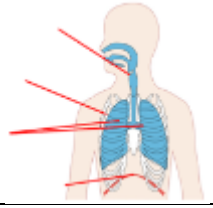
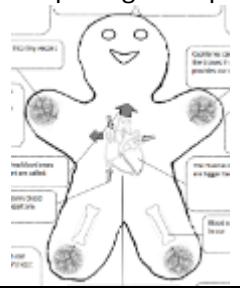
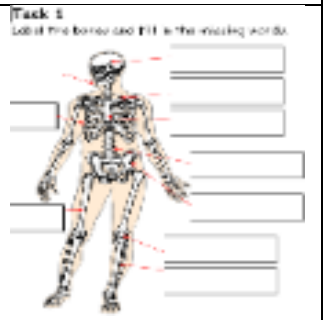
Holy Family Catholic School – Faculty of Science & Physiology

Science Autumn Half Term 1 Year 8

Learning Intention	Vocab	Concept	Retrieval	Success Criteria	Red Zone
Week 1 Lesson 1 How do muscles help you breathe?	Gas exchange Oxygen Carbon dioxide Respiration Diaphragm Pressure	Biological Molecules and Processes Health, Disease and Body Systems	MRS GREN Respiration is not the same as breathing Human organs	1. Describe how muscles cause air to enter and leave your lungs. 2. Describe what happens during the process of gas exchange in your lungs. 3. Explain how muscle cells are adapted to their function.	Label the diagram and then describe and explain 3 ways the lungs are adapted to move air in & out and for gas exchange. 
Week 1 Lesson 2 What is your blood made up of?	Vasculature Ventricles Artia Contract Deoxygenated Oxygenated Arteries Marrow Erythrocyte	Biological Molecules and Processes	Mitochondria produce energy Alveoli are adapted for gas exchange Structure & names of the human respiratory organs.	1. Describe the structure of red blood cells. 2. Describe the functions of: red blood cells, white blood cells and plasma. 3. Explain how the structure of capillaries is related to their function. 4. Explain why the left-hand side of the heart has a thicker muscle wall than the right-hand side.	Print out the Red Zone activity and distribute (Ginger blood man). Complete the Ginger blood man activity - labelling, completing close passages and questions. 
Week 1 Lesson 3 What is your skeleton made up of?	Calcium Phosphourous Cylindrical Porous Honeycomb weight-bearing Articulation	Health, Disease and Body Systems	Bone marrow in long bones Calcium-rich foods Importance of articulation to movement Erythrocytes	1. Describe the functions of individual bones (skull, vertebrae, ribs, sternum, hip). 2. Relate the properties of bones to their functions.	Correctly label the bones of the human skeleton. Describe the internal structure of bones and explain how the honeycomb structure of cylindrical provides a balance between strength and weight. 

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Week 2 Lesson 1 **Investigative Skills: Why are bones cylinders?**	compare, strength, evidence, conclusion	Thinking Like a Scientist Experimental and Investigative Skills Analysis and Evaluation	Bones, variables, hazard vs risk vs precaution, observations	1. State the variables of the investigation. 2. State the hazards and precautions. 3. Follow the method given. 4. Record Results. 5. Draw a graph 6. Evaluate the investigation 7. Draw conclusions	Evaluate the investigation.
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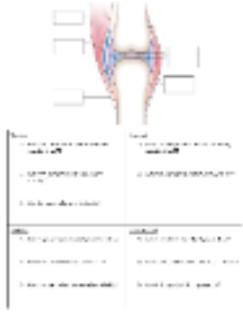
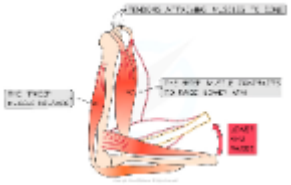
Week 2 Lesson 3 How do joints work?	Synovial Pivot Tendon Ligament Cartilage Arthritis	Biological Molecules and Processes	Names of key human bones Importance of articulation Three functions of bones Inherent strength of cylinders	1. Classify joints as different types. 2. Use a knowledge of bones and joints to suggest causes of problems with them.	Complete the anatomy labels for a typical synovial joint. Use the fact File print outs to gather information which will assist you in answering key questions about synovial joint structure and function. 
Week 3 Lesson 1 How do muscles and joints make you move?	Antagonistic pair Ligament Tendon Insertion Origin Abduction / adduction Nerve	Health, Disease and Body Systems	Anatomical names for the constituents of a synovial joint. The 4 types of articulated joint. Joint strength vs movement Ageing and osteoarthritis.	1. Describe how muscles and bones work together to allow movement. 2. Describe some evidence for continual changes in bone and muscles.	Using the example of the arm in the diagram provided, describe how the muscles are attached to the bones, and how they cause movement across the joint by contraction. 
Week 3 Lesson 2 How do your muscles work together to move?	Antagonism Contraction Filaments Force Atrophy Strength	Biological Molecules and Processes	Function of tendons Function of ligaments Antagonistic muscle pairs Muscles cross joints	1. Describe what happens when muscles contract and relax. 2. Describe the action of the biceps and triceps as an example of an antagonistic pair. 3. Explain why antagonistic muscles are used to operate bones in many joints.	Use the diagram to help you explain how a person can push a shopping trolly if muscles can only contract (pull)? 

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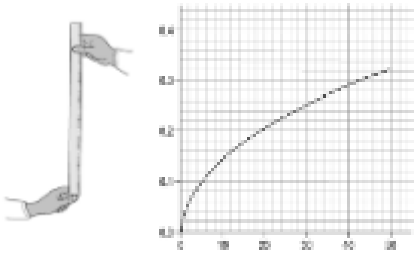
Week 3 Lesson 3 What are drugs?	Substance recreational medicinal legal illegal benefit side effect	Health, Disease and Body Systems	Anatomical names for the constituents of a synovial joint. Ageing and osteoarthritis. Function of tendons & ligaments Antagonistic muscle pairs Muscle only contract and don't push	1. Classify drugs as legal, illegal, medical, recreational. 2. Describe the effects of stimulants and depressants, including on reaction times. 3. Describe how muscle action is controlled by nervous impulses.	Modern medicine relies on the use of medicinal drugs. Read the information sheet about the history of aspirin and its importance in medical history; answer the comprehension questions. 
Week 4 Lesson 1 How do drugs affect your reaction time?	Reaction time Speed variable control average anomalous fair	Biological Molecules and Processes	Drugs affect the normal physiology of the body. Drugs can be recreational or medicinal. Aspirin has a long history. Drugs have benefits and risks.	1. Carry out an investigation into reaction times. 2. Identify independent and dependent variables 3. Identify sources of error	Work with a partner and use a stopwatch and ruler to calculate your average reaction time using the ruler drop method. Alternatively, print out the worksheets and use them to calculate reaction times. 

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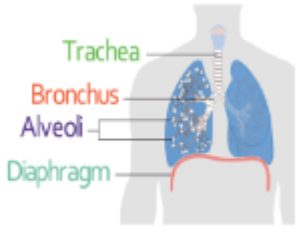
Week 4 Lesson 2 How do drugs affect your body?	Addiction Tolerance Alcoholism Liver Psycho-social Depressant Depressant	Health, Disease and Body Systems	Reactions time can be affected by drugs and alcohol. Reaction times can be quantified. A good experiment controls variables.	1. Explain the short- and long-term effects of alcohol. 2. Explain the effects of stimulants and depressants on the body by reference to the nervous system.	Write a paragraph explaining as many reasons as you can think of as to why people might drink alcohol. Describe as many short-term and long-term effects of excessive alcohol consumption. 
Week 4 Lesson 3 How are the lungs specialised for their function?	Ciliated Goblet Diaphragm Alveoli Trachea Bronchus Exchange Aerobic	Health, Disease and Body Systems Biological Molecules and Processes	Animal cells Specialised cells Respiration from MRS GREN Human organs	1. Describe how muscles attached to ribs and the diaphragm produce breathing movements 2. Use a model to explain how lungs expand and contract. 3. Use a pressure model to explain ventilation. 4. Explain how specialised cells keep the lungs clean (mucus production and ciliated epithelial cells).	Describe the cell types found in each labelled area of the thorax and how they contribute to efficient gas exchange. 

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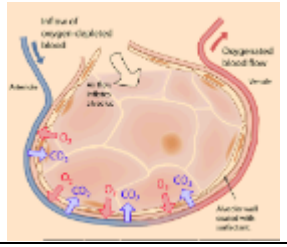
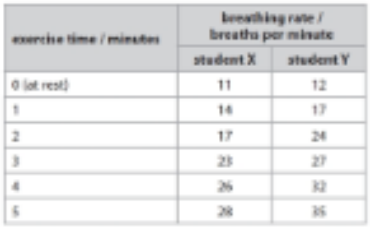
Week 5 Lesson 1 How is gas exchanged in the lungs?	Capillary Arterialized Venous Cillia Fick's law Bronchiole Gradient	Health, Disease and Body Systems	Names of airways in descending order of calibre. Alveoli are adapted for gas exchange. Difference between breathing & ventilation.	1. Recall the structure of the lungs 2. Recall how diffusion works in terms of particles 3. Explain how the lungs are adapted for efficient gas exchange. 4. Understand how smoking affects lung function	Using the diagram to help you, explain how the alveolus has evolved to be efficient at gas exchange. You should cover the diffusion pathway, how the concentration gradient is maintained, its surface area and moist lining. 
Week 5 Lesson 2 Investigate how peak flow and height are related.	Bronchiole Smooth muscle Muscle tone Inflammation Peak flow Anomalous Cyanosis		The alveolus is adapted for gas exchange. The mucociliary escalator keeps the bronchial tree clean.	1. Use a peak flow meter 2. Explain why data with a small range is of good quality. 3. Calculate means and explain their use. 4. Identify anomalous results in data. 5. Identify correlations using scatter graphs.	How can a Peak Flow meter assist asthmatics in monitoring their condition? How do they know the results it produces are accurate? 
Week 5 Lesson 3 Investigate how breathing rate and heart rate are related to exercise.	Aerobic Respiration Oxygen demand Oxygen debt	Biological Molecules and Processes	Anomalous Results can be identified and eliminated. Calculating a mean average is more accurate than any one individual result.	1. Carry out an experiment to try to correlate the strenuousness of an activity with the effect it has on pulse and breathing rates. 2. Identify the ranges of readings in data. 3. Explain why data with a small range is of good quality. 4. Calculate means and explain their use. 5. Identify anomalous results in data.	Calculate the increase in breathing rate for the two students and explain why they increase. Use the extended writing sheet for scaffolding. 

exercise time / minutes	breathing rate / breaths per minute	
	student X	student Y
0 (at rest)	11	12
1	14	17
2	17	24
3	23	27
4	26	32
5	28	35

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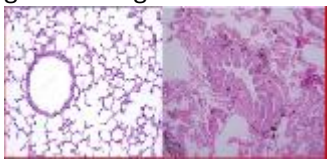
Week 6 Lesson 1 How are breathing rate, heart rate and exercised linked?	Heart rate Resting rate cardiovascular disease Fitness Exercise	Health, Disease and Body Systems	Aerobic respiration requires oxygen and releases CO2. Both oxygen and CO2 are transported by the blood. Oxygen is required in greater amounts by the skeletal muscles to produce extra energy during exercise.	1. Explain the changes in heartbeat and breathing rate during exercise. 2. Explain some of the effects of reduced oxygen supply on the body.	Describe the immediate effect of exercise on heart rate and explain why the heart rate increases during exercise. What are some of the long-term benefits to regular exercise? 
Week 6 Lesson 2 How does smoking effect gas exchange?	Nicotine Tar Carbon monoxide Soot Cancer Emphysema Bronchitis COPD Life expectancy Probability		Resting HR is approximately 70 BPM. A person's CV health and life expectancy is correlated with resting HR. HR increases during exercise to combat oxygen debt.	1. Describe how asthma, emphysema and tobacco tar can reduce gas exchange. 2. Explain the effects of some chemicals in tobacco smoke on the body.	The image on the left is what healthy lung tissue looks like under the microscope. The image on the right is lung tissue from a smoker. Describe the changes you see to the bronchiole and alveoli and explain how this would affect gas exchange. 

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Week 6 Lesson 3 How are gas exchange and respiration linked?	breathing, energy, glucose, oxygen, carbon dioxide, respiration	Biological Molecules and Processes	Cell structure blood vessels Red blood cells heart rate during exercise	1. Compare respiration in plants and animals. 2. Describe how gas exchange occurs in plants. 3. Compare the human gaseous exchange system with those of other animals.	Explain the difference between breathing and respiration.
Week 7 Lesson 1 What is anaerobic respiration?	Aerobic respiration Anaerobic respiration Oxygen Carbon dioxide Lactic acid Oxygen debt	Health, Disease and Body Systems	Aerobic respiration, waste products, gas exchange	1. Recall that anaerobic respiration releases less energy than aerobic respiration. 2. Model anaerobic respiration using a word equation. 3. Describe how lactic acid is removed from tissues. 4. Explain why anaerobic activity cannot be sustained. 5. Analyse and explain the changes in heartbeat and breathing rate during and after exercise.	Compare aerobic and anaerobic respiration, including the reactants, products and energy output of each process. [6 marks]
Week 7 Lesson 2 How does sound move?	wave energy vibration air particle pitch loudness	Waves and Radiation	particles, sold/liquid/gas	1. Use a model incorporating the idea of vibrations to explain how sound travels through different materials. 2. Use the terms frequency, amplitude, speed to describe waves. 3. Recall that waves transfer energy without transferring matter. 4. Explain why sounds are fainter further from the source in terms of the waves spreading out.	Jasmine is deaf. She blows up a balloon and holds it near to John's mouth. She cannot hear John's voice, but she can tell that he is speaking, by feeling the balloon. When John speaks what happens to the air around him? How can Jasmine tell when John is speaking, by feeling the balloon? John shouts loudly. How will the balloon feel different to Jasmine now?

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Week 7 Lesson 3 How do we measure the speed of sound?	wave energy vibration air particle louder quieter	Waves and Radiation	particles, sold/liquid/gas sound travels in waves, waves are vibrations	1. Use a model incorporating the idea of vibrations to explain how sound travels through different materials. 2. Use the terms frequency, amplitude, speed to describe waves. 3. Recall that waves transfer energy without transferring matter. 4. Explain why sounds are fainter further from the source in terms of the waves spreading out.	A rocket exploded making a loud sound and a bright flash. Peter, Sabrina and Jan were standing at different distances from the rocket. When the rocket exploded, who heard the sound first explain why. Who heard the loudest sound, explain why,
Week 8 Lesson 1 How do humans detect sound?	Ear drum, Cochlea, Ear bones (Ossicles)	Waves and Radiation	sound travels in waves, waves are vibrations	1. Describe the functions of the parts of the ear. 2. Describe how microphones convert sound into electrical signals.	The diagram shows part of an ear. Sound waves enter the ear and travel down the ear canal. What happens when they reach the ear drum? What happens to the ear drum when the pitch of the sound is increased. What happens to the ear drum when the sound is made louder. Stretch: Explain how a person's ear can be damaged by loud sounds.
Week 8 Lesson 2 How does sound travel through different materials?	louder quieter Ear drum, Cochlea, Ear bones (Ossicles) reflect absorb	Waves and Radiation	particles, sold/liquid/gas sound travels in waves, waves are vibrations	1. Compare how sounds travel through different materials. 2. Recall the units for loudness. 3. Evaluate different materials used for soundproofing/ sound insulation.	Should under 16s be made to wear ear defenders at music concerts? You are going to write a blog for a music website answering the question above. You should describe in your blog: How loud sounds damage hearing. How ear defenders protect hearing. If music at a concert could damage hearing. Discuss the use of ear defenders and suitable materials to make them. Challenge- would it make a difference if the concert was indoor or outdoor?

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Week 8 Lesson 3 How do we use sounds in different ways?	ultrasound, infrasound	Waves and Radiation	cause of sound, describing waves	1. Recall that different animals have different hearing ranges. 2. State the meaning of: ultrasound, infrasound. 3. Describe some uses of ultrasound. 4. State the meaning of: absorb, transmit, reflect. 5. Calculate depth or distance from time and velocity of ultrasound	Ultrasound waves are very high frequency sound waves. They cannot be heard by humans. Ultrasound waves can be used to clean jewellery. The jewellery is put into a container of cleaning fluid which can produce ultrasounds. Explain how you think this would work.