cards and feed back their learning to the others.</p> <p>There are many examples on the internet available for download. Here is one that can be adapted:</p> <p>Blood vessel summary page ( + borrowed diagrams)            TES  <a href="https://www.tes.com/teaching-resource/blood-vessel-summary-page-borrowed-diagrams-6233472">https://www.tes.com/teaching-resource/blood-vessel-summary-page-borrowed-diagrams-6233472</a>            Note that some TES resources require sign up for membership to access; most are free but some have a small charge.</p>	< 1 hour	
<b>Monitoring the cardiovascular system in people</b>	<p>Practical activity: monitoring physiological parameters to design an exercise regime by collecting pulse rate data before, during and after exercise.</p> <p>Ask learners to:</p> <ul style="list-style-type: none"> <li>• Design a suitable exercise programme of jogging on the spot or use of an exercise bike/aerobics step (if available).</li> <li>• Measure resting pulse rates and, if possible, blood pressures of their chosen populations, who then undergo exercise.</li> <li>• Measure their parameter(s) immediately after exercise and then at regular intervals until full recovery.</li> <li>• Compare different populations (e.g. age groups, males and females).</li> </ul> <p>For age groups secondary data may be required if not directly collected. The primary and secondary data can be presented graphically and put in a report on monitoring and how exercise effects the cardiovascular system.</p> <p>Monitoring heart rates: learners could visit a local gym or invite in a guest speaker such as a trainer or sports coach (possibly collaborate with centre PE staff). This could be for a discussion about exercise and the use of heart monitors in medicine, health and fitness.</p>	2–3 hours	



Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>Electrocardiogram (ECG) interpretation</b> 	<p>Comparison of example ECGs; calculation of heart rates and the effects on health.</p> <p>Learners could study examples of ECG traces from healthy individuals to identify key components such as the P, QRS and T waves. They should then:</p> <ul style="list-style-type: none"> <li>• Link these components to the main parts of the cardiac cycle and use them to calculate heart rate. For example, the QRS part of an ECG coincides with ventricular systole.</li> <li>• Investigate how different conditions affect these measures. Examples including arrhythmias, bradycardia and coronary heart disease would allow good comparisons and highlight how medical practitioners use ECG traces to diagnose circulatory problems.</li> </ul> <p>ECG traces can be found in good biology textbooks or can be found in the ECG Library (see link below).</p> <p>ECG Library Life In The Fast Lane <a href="http://lifeinthefastlane.com/ecg-library/">http://lifeinthefastlane.com/ecg-library/</a></p> <p>This is a medical blog and website providing free online emergency medicine and critical care insights and education. Learners could use the ECG traces from the library to illustrate how changes to the key components of the trace (i.e. QRS waves) are changed in disease and how this is used as a diagnostic tool in medicine.</p>	1 hour	
<b>Common cardiovascular disorders, their possible causes and symptoms</b> 	<p>Research task. Learners could track the progress of coronary heart disease (CHD) linked to factors such as smoking, exercise and fatty diets. Use the internet or other resources to investigate the given risk factors in respect of:</p> <ul style="list-style-type: none"> <li>• hypertension (high blood pressure)</li> <li>• coronary heart disease (symptoms to include angina and heart attack).</li> </ul> <p>Coronary heart disease NHS Choices <a href="http://www.nhs.uk/Conditions/Coronary-heart-disease/Pages/Introduction.aspx">http://www.nhs.uk/Conditions/Coronary-heart-disease/Pages/Introduction.aspx</a></p> <p>The NHS Choices website is a useful resource for this activity.</p> <p>Having researched this, learners could produce an information booklet that might be used in a GP surgery or health centre about the signs and the risks of CHD and related conditions. An interesting expansion of this is to investigate how hypertension is particularly hazardous in pregnancy (pre-eclampsia).</p> <p>Further research task. How do varicose veins form and who is affected by them? Learners could be guided to look at age and pregnancy.</p>	2–4 hours (depending on number of research tasks set) then homework	

# SUGGESTED ACTIVITIES

LO No:	4		
LO Title:	Be able to assess how the respiratory system functions in the body		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>The components and function of the respiratory system</b>	<p>Lung dissection. Learners could undertake an investigative dissection to locate main airways and how they link together then connect into the deep lung tissue.</p> <p>They could demonstrate characteristics of the spongy alveoli by flotation and the elastic recoil using a pump. Using a foot pump connected to a length of hose, the lungs can easily inflate. Releasing the pressure immediately causes deflation, demonstrating the presence of elastic tissue.</p> <p>A good source of information would be a good biology textbook or these websites:</p> <p>Lung Anatomy and Structure LifeMap Sciences, Inc. <a href="http://discovery.lifemapsc.com/library/images/lung-anatomy-and-structure">http://discovery.lifemapsc.com/library/images/lung-anatomy-and-structure</a></p> <p>The Lungs BiologyGuide <a href="http://www.biologyguide.net/biol1/4_lungs.htm">http://www.biologyguide.net/biol1/4_lungs.htm</a></p>	1–2 hours	
<b>Microscope work on tissues of gas exchange</b>	<p>Ask learners to investigate lung epithelia using microscopes to:</p> <ul style="list-style-type: none"> <li>• Make labelled and annotated drawings of prepared slides of squamous and ciliated epithelia.</li> <li>• Investigate the roles of these tissues and contrast their similarities and differences in structure. For example, the alveoli and airways both contain elastic fibres and epithelium; airways are primarily routes for airflow and contain ciliated epithelium, whereas the squamous epithelium in alveoli has a large surface area concerned with gas exchange.</li> <li>• Link structure to function of these tissues.</li> </ul> <p>Reference to texts such as the Atlas of Histology would be useful.</p> <p>Atlas of Human Histology: A Guide to Microscopic Structure of Cells, Tissues and Organs Robert L. Sorenson <a href="http://www.histonano.com/atlass/Atlas_of_Human_Histology.pdf">http://www.histonano.com/atlass/Atlas_of_Human_Histology.pdf</a></p> <p>There are many books called 'Atlas of Histology', which vary in price. This is an excellent free resource.</p>	1–2 hours	Unit 8 LO2



Title of suggested activity	Suggested activities	Suggested timings	Also related to
<p><b>How the respiratory system is monitored in people using a spirometer</b></p>  	<p>Practical activity: taking measurements of vital capacity, residual volume etc by use of a spirometer.</p> <p>A spirometer can be used or demonstrated to take measurements of vital capacity, tidal volume, residual volume, inspiratory and expiratory reserve volumes and breathing rates. Suitable care needs to be taken when setting up the spirometer; if learners are to use it ensure tutors check for potential health problems like asthma. Check the apparatus is safely set up and the mouthpiece is suitably sterilised.</p> <p>Under guidance from the tutor learners can:</p> <ul style="list-style-type: none"> <li>• Measure their tidal volume and vital capacity.</li> <li>• Calculate breathing rate from the traces achieved.</li> <li>• Carry out further studies on oxygen uptake using soda lime in the spirometer. (Take extra care as soda lime is corrosive.)</li> </ul> <p>Using a spirometer to investigate human lung function Nuffield Foundation <a href="http://www.nuffieldfoundation.org/practical-biology/using-spirometer-investigate-human-lung-function">http://www.nuffieldfoundation.org/practical-biology/using-spirometer-investigate-human-lung-function</a> How to undertake a class practical with health and safety advice, technical guidance and teaching notes.</p>	1–2 hours	
<p><b>Common disorders of the respiratory system 1: asthma</b></p> 	<p>Learners could design a leaflet advising someone who has to live with asthma. They could research symptoms and provide guidance on dealing with asthma.</p> <p>Asthma British Lung Foundation <a href="https://www.blf.org.uk/support-for-you/asthma?gclid=CPfjmMCgzc0CFUmeGwodD_ANIQ">https://www.blf.org.uk/support-for-you/asthma?gclid=CPfjmMCgzc0CFUmeGwodD_ANIQ</a> Information for people living with asthma, and their family, friends and carers.</p>	Homework	
<p><b>Common disorders of the respiratory system 2: emphysema</b></p> 	<p>Learners could research chronic obstructive pulmonary disease (COPD) and its relationship to lifestyle. Learners could be guided towards looking at effects on the respiratory system in different populations.</p> <p>Chronic obstructive pulmonary disease (COPD) NHS Choices <a href="http://www.nhs.uk/Conditions/Chronic-obstructive-pulmonary-disease/Pages/Introduction.aspx">http://www.nhs.uk/Conditions/Chronic-obstructive-pulmonary-disease/Pages/Introduction.aspx</a> Covers symptoms, causes, treatment, outlook and prevention.</p> <p>Smoking cessation health centre: Emphysema WebMD UK Limited and Boots UK Limited <a href="http://www.webmd.boots.com/smoking-cessation/emphysema">http://www.webmd.boots.com/smoking-cessation/emphysema</a> Sets out causes, symptoms, when to seek medical care and treatments, and advice on prevention.</p>	Homework	

Title of suggested activity	Suggested activities	Suggested timings	Also related to
<p><b>Common disorders of the respiratory system 3: cystic fibrosis</b></p> 	<p>Learners could watch case studies about physiology, genetics and treatment of cystic fibrosis.</p> <p>Let's get personal! Cystic Fibrosis Trust <a href="https://www.cysticfibrosis.org.uk/life-with-cystic-fibrosis/lets-get-personal">https://www.cysticfibrosis.org.uk/life-with-cystic-fibrosis/lets-get-personal</a> Scroll down this page to find a video showing three people directly affected by cystic fibrosis and the many challenges it can bring. There are also links to further personal stories about people who have this condition.</p> <p>Learners can summarise the symptoms and general effects of this disease on sufferers, what treatments are available and how this is a common genetic disease of the lungs.</p>	Homework	

# SUGGESTED ACTIVITIES

LO No:	5		
LO Title:	Understand how homeostasis maintains balance within the body		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>The concept of homeostasis 1: temperature loss</b>  	Experiment to show temperature loss in vessels of differing sizes and levels of insulation Learners will: <ul style="list-style-type: none"> <li>• Boil 100 cm<sup>3</sup> of water in a beaker on a Bunsen burner and regularly check the temperature over time as the water cools.</li> <li>• Repeat this experiment but after the water has boiled lag the beaker with insulation (newspaper, paper towels, cotton wool etc).</li> <li>• Time how long the water takes to cool in a glass beaker and compare this with the results from the insulated beaker.</li> <li>• Plot a line graph of data to show the rate of temperature loss.</li> <li>• Investigate the effects of different levels of insulation or variations in the surface area of the vessel.</li> <li>• Model this on a human body and describe the physiological response to temperature change and thermoregulation as an example of homeostasis.</li> <li>• Link this to calculations of surface area to volume ratio; larger animals such as humans have a low SA:V ratio so lose heat less rapidly, an underpinning concept of homeostasis.</li> </ul>	1–2 hours	
<b>The concept of homeostasis 2: effects of salt on activity of yeast cells</b>  	Investigate the effects of salt concentration on activity of yeast cells.  In this experiment, provide learners with a preparation of live yeast that is exposed to increasing concentrations of salt. They then: <ul style="list-style-type: none"> <li>• Add set volumes of the yeast to increasingly strong solutions of salt by added it to syringe barrels with capillary tubes connected at one end. As the yeast respire, a bubble pushes along the tube. This is indicative of respiration rate but also of the osmotic disruption by the salt. The yeast will respire normally until the salt is disrupting the yeast cells' osmotic balance. An optimum should be somewhere between 0 and 5% salt.</li> <li>• Plot a line graph of their data and identify an optimum as part of a lab report.</li> </ul>	1–2 hours	

Title of suggested activity	Suggested activities	Suggested timings	Also related to
<p><b>The concept of homeostasis 3: effects of salt concentration on stability of red blood cells</b></p>	<p>Effects of salt on haemolysis of lyophilised horse erythrocytes.</p> <p>In this experiment learners will treat lyophilised horse blood with increasing concentrations of salt and:</p> <ul style="list-style-type: none"> <li>Record the time taken to completely clear (i.e. the symbol behind the tube becomes fully readable).</li> <li>Plot a line graph of the time taken against concentration.</li> <li>Identify an optimum as part of a lab report.</li> </ul> <p>At higher concentrations, the blood sample remains opaque, but at lower concentrations and in pure water, the cells haemolyse and the suspension becomes transparent (a text can be read through a test tube). This shows the importance of maintaining the water potential of body fluids.</p> <p>Lyophilised horse blood is available in small (25 cm<sup>3</sup>) samples from various suppliers including TCS Biosciences, see link below:</p> <p>Donor Horse Blood TCS Biosciences <a href="http://www.tcsbiosciences.co.uk/catalog/index.php?CG_ID=6&amp;CS_ID=15&amp;CSS_ID=0&amp;numrecs=12&amp;offset=24">http://www.tcsbiosciences.co.uk/catalog/index.php?CG_ID=6&amp;CS_ID=15&amp;CSS_ID=0&amp;numrecs=12&amp;offset=24</a></p> <p>An alternative to using blood, but still demonstrating how animal cells respond to changes in water potential, is to use de-shelled chicken eggs as outlined here:</p> <p>Investigating osmosis in chickens' eggs Nuffield Foundation <a href="http://www.nuffieldfoundation.org/practical-biology/investigating-osmosis-chickens%E2%80%99-eggs">http://www.nuffieldfoundation.org/practical-biology/investigating-osmosis-chickens%E2%80%99-eggs</a> This latter method would allow learners to evaluate and compare the two methods in terms of accuracy and reliability.</p> <p>Both investigations demonstrate how alterations of water potential in body fluids can be disruptive. Too much water in tissues will cause cells to lyse (burst), disrupting cell membranes. Too much salt causes cells to shrink (crenate), disrupting internal biochemical reactions. Learners could expand their learning research around this topic to investigate how lack of water or salts can affect human tissues.</p>	<1 hour	Unit 8 LO1
<p><b>The autonomic nervous system</b></p>	<p>Research task. The role of the autonomic nervous system in the fight or flight response. Learners will research fight or flight and investigate the roles of the autonomic nerves on various involuntary systems (breathing, heart rate, the gut, pupil dilation) and on hormone secretion (adrenaline). They could make a poster of the response of a prey animal; a rabbit would be appropriate.</p>	Homework	

Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>The endocrine system including the main glands</b>	<p>Cut and stick activity.</p> <p>Learners could match pictures of the glands to partially completed text boxes of functions to a large picture of a human body (draw an outline of a learner on a large sheet of flip chart paper).</p> <p>Some useful sources of information are available from:</p> <p>Glands of the Human Endocrine System IvyRose Holistic <a href="http://www.ivyroses.com/HumanBody/Endocrine/Endocrine_Glands.php">http://www.ivyroses.com/HumanBody/Endocrine/Endocrine_Glands.php</a> A simple summary of the locations of the main endocrine glands in the human body, and the hormones secreted by these glands.</p> <p>The Endocrine System John Wiley &amp; Sons, Inc. <a href="http://www.slideshare.net/NadaGYoussef/lecture-1-the-endocrine-system">http://www.slideshare.net/NadaGYoussef/lecture-1-the-endocrine-system</a> Slide presentation that goes into details of functions as well.</p>	<1 hour	
<b>Common disorders caused by the inability to maintain homeostasis</b>	<p>Research task. Provide learners with patient profiles of type 1 and 2 diabetes, including physiological data and background information (profiles of diabetics are common in many textbooks).</p> <p>Learners can research these online, find definitions of each and how they may manifest themselves in diabetics, both type 1 and 2.</p> <p>This activity also links to work on heart failure and the cardiovascular system in Learning Outcome 3.</p> <p>Good outlines can be found here:</p> <p>Diabetes Risk Factors Diabetes UK <a href="https://www.diabetes.org.uk/Guide-to-diabetes/What-is-diabetes/Know-your-risk-of-Type-2-diabetes/Diabetes-risk-factors/?gclid=CJO3guWCpc4CFeoy0wod7fcFUA">https://www.diabetes.org.uk/Guide-to-diabetes/What-is-diabetes/Know-your-risk-of-Type-2-diabetes/Diabetes-risk-factors/?gclid=CJO3guWCpc4CFeoy0wod7fcFUA</a></p>  <p>Reduce your diabetes risk NHS Choices <a href="http://www.nhs.uk/Livewell/Diabetes/Pages/Avoiddiabetes.aspx">http://www.nhs.uk/Livewell/Diabetes/Pages/Avoiddiabetes.aspx</a></p>	1–2 hours	

# SUGGESTED ACTIVITIES

LO No:	6		
LO Title:	Understand the role and function of the immune system		
Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>How the innate immune system functions</b>	Investigation of pathways of infection. Ask learners to research skin structure and find out what other physical barriers are present in a human (e.g. ear wax, lachrymal glands, stomach acid).	1 hour	
<b>Components of the immune system card sort</b>	<p>To introduce learners to the complexities of the immune system, a card sort activity will familiarise them with the appearance and functions of the cellular and non-cellular components.</p> <p>Provide learners with:</p> <ul style="list-style-type: none"> <li>• Pictures of different cells such the types of lymphocyte, macrophage and phagocyte on cards.</li> <li>• Other matching cards giving the functions of these cells e.g. phagocytes engulf invading pathogens while plasma B-lymphocytes make antibodies.</li> </ul> <p>Learners then match the cards using a textbook ad discuss their findings with the group.</p> <p>Most good biology textbooks will have pictures and text. Alternatively they could use websites such as:</p> <p>What Do White Blood Cells Do? Med-Health.net <a href="http://www.med-health.net/What-Do-White-Blood-Cells-Do.html%22%3Ewhat">http://www.med-health.net/What-Do-White-Blood-Cells-Do.html%22%3Ewhat</a></p> <p>White Blood Cells (Leukocytes) Science Prof Online <a href="http://www.scienceprofonline.com/immunology/leukocytes-types-white-blood-cells-2.html">http://www.scienceprofonline.com/immunology/leukocytes-types-white-blood-cells-2.html</a></p> <p>This activity could be expanded to include types of antibody and other chemical components to set up the next activity.</p>	1 hour	Unit 8 LO2

Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>Agglutination practical</b>	<p>Research task into human blood types or groups and how organisations such as the blood transfusion service use antibodies to test for blood types.</p> <p>Introduce learners to antibodies and how they are central to how the body resists disease and combats pathogens, discussing how antibiotics are produced by B-lymphocytes and are specific to the pathogen the cells are exposed to.</p> <p>Explain that one action of antibodies is agglutination, where the pathogens are clumped together. This immobilises them and allows easier destruction by phagocytes. A body's immune system will also cause other foreign cells to clump such as the wrong blood type.</p> <p>More information is available from these websites:</p> <p>NHS Blood and Transport homepage  <a href="https://www.blood.co.uk">https://www.blood.co.uk</a></p> <p>Blood groups  NHS Choices  <a href="http://www.nhs.uk/Conditions/Blood-groups/Pages/Introduction.aspx">http://www.nhs.uk/Conditions/Blood-groups/Pages/Introduction.aspx</a></p> <p>Practical activity: modelling blood typing as done at a donor session.</p> <p>The practical involves making up mock blood samples, so is very safe, and uses chemical reagents that model the agglutination or clotting effectively. The practical will facilitate discussion the importance of antibodies and how their actions protect the body from infectious diseases.</p> <p>Full details of the practical are on this website:</p> <p>Investigating blood types  Science in School  <a href="http://www.scienceinschool.org/content/investigating-blood-types">http://www.scienceinschool.org/content/investigating-blood-types</a></p> <p>An experiment using simple liquids that mimic blood to demonstrate blood typing.</p>	1–2 hours	
<b>How the adaptive immune system functions 1</b>	<p>Group activity on the body's complement system.</p> <p>Tutors could provide the parts of pathways and the barriers present that prevent infection at a cellular level. Learners then collect information, pictures and matching text to build up a group poster.</p> <p>Linking the three areas on a poster would lead to a good display as this is a visual subject.</p>	1–2 hours	

Title of suggested activity	Suggested activities	Suggested timings	Also related to
<b>How the adaptive immune system functions 2</b>	<p>Learners to research and discuss as a group, the historical development of vaccines and review situations when vaccination programmes are not implemented. Tutors to provide websites and news bulletins like the ones below to guide learners.</p> <p>Measles outbreak feared in London and South East BBC News <a href="http://www.bbc.co.uk/news/health-35786959">http://www.bbc.co.uk/news/health-35786959</a> Report on doctors' concerns about a possible measles outbreak in 2016.</p> <p>Measles outbreak: what to do NHS Choices <a href="http://www.nhs.uk/conditions/vaccinations/pages/measles-outbreak-advice.aspx">http://www.nhs.uk/conditions/vaccinations/pages/measles-outbreak-advice.aspx</a> Explains what to do in the event of a measles outbreak and why it is important to be vaccinated.</p>	1–2 hours then homework	
<b>Disorders of the immune system</b>	<p>A research task into autoimmune diseases.</p> <p>Tutors could provide a set of case studies for problem-based learning. These could be put together by background reading from websites such as::</p> <p>Autoimmune disease The Leeds Teaching Hospitals NHS Trust <a href="http://www.pathology.leedsth.nhs.uk/pathology/ClinicalInfo/Immunology/Autoimmunedisease.aspx">http://www.pathology.leedsth.nhs.uk/pathology/ClinicalInfo/Immunology/Autoimmunedisease.aspx</a> General overview.</p> <p>Addison's disease – Causes NHS Choices <a href="http://www.nhs.uk/Conditions/Addisons-disease/Pages/Causes.aspx">http://www.nhs.uk/Conditions/Addisons-disease/Pages/Causes.aspx</a> Causes of Addison's disease.</p> <p>Lupus NHS Choices <a href="http://www.nhs.uk/conditions/Lupus/Pages/Introduction.aspx">http://www.nhs.uk/conditions/Lupus/Pages/Introduction.aspx</a> Symptoms, causes, treatments and complications of this condition.</p> <p>Inflammatory diseases Oxford University Hospitals <a href="http://www.ouh.nhs.uk/oxparc/information/diagnoses/inflammatory-diseases.aspx">http://www.ouh.nhs.uk/oxparc/information/diagnoses/inflammatory-diseases.aspx</a> Causes and brief discussion of long-term effects.</p> 	Homework	



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Cambridge Technicals Level 3

## Applied Science textbook

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