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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 | Circulatory  Systemic  Oxygenated  Ventricle  Pulmonary  Arteries  Veins  Capillaries  Lunem  Valves  Backflow  Oxygenated  Deoxygenated  Pressure  Gaseous exchange  Vena Cava  Venules |  | * Targeted Questioning * Active plenary * Point to partner * Label the skeleton * Application task |
| **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 / Atrium  Ventricles  Vena Cava  Aorta  Chamber  Valve  Bicuspid valve  Tricuspid valve  Aortic valve  Pulmonary valve  Semilunar valve  Myocardium  Atrioventricular valves  Septum |  | * Pose pause pounce bounce * Targeted questioning * White boards Q&A * Application task |
| **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 hypertrophy  Blood pressure  Sphygmomanometer  Systolic pressure  Diastolic 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 |
| **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 / respiratory  Mouth  Nose  Trachea  Bronchi  Bronchioles  Alveoli  Inhalation / Inspiration  Diaphragm  External  Intercostal muscles  Pressure  Exhalation / Expiration  Diaphragm  External  Intercostal muscles  Pressure |  |  |
| **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)  Continuous  Aerobic  Oxygen  Glycogen  Carbohydrates  Carbon Dioxide  Intensity  Anaerobic  Oxygen  Glycogen  Lactic acid  Intensity | * Butterfly run - fartlek training - Swedish word for ‘speedplay’ * Continuous training - steady running at the same speed * Interval training - work periods followed by rest periods. |  |