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**Knowledge Rich Curriculum Plan**

GCSE PE - Cardiovascular and Respiratory system



| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Tiered Vocabulary** | **Prior Knowledge:***In order to know this students, need to already know that…* | **Assessment**  |
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| **Lesson 1 - 1.1.d - structure and function of the cardiovascular system** | * Know the **double-circulatory system** (**two systems - systemic and pulmonary circulation**)
* **Systemic circulation** and the circulation of **oxygenated** blood pumped from the **left ventricle** of the heart to the body
* **Pulmonary circulation** is the circulation of deoxygenated blood from the right ventricle to the lungs to collect oxygen through the process of gaseous exchange.
* Know the different types of **blood vessel - arteries, veins and capillaries**
	+ **Arteries** - carry blood away (**A**rtery) from the heart, thick muscular walls, higher pressure, most carry oxygenated blood (apart from the pulmonary artery).
	+ **Veins** - carry blood towards the heart (ve**IN**), thinner walls, bigger lunem, have valves to prevent backflow of blood, lower pressure, most carry deoxygenated blood (apart from pulmonary vein)
	+ **Vena Cava** - largest vein - enters the heart through the right atrium
	+ **Smallest veins** are called **venules** and transport blood from the **capillaries**
	+ **Capillaries** - walls are one cell thick, thin enough for nutrients and waste products to pass through them - tiny blood vessel
 | CirculatorySystemicOxygenatedVentriclePulmonaryArteriesVeinsCapillariesLunemValvesBackflowOxygenatedDeoxygenatedPressureGaseous exchangeVena CavaVenules |  | * Targeted Questioning
* Active plenary
* Point to partner
* Label the skeleton
* Application task
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| **Lesson 2 - 1.1.d - structure and function of the cardiovascular system** | * Know the pathway of blood through the heart
* Know what the following terms mean and where they are:
	+ **Atria (Atriums)** - top chamber(s) of the heart. Blood enters in the atria.
	+ **Ventricle(s)** - chamber of the heart that pumps blood to the lungs/body
	+ **Aorta** - largest artery that carries oxygenated blood from the left ventricle of the heart to the body
	+ **Inferior / superior Vena Cava** - largest veins that bring deoxygenated blood from the body to the right atrium of the heart
	+ **Bicuspid valve** - valve between the left atrium and left ventricle
	+ **Tricuspid valve** - valve between the right atrium and right ventricle
	+ **Aortic valve** - valve between left ventricle and aorta
	+ **Pulmonary valve** - valve between right ventricle and the pulmonary artery
	+ **Semilunar valves** - collective term for aortic and pulmonary valves
	+ **Myocardium** - heart muscle
	+ **Atrioventricular valves** - collective term for valves between the atria and ventricles
	+ **Septum** - wall of cardiac tissue that separates the right and left ventricles (lower chambers of the heart)
 | Atria / AtriumVentriclesVena CavaAortaChamberValveBicuspid valveTricuspid valveAortic valvePulmonary valveSemilunar valveMyocardiumAtrioventricular valvesSeptum |  | * Pose pause pounce bounce
* Targeted questioning
* White boards Q&A
* Application task
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| **Lesson 3 - 1.1.d - structure and function of the cardiovascular system** | * Know the definitions of:
	+ **Heart Rate (HR)** - *‘****the number of times the heart beats per minute (bpm)’*** - average resting heart rate is 75bpm at rest
	+ **Stroke volume (SV)** - ***‘the volume (amount) of blood that is pumped out of the heart during one contraction/beat’***- you measure SV in millilitres per beat (ml per beat)
	+ **Cardiac Output** (**Q**) - ***‘the volume of blood ejected from the left ventricle in one minute’*** *-* measured in litres/min

**Cardiac Output (Q) = Stroke Volume (SV) v Heart Rate (HR)*** **Athletes - effects of training on HR, SV and Q**)
	+ Due to the resting heart being lower (below 60bpm)
	+ To produce the same amount of cardiac output the stroke volume has the increase to compensate for the drop-in heart rate. This caused by an increase in the size of the heart **(known as myocardial hypertrophy)**
* **Blood pressure (BP)** - This is the force applied to the blood vessel walls. It is the pressure needed to pump around the body. A **sphygmomanometer** takes blood pressure. Measured in millimetres of mercury **(mm/Hg) 120/80mmHg** is an average blood pressure. 120 - systolic pressure / 80 -diastolic number. With regular exercise blood pressure will reduce.
* **Systolic blood pressure** - is measured when the heart contracts (top number)
* **Diastolic pressure** - is measured when the heart relaxes (bottom number) -
 | Heart rate (HR)Stroke volume (SV)Cardiac Output (Q)Myocardial hypertrophyBlood pressureSphygmomanometerSystolic pressureDiastolic pressure | * *ABCD of PE fitness lessons - how to take heart rate.*
* *Resting heart rate between 60-80bpm for average person.*
* *ABCD of PE - aerobic training zone 120 - 160bpm*
 | * White board Q&A
* Worksheet (SA/PA)
* Application task
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| **Lesson 4 - 1.1.d - structure and function of the respiratory system** | * Know that the word **respire means - ‘breathe’** - therefore the **respiratory system is the ‘breathing system’**
* Know the pathway of air through the respiratory system
* Know the role of the respiratory muscles in breathing
* **During inhalation / inspiration (breathing in)**
	+ **Diaphragm -** contracts downwards and flattens causes space for the lungs to increase in size
	+ **External Intercostal muscles** that are attached to the ribs contract and the ribs move upwards and outwards
	+ **Gases move** from an area of **high pressure to low pressure** and so air is **inspired into lungs**
* **During exhalation / expiration (breathing out)**
	+ **Diaphragm - during exhalation - (breathing out)** relaxes into original domed position - area of the lungs decreases
	+ **External intercostal muscles** - relax, and ribs are lowered
	+ Area in the lungs decreases and the pressure in the lungs becomes greater than the pressure outside the body
 | Respire / respiratoryMouthNoseTracheaBronchiBronchiolesAlveoliInhalation / InspirationDiaphragmExternalIntercostal musclesPressureExhalation / ExpirationDiaphragmExternalIntercostal musclesPressure |  |  |
| **Lesson 5 - 1.1.d - structure and function of the respiratory system****Lesson 6 - 1.1.d - aerobic and anaerobic exercise** | * Know the definitions of:
* **Breathing rate (F) (respiratory rate / ventilation rate)** - is *the frequency of breathing measured in breaths per minute*
* **Tidal volume (TV) -** *The volume of air that is inspired or expired per breath*
* **Minute ventilation (VE) -** *the volume of air that is inspired or expired in one minute.*This is calculated by multiplying TV and number of breaths per minute **(F)**
	+ **VE = TV x F**

Know the definitions of:**AEROBIC EXERCISE*** **Aerobic exercise -** aerobic exercise is the ability to **continuously** exercise without tiring. Most low to moderate intensity exercise is aerobic.
* **Aerobic exercise - uses oxygen**
* During aerobic exercise we use **glycogen** (**carbohydrates**) and fat as the fuel for energy
* As you breathe more heavily when exercising **carbon dioxide** is expelled from the body
* **Low intensity - long duration** (e.g. marathon, tour de France cycling)

**ANAEROBIC EXERCISE*** **Anaerobic exercise - without the use of oxygen**, instead we use **glycogen stores** within the muscle as fuel**.**
* Produces small bursts of energy
* Produced **lactic acid**
* **High intensity - maximum level work -** (e.g. sprinting / weight lifting)
 | Breathing rate (F)Tidal volume (TV)Minute ventilation (VE)ContinuousAerobicOxygenGlycogenCarbohydratesCarbon DioxideIntensityAnaerobicOxygenGlycogenLactic acidIntensity | * Butterfly run - fartlek training - Swedish word for ‘speedplay’
* Continuous training - steady running at the same speed
* Interval training - work periods followed by rest periods.
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