

Main body systems essay sample



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The respiratory system is one of the bodies most important systems, the main goal of the respiratory system is to provide gas exchange so the inhaling of oxygen and the exhaling of carbon dioxide. In the health and social care setting the words “respiratory rate” or “resps” are often used, this simply means how many times a person breathes in a minute this can help to diagnose problems such as asthma and other breathing related illnesses. Parts of the Respiratory System and what they do

Nose: the nose is a main part in the respiratory system as it is the main way in which gasses enter and exit the body. Your nose has two nostrils which lead to the nasal cavity the air passes through these and leads into the trachea.

Mouth: the mouth is another way for air to enter and exit the body this allows us to breathe in and out how ever the nose is the preferred way of breathing.

Trachea: the trachea is a very important part as this is where the air flows from the nose into the lungs. The trachea is made up of cartilage and ligaments this prevents it from caving in each time we take a breath.

Bronchus: the bronchus is where the air arrives after the trachea this splits into two providing each lung its own air supply. This then splits off into the Bronchi lots of little tubes are formed which spread out right across the lungs making sure the air covers the whole lung.

Lungs: the air then reaches the lungs which is where the blood is oxygenated and pumped back to the heart ready to be transferred around the body.

Alveoli: once the air has reached the lungs the oxygen exchange then happens across the membranes of the alveoli. These are small balloon like structures which are attached to the bronchial passages.

Diaphragm: this is where breathing starts the diaphragm is a muscle which is located below the lungs. As we breathe in the diaphragm contracts this therefore creates more room for the lungs to take in more air. When we breathe out the diaphragm expands reducing the amount of space the lungs have forcing air out of the lungs this is the main muscle the respiratory system uses.

The Breathing Process

Breathing begins when you inhale air through your nose or mouth and into your lungs. As you breathe in the diaphragm expands making more space for the lungs to fill up with more air. The air then travels across the lungs and the oxygen is taken out through the alveoli and transported around the body through the use of red blood cells.

The cardiovascular system

The cardiovascular system or the circulatory system is the pumping of oxygenated and deoxygenated blood around the body. The blood: the blood is made up from a mixture of 3 things red blood cells white blood cells and plasma. The blood transports things around the body such as hormones and nutrients from our food. The red blood cells only purpose is to carry oxygen around the body. These cells have no nucleus so they cannot reproduce this is why their lifespan is usually a maximum of 90 days then they are replaced.

The white blood cells purpose is to fight infection. These cells are constantly observing the blood to ensure that unwanted bacteria aren't present. If they detect unwanted bacteria they can defend the body in various ways by producing things such as antibodies.

Plasma within the blood takes up half of the bloods volume. 90% of plasma is mainly water however the other 10% consists of proteins, minerals, waste products, clotting factors, and hormones.

The heart

The heart has two atriums and two ventricles; the ventricle on the right receives blood from the right atrium and sends it to the lungs to pick up oxygen this is then returned to the heart by veins. The left ventricle receives blood from the left atrium the blood is then distributed around the body via the aorta. The heart never rests this is why the muscle must be strong to withstand the workload. The normal rhythm for the heart to bet is known as sinus rhythm, the heart can also beat in different rhythms one is ventricular fibrillation when the heart isn't in its normal rhythm and races but no blood is being pumped around the body. This must be treated urgently as it can lead to death the standard treatment for this is CPR followed by an electric shock from a defibrillator. Ventricular fibrillation

Ventricular fibrillation

Arteries

The arteries are the thickest blood vessels this is because they are under immense pressure and they have to withstand high volumes of blood being transported through them. The pressure of the blood in these is high as the

heart has to get the blood right around the body this is why when taking a blood pressure the systolic (top number) is always higher as it is the blood exiting the heart as appose to the diastolic (bottom number) which is the blood returning to the heart at a lower pressure.

Veins

The veins are the blood vessels which transport the blood back to the heart. Most veins carry deoxygenated blood back to the heart this is why they are not as strong as arteries. Veins also have valves to prevent the backflow of blood.

Capillaries

Capillaries are extremely small and are located within the tissues of the body their main purpose is to transport blood from the arteries to the veins. Capillaries are most abundant in tissues and organs that are metabolically active. For example, muscle tissues and the kidneys have a greater amount of capillary networks than do connective tissues.

The Digestive System

The mouth: The digestive system being at the mouth where the food is broke down into smaller pieces and mixed with saliva. As the food mixes with the saliva the carbohydrates are starting to digest. The Oesophagus: once the food is broken down it travels down the oesophagus and into the stomach where it is broken down even further.

The Stomach: once the food as entered the stomach it begins to churn as the food is mixed with the gastric acid in order to kill any excess bacteria which could cause us harm. The stomach is strongly acidic it sits at 1-2 on the ph

scale therefore the stomach has layers of tissue which are resistant to the acid. Once the food has been broken down it then leaves the stomach at little bits at time.

The small intestine: the partly digested food then enters here it is then mixed with chemicals from the liver and the pancreas to. The small intestine is almost 6 metres long.

The ileum: is the lower section of the small intestine. The fully digested food is then absorbed here the nutrients from the food are then taken at this stage of digestion. Proteins and carbohydrates are passed straight into the capillary network.

The colon: this is where the small intestine meets the large intestine, within here are two biological remnants the appendix and the caecum, in the human body these have no use as they are for organism who survive mainly on grass. The colon runs all the way to the end of the digestive system which is eventually the anus as the faeces is stored in the rectum until we are ready to dispose of it in the correct manor.

The liver: the liver produces bile this is what is used to emulsify the fats in the body. Bile also contains degraded haemoglobin from old and broken red blood cells this is how the faeces is a brown colour. The bile is sent to the gall bladder where it is stored until it is needed. The liver also removes sugar from the small intestines and turns it into glycogen for storage.

The pancreas: this is located between the intestines and stomach, it produces an alkaline substance to neutralise the acidic liquid secreted by the

stomach. Pancreatic enzymes are responsible for the breakdown of protein fat and carbohydrates these are important for the complex breakdown of all food molecules into amino acids, glucose similar sugars fatty acids and glycerol.

The Nervous System

The nervous system is a fast message system meaning that it is responsible for detecting any changes, processing information and ordering actions all over our body.

The Brain

The brain commands the entire body. The brain is the bodies main information centre, the brain is made up of billions of neurons. The brain helps the body respond to the information it receives from the senses. The brain also processes thoughts, when people think it means that the neurons in the brain are working. The brain has three main parts. The largest part of the brain is the cerebrum; this controls vision, touch, smell, taste and many other senses. It also handles movements you have control over such as walking. When people think this takes place within the cerebrum. The cerebellum is another section of the brain called stem. The brain stem links to the spinal cord and it also controls digestion, breathing and the beating of the heart.

Spinal Cord

The spinal cord is made up of neurons that runs up the spine and attaches to the brain stem. Information from the nerves branch out to the rest of the

body goes to the spinal cord. Many messages are processed by the spinal cord but most information is then passed onto the brain.

Message Transmission

Nerve cells are all equipped with extensions. These are called Axons and Dendrites. When the message is sent it travels along the extensions as a wave of electrical change. When the nerve cells meet there is something called a Synapse which is just a gap from the nerve cells meeting. For the message to be set across the gap it uses a chemical called a Neurotransmitter. Most axons are covered by a fatty sheath of Myelin. This acts as an insulator meaning that the message is able to travel faster along the nerves.

Voluntary (somatic) Nervous System

This involves any actions we do when we are under conscious control. I. e. Speaking, movement.

Involuntary (autonomic) Nervous System

This is any actions which are not under conscious control. I. e. Breathing, our heart rate, sweating.

Parasympathetic (rest and digest/unstressed)

This means that:

- * Our pupils constrict.
- * We produce more saliva.
- * Slower, shallower breaths.
- * Our heart beats slower.

- * Pancreas, stomach, intestines and bladder become more active.
- * We also become easy to arouse.

Sympathetic (ready for action/stressed)

This means that:

- * Our pupils dilate.
- * Our mouth becomes dry.
- * Deeper, faster breaths
- * Our heart beats faster.
- * Our liver releases glucose.
- * Pancreas, stomach, intestines and bladders becomes less active. * We become difficult to arouse.

The Musculoskeletal System

The function of this system is to provide support, help us with movement, and to act as protection for our organs. The Two Main Structural Sections.

The Skeleton:

The skeleton is made up of 206 bones when we are fully developed as a child we have 450 bones as our bodies are not fully developed. As we develop our bones meet and form a suture therefore reducing our number of bones to 206.

The Bone Layout:

The bones are layout in a complex way to ensure that they do the job they are meant to do. The structure is as follows; The toe bone connects to the foot bone this is where the bodies weight is absorbed, the foot bone connects to the ankle bone, the ankle bone connects to the leg bone, the leg

bone connects to the knee bone, the knee bone connects to the thigh bone this is the largest bone in the body this bone also produces the most red blood cells from the bone marrow, the thigh bone connects to the hip bone this bone varies in size dependent on the sex of the person as a female hip bone is bigger in size than a males. The hip bones also protects the females sexual organs such as the ovaries, the hip bone connects to the back bone where there are 22 pieces of vertebrate. This bone protects our spinal cord one of the most important parts of our body, the back bone connects to the shoulder bone, the shoulder bone then connects to the neck bone and finally the neck bone connects to the head bone also known as the skull, this bone protects the brain along with the cerebral spinal fluid which also covers the spinal cord. Joints

The place where two bones meet is called a joint, most of these joint don't move apart from 3 joints in particular these are; A pivot joint this is at the top of the neck this allows us to move our heads from side to side. A hinge joint these are located in the knees and elbows this allow us to move our limbs backwards and forwards. A ball and socket joint these are located in the hip and the shoulders these allow us to move our limbs in a 360 degree motion A saddle joint which is located at the end of our knuckles this allows us to move our fingers A gliding joint which connects the wrist to the beginning of the hand allowing us to swivel and bend our hand And the conyloid joint this is the joint which connects our fingers together allowing us to bend our fingers.

The Muscles

Muscles are made up of striated muscle tissues. They attach two bones

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across joints whenever they contract; muscles pull on the bones to make them move at the joint. When moving the joint in the opposite direction another muscle must contract to pull it in that direction. By doing this the muscles become an antagonising pair.

There is also 3 others items included in the Musculoskeletal System. They are:

- * Cartilage: this forms a lining at the end of bones to stop them from rubbing each other away.
- * Ligaments: Tough, fibrous tissues that hold bones in position.
- * Tendons: Tough, fibrous tissues that attach bones to muscles.

The Skin

The skin is the largest organ. Its function is to protect our internal organs and bones. Your skin is a support system and keeps things in place. It is also a barrier for bacteria and diseases as it stops them entering the body. Your skin makes sure your internal organs don't become dry or dehydrated. The skin has many functions and another is that it produces sebum; this stops your hair and skin going dry by making it greasy. Sebum also makes your skin water proof. The skin makes sure your body temperature maintains a normal temperature. It helps give humans a shape and also excretes sweat and some weight.

There are two layers, the top and bottom layer of the skin. The top is called the Epidermis, inside this layer of skin there is many other parts. The base layer is in the epidermis. The base layer divides cells and pushes layers above it. The prickle cell, locks cells into position. The granule cell layer is where the cells begin to get tough and die; you lose 30, 000 cells a day! The

keratinized squames these cells are dead and waterproof. Langerhan cell, this alerts your immune system to infection. Melanocyte produces Melanin which in natural tan and finally, merkel cell this is a touch sensor which is sensitive to light touches.

Then there is the lower layer of the skin which is called the Dermis. This also has many parts. The hair shaft, keeps animals warm and traps air in animals. The hair erector muscle this makes the hair on your body stand up. The sweat gland, this makes sweat which cools the skin when it evaporates. The sebaceous gland, this produces sebum to waterproof the skin. Blood vessels, these supply nutrients and remove waste. Paninian corpuscle, this is a touch sensor it is less sensitive to light touch and finally, fat for insulation to keep you warm.

The renal system

The kidneys are organs which are located toward the back of our abdomens. The kidneys perform many vital functions which are important in everyday life. For example, they help us get rid of waste products by making urine and excreting it from the body. A special system of tubes within the kidneys allows substances such as sodium and chloride to be filtered. The kidneys regulate the amount of water in the body. Humans produce about 1.5 litres of urine a day. However, if we drink more water, we may produce more urine. On hot days, if we get dehydrated and sweat more, we may produce less urine. This is why we have to ensure we drink more water than usual when the weather is of at a higher temperature.

Ureter:

The ureters are paired muscular ducts that carry urine from the kidneys to the bladder.

The bladder:

The main function of the bladder is to store urine and, under the appropriate signals, release it into a tube which carries the urine out of the body.

Normally, the bladder can hold up to 500 mL of urine.

Urethra

The male urethra is 18–20 cm long, running from the bladder to the tip of the penis. This is where the urine flows from the bladder and out of the penis.

The female urethra is 4–6 cm long and 6 mm wide. It is a tube running from the bladder neck right to the vagina. As the female urethra is shorter than the male urethra, it is more likely to get infections from bacteria in the vagina; this is how women often suffer from water infections.

The reproductive system

The function of the reproduction system is to keep the human race alive by enabling us to produce more offspring. The female reproductive system:

Ovaries; The ovaries sit just above the fallopian tubes, one ovary on each side of the uterus. Every month during ovulation, either the right or left ovary produces a single mature egg for fertilization.

Fallopian tubes; the eggs which have been released from the ovaries travel down these tubes. If the egg is fertilised by the sperm of the male this is where the fertilisation process begins.

Uterus: this is where the fertilised egg will grow into a child. The lining of the uterus thickens every 28 days in preparation of the implantation of the embryo. If the embryo isn't implanted the lining then breaks away and exits out of the vagina in the form of small blood clots this is known as the period.

Cervix: During the females monthly cycle the cervix stretches open slightly to allow the lining of the uterus to be shed. During childbirth, contractions of the uterus will dilate the cervix up to 10 cm in diameter to allow the child to pass through.

Vagina: The vagina is a muscular passage which forms a part of the female sex organs and which connects the neck of the uterus. The walls of the vagina become engorged when a woman is aroused as extra blood is pumped into the vessels. The vagina has three functions: as a collection point for the sperm from the penis during sexual intercourse; as an outlet for blood during the monthly cycle; and as a passageway for the baby to pass through at birth.

Vulva: the vulva is the opening of the vagina. The vulva also contains the opening of the female urethra, but apart from this has little relevance to the function of urination

The male reproductive system:

Testicles: These are oval organs about the size of large olives that lie in the scrotum, secured at either end by a structure called the spermatic cord. Most men have two testes. The testes are responsible for making testosterone, the primary male sex hormone, and for generating sperm. Within the testes are coiled masses of tubes called seminiferous tubules. These tubes are responsible for producing sperm cells.

Epididymis: The epididymis is a long, coiled tube that rests on the backside of each testicle. It transports and stores sperm cells that are produced in the testes. It also is the job of the epididymis to bring the sperm to maturity, since the sperm that emerge from the testes are immature and incapable of fertilization.

Vas Deferens: The vas deferens is a long, muscular tube that travels from the epididymis into the pelvic cavity, to just behind the bladder. The vas deferens transports mature sperm to the urethra, the tube that carries urine or sperm to outside of the body, in preparation for ejaculation. Prostate

gland: The prostate gland is a walnut-sized structure that is located below the urinary bladder in front of the rectum. The prostate gland contributes additional fluid to the ejaculate. Prostate fluids also help to nourish the sperm. The urethra, which carries the ejaculate to be expelled during orgasm, runs through the centre of the prostate gland. **Seminal vesicles:** The seminal vesicles are pouches that attach to the vas deferens near the base of the bladder. The seminal vesicles produce a sugar-rich fluid that provides sperm with a source of energy to help them move. The fluid of the seminal vesicles makes up most of the volume of a man's ejaculatory fluid. During ejaculation this fluid is mixed with sperm creating a substance known as semen.

Urethra: The urethra is the tube that carries urine from the bladder to outside of the body. In males, it has the additional function of ejaculating semen when the man reaches orgasm. When the penis is erect during sex, the flow of urine is blocked from the urethra, allowing only semen to be ejaculated at orgasm. **Penis:** This is the male organ used in sexual

intercourse. It has three parts: the root, which attaches to the wall of the abdomen; the body, or shaft; and the glans, which is the cone-shaped part at the end of the penis. The glans, also called the head of the penis, is covered with a loose layer of skin called foreskin. The opening of the urethra, the tube that transports semen and urine, is at the tip of the penis. The penis also contains a number of sensitive nerve endings. Semen is ejaculated through the end of the penis when the man reaches sexual climax. When the penis is erect, the flow of urine is blocked from the urethra, allowing only semen to be ejaculated at orgasm.

The Endocrine System

The function: uses chemicals to control aspects of body function. Chemicals are produced by endocrine glands which secrete them into the bloodstream to reach their target cells.

Pituitary gland: About the size of a pea, the pituitary is found at the base of the brain, behind the bridge of your nose. The pituitary gland is often called the master gland because it controls several other hormone-releasing glands such as the ovaries, adrenals and testes. The hormones produced by this gland are Adrenocorticotrophic hormone, Follicle-stimulating hormone, Growth hormone, Luteinising hormone, Melanocyte-stimulating hormone, Prolactin, Thyroid-stimulating hormone.

Pineal gland: The pineal gland is a pine cone shaped gland of the endocrine system. A structure of the diencephalon of the brain, the pineal gland produces several important hormones including melatonin. Melatonin influences sexual development and sleep-wake cycles. The pineal glands

main functions are Secretion of the Hormone Melatonin Regulation of Endocrine Functions Conversion of Nervous System Signals to Endocrine Signals Causes Feeling of Sleepiness Influences Sexual Development.

Thyroid: The thyroid gland is a small gland with two lobes. It is located in the front of your neck, just below the Adams Apple. The thyroid gland produces two main hormones which are important for growth and development. One is called thyroxine (T4) and the other is called triiodothyronine (T3). T4 is converted to T3 in the body's cells and tissues. T3 is an active hormone and is needed by all of the cells and tissues of the body. The thyroid gland also produces another hormone called calcitonin, this works alongside parathyroid hormone in the maintenance of calcium levels in the blood.

Parathyroid: this gland is responsible for the control of the calcium levels within the blood they produce a hormone called parathyroid hormone.

Stomach: this gland produces hormones which can tell us if we are hungry or full these hormones are called Gastrin hormones. **Adrenal gland:** this gland produces the chemical adrenaline, noradrenaline and cortisol. These hormones can increase or decrease the heart rate. These chemicals are produced in response to acute stress such as fright and anger. These cause the heart to pump harder and the heart rate to increase. They also open airways into the lungs, increase blood flow to major muscle groups and enable the body to fight or run in a stressful situation. Noradrenalin is related to the sympathetic nervous system. **Islets of Langerhans in pancreas:** this gland produces the hormones insulin and glucagon insulin helps to regulate the glucose level within the blood by reducing it while glucagon increases it.

Ovaries/ testes: the testes produce the hormone called testosterone which is responsible for the characteristics within males it also is needed to produce sperm. The ovaries produce hormones called oestrogen and progesterone, Oestrogen strengthens bones and has a protective effect on the heart, and progesterone causes the womb's lining to thicken ready for pregnancy. The ovaries also produce small amounts of testosterone.

The lymphatic system

Function: an alternative circulatory system it also plays a role in the immune system. Returns interstitial fluid from the tissues to the blood.

Transport the products of fat digestion from the villi to the blood. Lymph vessels: closed ended tubes that drain the tissues of excess blood. These tubes have valves which prevent back flow of fluids. This fluid is moved by pressure caused by muscles squeezing other tissues and indirectly pressing on the lymph vessels. This caused fluid to move slowly compared to blood in the cardio vascular system. Lymph nodes: areas of connective tissue located at various locations along the lymph along the lymph vessels (especially in the neck arm pits and groin). They are “ holding areas” for white blood cells. During an infection, many white blood cells may gather there to form swollen glands. Thymus: located in the upper chest below the neck. It is involved in making a type of white blood cells these are known as T lymphocyte. These will migrate through the lymph vessels to wait in the lymph nodes. Spleen: located below the stomach it acts as a reservoir for blood.

The immune system

The function of the immune system is to fight infections and prevent diseases. The major components of the immune system are:

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- * Spleen
- * White blood cells; Lymphocytes, Granulocytes and Monocytes
- * Thymus gland
- * Lymphatic vessels and lymph nodes
- * Adenoids
- * Tonsils
- * Other lymphoid tissue for example in the intestine

White blood cells are produced in the bone marrow and thymus. They kill pathogens in a number of ways such as: a) Engulfing –the cell surrounds the pathogen and then digests it. b) Produce anti-bodies to:

- i) Kill the pathogen directly.
- ii) Tag the pathogen to attract other white blood cells. c) Inject the pathogen with digestive enzymes to kill it.

Granulocytes are a type of white blood cells that has granules in their cytoplasm. They also circulate the blood until they get a signal that provides instructions. Monocytes make up between 1-3% of the bodies white blood cells. The lower the monocytes count is in a person's body the healthier they are. They can also develop into a cell called macrophages which are cells that eat other cells. There are two main types of lymphocytes; B and T cells. B cells produce antibodies that attack foreign molecules whereas T cells can attack the body's own cells when they are diseased for example if a cell is infected or invaded by cancer.

The thymus gland produces T-lymphocytes (T cells) that fight off infections and abnormal cells. Lymphoid tissue is found in the organs of the lymphatic system for example the lymph vessels and nodes. Lymphoid tissue contains

lymphocytes that help fight against infection (play a role in the immune system). Adenoids contain lymphocytes which make up 25% of the white blood cells that are circulating in the body. Before the age of 3 adenoids are more active whereas after 5 years of age they start to become smaller. Tonsils catch bacteria and viruses that people may breathe in and then the antibodies in the tonsils help and kill them in return preventing infections.

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