Hole’s anatomy and physiology 12th edition

Understanding Words * acetabul-: vinegar cup * adip-: fat * aer-: air * alb-: white * an-: without * ana-: up * anul-: ring * Apo-: away from * Append-: “ to hang something”; * arth-: joint * Astr-: starlike * aud-: to hear * Ax-: axle * ax-: axis * Bi-: two * Bio-: life * blast: bud * burs-: bag, purse * calat-: something inserted * canal-: channel * Cardi-: referring to the heart * carp-: wrist * cata-: down * Cephal-: head * Cerebr-: referring to the brain * Chiasm-: cross * chondr-: cartilage * choroid: skinlike * -clast: break * clav-: bar * co-: with * cochlea: snail * condyl-: knob * condyl-: knob: knuckle corac-: a crow’s beak * corn-: horn * Cran-: referring to the head * cribr-: sieve * crist-: crest * cut-: skin * cyt: cell * Cyt-: cell * de-: undoing * Dendr-: tree * derm-: skin * di-: two * Dors-: referring to the back * Endo-: within * Ependym-: tunic * epi-: upon, after, in addition * erg-: work * Fasc-: bundle * Flacc-: flabby * folic-: small bag * fov-: pit * fov-: pit * Funi-: small cord or fiber * Gangli-: swelling * glen-: joint socket * glen-: joint socket * glia: glue * glyc-: sweet * -gram: something written * hist-: web, tissue * hol-: entire, whole * Homeo-: referring to same hyal-: resemblance to glass * Hyper-: above * hyper-: over, more * Hypo-: below * inter-: among, between * Inter-: between * inter-: among, between * intra-: inside * iris: rainbow * iso-: equal * Iso-: equal * iso-: equal * kerat-: horn * labr-: lip * labyrinth: maze * lacri-: tears * lamell-: thin plate * laten-: hidden * -lemm: rind or peel * lip-: fat * -logy: scientific study of something * lut-: yellow * Lys-: to break up * -lyt: dissolvable * macr-: large * macula: spot * malle-: hammer * meat-: passage * melan-: black * Mening-: membrane * Meta-: change * Mit-: thread * Mono-: single; one Moto-: moving * Multi-: many * mut-: change * myo-: muscle * Nas-: referring to the nose * neur-: nerve * Nucle-: kernel * ocul-: eye * odont-: tooth * olfact-: to smell * Oligo-: few * Orb-: circular * os-: bone * ov-:

egglike * palpebra: eyelid * Pariet-: referring to a wall * Pelv-: basin * Peri-: all around * Peri-: around * Phag-: to eat * phag-: to eat * photo-: light * Pino-: to drink * Pleur-: referring to the rib * Plex-: interweaving * poie-: make: produce * Poly-: many * por-: passage, channel * Pro-: before * pseud-: false * reticul-: a net * Sacchar-: sugar * Saltator-: dancer sarco: flesh * scler-: hard * seb-: grease * Sens-: feeling * -som: body * squam-: scale * -stasis: remaining still * strat-: layer * -strat: spread out * stria-: groove * sub-: under * Super-: above * sutur-: sewing * Syn-: together * syn-: together * Syn-: together * syndesm-: binding together * tetan-: stiff * therm-: heat * -tomy: cutting * -tonic: stretched * -troph: well fed * tympan-: drum * Uni-: one * -valenthaving power * Vesic-: bladder * Voluntar-: of one’s free will * -zym: causing to ferment * vitre-: glass * Table 1. 2 (page 8) Organ System| Major Organs| Major Functions|

Integumentary| Skin, hair, nails, sweat ; sebaceous glands| Protection, body temperature regulation, sensory receptor support| Skeletal| Bones, ligaments, cartilage| Framework, protection, attachment for muscle, blood cell production, storage for inorganic salts| Muscular| Muscles| Movement, posture, body heat production| Nervous| Brain, spinal cord, nerves, sensory organs| Detection in changes, receive/interpret information from senses, motivate muscles ; glands| Endocrine| Hormone glands: pituitary, thyroid, parathyroid, adrenal, pancreas, ovaries, testes, pineal, thymus| Regulator of metabolic activities of the body|

Cardiovascular| Heart, arteries, capillaries, veins| Move of blood ; other substances throughout the body| Lymphatic| Lymph nodes, lymphatic vessels, thymus, spleen| Responsible for returning fluid from tissue to the

blood ; defense mechanism against infection; carries absorbed food molecules| Digestive| Mouth, tongue, teeth, salivary glands, pharynx, esophagus, stomach, liver, gallbladder, pancreas, large ; small intestine| Mechanical ; chemical breakdown of nutrients from food; absorption of nutrients from food; removal of absorbed food| Respiratory| Nasal cavity, pharynx, trachea, bronchi, lungs| Inhalation/exhalation of air; exchange of oxygen and CO2 | Urinary| Kidneys, ureters, urinary bladder, urethra| Storage of Urine ; Excretion of waste from the blood; maintenance of water/electrolyte balance; | Reproductive| Male organs: penis, teste, seminale vesicle, prostate, eppididymides, ductus deferentia, bulbourethral gland| Responsible for production ; transportation of sperm | | Female organs: uterus, ovaries, cervix, vulva, fallopian tubes, vagina, clitoris| Responsible for production ; maintenance of egg cell until receipt of sperm to create embryo in which the system support ; maintain the embryo until birth| Table 1. 3 (page 8) Process| Examples| Movement| Motion of part or all of the body| Responsiveness| Reaction to change| Growth| Change in size| Reproduction| Creation of offspring| Respiration| Inhalation/Exhalation| Digestion| Breakdown of food into absorbable nutrients| Absorption| Passage of substance through the membranes and tissues of the body turning| Circulation| Motion of body fluids throughout the body| Assimilation| Breakdown of absorbed nutrients to their chemical state| Excretion| Removal of wastes from the body| Table 2. 1: Some Particles of Matter Name| Characteristic|

Atom| Smallest particle of an element that has the properties of that element| Electron (e-)| Extremely small particle with almost no weight;

carries negative electrical charge and is in constant motion around an atomic nucleus| Proton (p+)| Relatively large atomic particle; carries a positive electrical charge and is found within an atomic nucleus| Neutron| Particle with about same weight as proton; uncharged and electrically neutrol; found within atomic nucleus| Ion| Particle that is electrically charged because it has gained or lost one or more electrons| Molecule| Particle formed by chemical union of two or more atoms| Table 2. 4: Types of Electrolytes | Characteristic| Example|

Acid| Substance that released hydrogen ions (H+)| Carbonic acid, hydrochloric acid, acetic acid, phosphoric acid| Base| Substance that releases ions that can combine with hydrogen ions| Sodium hydroxide, potassium hydroxide, magnesium hydroxide, sodium bicarbonate| Salt| Substances formed by reaction between acid ; base| Sodium chloride, aluminum chloride, magnesium sulfate| Table 2. 6: Inorganic Substances Common in Cells | Substance| Functions| I. Inorganic Molecules| Water| Major component of body fluids; medium in which most biochemical reactions occur; transports various chemical substances; helps regulate body temperature| | Oxygen| Used in release of energy from glucose molecules| | Carbon dioxide| Waste product that results from metabolism; reacts with water to form carbonic acid| II. Inorganic Ions| Bicarbonate ions| Help maintain acid-base balance| | Calcium ions| Necessary for bone development; muscle contraction, and blood clotting| | Carbonate ions| Component of bone tissue| Chloride ions| Help maintain water balance| | Hydrogen ions| pH of internal environment| | Magnesium ions| Component of bone tissue; required for certain metabolic processes| | Phosphate ions|

Required for synthesis of ATP, nucleic acids and other vital substances; component of bone tissue; help maintain polarization of cell membranes| | Potassium ions| Required for polarization of cell membranes| | Sodium ions| Required for polarization of cell membranes; help maintain water balance| | Sulfate ions| Help maintain polarization of cell membranes and acid-base balance| Table 2. 7: Important Groups of Life Group| Basic Molecular Structure| Characteristics|

Triglycerides| Three fatty acid molecules bound to glycerol molecule| Most common lipid in body; stored in fat tissue as energy supply; fat tissue also provides insulation beneath skin| Phospholipids| Two fatty acid molecules and phosphate group bound to glycerol molecule (may also include nitrogen-containing molecule attached to phosphate group)| Used as structural component in cell membranes; large amounts are in liver and parts of nervous system| Steroids| Four connected rings of carbon atoms| Widely distributed in body with variety of functions; includes cholesterol, sex hormones, and certain hormones of adrenal glands| Table 2. 8: Organic Compound in Cells

Compound| Elements Present| Building Blocks| Functions| Examples| Carbohydrates| Carbon; Hydrogen; Oxygen| Simple Sugar| Provide energy ; cell structure| Glucose, starch| Lipids| Carbon, hydrogen, oxygen (often Phosphorous)| Glycerol, fatty acids, phosphate groups| Provide energy ; cell structure| Triglycerides, phospholipids, steroids| Proteins| Carbon; hydrogen; oxygen; nitrogen (often Sulfur)| Amino acids| Provide cell structure, enzymes, energy| Albumins, hemoglobin| Nucleic acids| Carbon, hydrogen, oxygen, nitrogen, phosphorous| Nucleotides| Store information for synthesis

of proteins, control cell activities| RNA, DNA| Table 3. 2: Structures and Functions of Cell Parts Cell Parts| Structure| Function| Cell membrane| Membrane mainly composed of protein and lipid molecules| Maintains integrity of cell, controls passage of materials into and out of cell, and provides for signal transduction| Ribosomes| Particles composed of protein and RNA molecules| Synthesize proteins| Endoplasmic reticulum| Complex of connected, membrane-bound sacs, canals, and esicles| Transports materials in cell, provides attachment for ribosomes, and synthesizes lipids| Vesicles| Membranous sacs| Contain substances that recently entered cell, store and transport newly synthesized molecules| Golgi apparatus| Group flattened, membranous sacs| Packages and modifies protein molecules for transport and secretion| Mitochondria| Membranous sacs with inner partitions| Release energy from food molecules and convert energy into usable form| Lysosomes| Membranous sacs| Contain enzymes capable of digesting worn cellular parts or substances that enter cells| Peroxisomes| Membranous vesicles| contain enzymes called peroxidases, important in breakdown of many organic molecules| Centrosome| Nonmembranous structure composed of two rodlike centrioles| Helps distribute chromosomes to new cells during cell division, initiated formation of cilia| Cilia| Motile projections attached to basal bodies beneath cell memebrane| Propel fluids over cellular surface| Flagella| Motile projections attached to basal bodies beneath cell membrane| Enable sperm cells to move| Microfilaments and microtubules| Thin rods and tubules| Support cytoplasm, help move substance and organelles within cytoplasm| Nuclear envelope| Porous double membrane that separate nuclear contents from cytoplasm| Maintains integrity of nucleus, controls passage of materials between nucleus and cytoplasm| Nucleolus| Dense,

nonmembranous body composed of protein and RNA molecules| Site of ribosome formation| Chromatin| Fibers composed of protein and DNA molecules| Carries information for synthesizing proteins| Table 3. 3: Movements Into and Out of the Cell (Process and Characteristics only) | Process| Characteristics| I.

Passive (Physical) Processes| Simple diffusion| Molecules move through phospholipid bilayer from regions of higher concentration toward regions of lower concentration [exchange of oxygen ; carbon dioxide of lungs]| | Facilitated diffusion| Molecules or ions move across membrane through channels or by carrier molecules from region of higher concentration to one of lower concentration [movement of glucose through cell membrane]| | Osmosis| Water molecules move through selectively permeable membrane toward solution with more impermeant solute (greater osmotic pressure) [distilled water entering a cell]| | Filtration| Smaller molecules are forced through porous membranes from regions of higher pressure to regions of lower pressure [molecules leaving blood capillaries]| II. Active (Physiological) Processes| Active Transport| Carrier molecules transport molecules or ions through membranes from regions of lower concentration toward regions of higher concentration [movement of various ions and amino acids through membranes]| | Endoyctosis| 1.

Pinocytosis| Membrane engulfs droplets of liquid from surroundings [membrane forming vesicles containing large particles dissolved in water]| | | 2. Phagocytosis| Membrane engulfs solid particles from surroundings [white blood cell membrane engulfing bacterial cell]| | | 3. Receptor mediated endocytosis| Membrane engulfs selected molecules combined with receptor

proteins [cell removing cholesterol – containing LDL particles from its surroundings]| | Exocytosis| Vesicles fuse with membrane and release contents outside of cell [protein secretion, neurotransmitter release]| | Transcytosis| Combines receptor-mediated endocytosis and exocytosis to ferry particles through a cell [HIV crossing cell layer]| Table 3. 5 Characteristics of Cancer Cells * Loss of cell cycle control Heritability (cancer cell divides to form more cancer cells) * Transplantability (cancer cell implanted into another individual will cause cancer to develop) * Dedifferentiation (loss of specialized characteristics) * Loss of contact inhibition * Ability to induce local blood vessel formation (angiogenesis) * Invasiveness * Ability to metastasize (spread) TABLE 4. 1: A Comparison of DNA and RNA Molecules | DNA| RNA| Main location| Part of chromosomes, in nucleus| Cytoplasm| 5-carbon sugar| Deoxyribose| Ribose| Basic molecular structure| Double-stranded| Single-stranded| Nitrogenous bases| Cytosine, guanine, adenine, thymine| Cytosine, guanine, adenine, racil| Major functions| Contains genetic code for protein synthesis, replicates prior to mitosis| Messenger RNA carries transcribed DNA information to cytoplasm and acts as template for synthesis of protein molecules; transfer RNA carries amino acids to messenger RNA; ribosomal RNA provides structure for ribosomes| TABLE 4. 3: Protein Synthesis Transcription (In the Nucleus)| 1. RNA polymerase binds to the DNA base sequence of a gene. | 2. This enzyme unwinds a portion of the DNA molecule, exposing part of the gene. | 3. RNA polymerase moves along one strand of the exposed gene and catalyzes synthesis of an mRNA, whose nucleotides are complementary to those of the strand of the gene. | 4. When RNA polymerase reaches the end of the gene, the newly formed mRNA is released. 5. The DNA rewinds and closes the

double helix. | 6. The mRNA passes through a pore in the nuclear envelope and enters the cytoplasm. | Translation (In the Cytoplasm)| 1. A ribosome binds to the mRNA near the codon at the beginning of the messenger strand. | 2. A tRNA molecule that has the complementary anticodon brings its amino acid to the ribosome. | 3. A second tRNA brings the next amino acid to the ribosome. | 4. A peptide bond forms between the two amino acids, and the first tRNA is released. | 5. This process is repeated for each codon in the mRNA sequence as the ribosome moves along its length, forming a chain of amino acids. | 6.

As the chain of amino acids grows, it folds, with the help of chaperone proteins, into the unique conformation of a functional protein molecule. | 7. The completed protein molecule (polypeptide) is released. The mRNA molecule, ribosome, and tRNA molecules are recycled. | TABLE 5. 1: Types of Intercellular Junctions Type| Characteristics| Example| Tight junctions| Close space between cells by fusing cell membranes| Cells that line the small intestine| Desmosomes| Bind cells by forming “ spot welds” between cell membranes| Cells of the outer skin layer| Gap junctions| Form tubular channels between cells that allow exchange of substances| Muscle cells of the heart and digestive tract| TABLE 5. 2: Tissues

Type| Function| Location| Distinguishing Characteristics| Epithelial| Protection, secretion, absorption, excretion| Cover body surface, cover and line internal organs, compose glands| Lack blood vessels, cells readily divide, cells are tightly packed| Connective| Bind, support, protect, fill spaces, store fat, produce blood cells| Widely distributed throughout the body| Mostly have good blood supply, cells are farther apart than epithelial cells, with

extracellular matrix in between| Muscle| Movement| Attached to bones, in the walls of hollow internal organs, heart| Able to contract in response to specific stimuli| Nervous| Transmit impulses for coordination, regulation, integration, and sensory reception| Brain, spinal cord, nerves| Cells communicate with each other and other body parts| TABLE 5. 4: Types of Glandular Secretions Type| Description of Secretion| Example|

Merocrine glands| A fluid product released through the cell membrane by exocytosis| Salivary glands, pancreatic glands, sweat glands of the skin| Apocrine glands| Cellular product and portions of the free ends of glandular cells pinch off during secretion| Mammary glands, ceruminous glands lining the external ear canal| Holocrine glands| Disintegrated entire cells filled with secretory products| Sebaceous glands of the skin| TABLE 5. 5: Epithelial Tissues Type| Description| Function| Location| Simple squamous epithelium| Single layer, flattened cells| Filtration, diffusion, osmosis, covers surface| Air sacs of lungs, walls of capillaries, linings of blood and lymph vessels| Simple cuboidal epithelium| Single layer, cube-shaped cells| Secretion, absorption| Surface of ovaries, linings of kidney tubules, and linings of ducts of certain glands| Simple columnar epithelium| Single layer, elongated cells| Protection, secretion, absorption| Linings of uterus, stomach, and intestines| Pseudostratified columnar epithelium| Single layer, elongated ells| Protection, secretion, movement of mucus and substances| Linings of respiratory passages| Stratified squamous epithelium| Many layers, top cells flattened| Protection| Outer layer of skin, linings of oral cavity, vagina, and anal canal| Stratified cuboidal epithelium| 2 to 3 layers, cube-shaped cells| Protection| Linings of larger ducts of mammary glands, sweat glands,

salivary glands, and pancreas| Stratified columnar epithelium| Top layer of elongated cells, lower layers of cube-shaped cells| Protection, secretion| Part of the male urethra and parts of the pharynx| Transitional epithelium| Many layers of cube-shaped and elongated cells| Distensibility, protection| Inner lining of urinary bladder and linings of ureters and part of urethra| Glandular epithelium| Unicellular or multicellular| Secretion| Salivary glands, sweat glands, endocrine glands| TABLE 5. 7: Connective Tissues Type| Function| Location|

Areolar connective tissue| Binds organs, holds tissue fluids| Beneath the skin, between muscles, beneath epithelial tissues| Adipose tissue| Protects, insulates, and stores fat| Beneath the skin, around the kidneys, behind the eyeballs, on the surface of the heart| Reticular connective tissue| Supports| Walls of liver, spleen, and lymphatic organs| Dense regular connective tissue| Binds body parts| Tendons, ligaments| Dense irregular connective tissue| Sustains tissue tension| Dermis| Elastic connective tissue| Provides elastic quality| Connecting parts of the spinal column, in walls of arteries and airways| Hyaline cartilage| Supports, protects, provides framework| Ends of bones, nose, and rings in walls of respiratory passages| Elastic cartilage| Supports, protects, provides flexible framework| Framework of external ear and part of larynx| Fibrocartilage| Supports, protects, absorbs shock| Between bony parts of spinal column, parts of pelvic girdle, and knee| Bone| Supports, protects, provides framework| Bones of skeleton, middle ear| Blood| Transports gases, defends against disease, clotting| Throughout the body in a closed system of blood vessels and heart chambers| TABLE 5. : Muscle and Nervous Tissues Type| Description| Function| Location| Skeletal

muscle tissue| Long, threadlike cells, striated, many nuclei| Voluntary movements of skeletal parts| Muscles usually attached to bones| Smooth muscle tissue| Shorter cells, single, central nucleus| Involuntary movements of internal organs| Walls of hollow internal organs| Cardiac muscle tissue| Branched cells, striated, single nucleus| Heart movements| Heart muscle| Nervous tissue| Cell with cytoplasmic extensions| Sensory reception and conduction of nerve impulses| Brain, spinal cord, and peripheral nerves| TABLE 6. 1: Layers of the Epidermis Layer| Location| Characteristics|

Stratum corneum| Outermost layer| Many layers of keratinized, dead epithelial cells that are flattened and nonnucleated| Stratum lucidum| Between stratum corneum and stratum granulosum on soles and palms| Cells appear clear; nuclei, organelles, and cell membranes are no longer visible| Stratum granulosum| Beneath the stratum corneum| Three to five layers of flattened granular cells that contain shrunken fibers of keratin and shriveled nuclei| Stratum spinosum| Beneath the stratum granulosum| Many layers of cells with centrally located, large, oval nuclei and developing fibers of keratin; cells becoming flattened| Stratum basale (basal cell layer)| Deepest layer| A single row of cuboidal or columnar cells that divide and grow; this layer also includes melanocytes| TABLE 6. 2: Skin Glands Type| Description| Function| Location|

Sebaceous glands| Groups of specialized epithelial cells| Keep hair soft, pliable, waterproof| Near or connected to hair follicles, everywhere but on palms and soles| Eccrine sweat glands| Abundant sweat glands with odorless secretion| Lower body temperature| Originate in deep dermis or subcutaneous layer and open to surface on forehead, neck, and back|

Apocrine sweat glands| Less numerous sweat glands with secretions that develop odors| Wet skin during pain, fear, emotional upset, and sexual arousal| Near hair follicles in armpit, groin, around nipples| Ceruminous glands| Modified sweat glands| Secrete earwax| External ear canal| Mammary glands| Modified sweat glands| Secrete milk| Breasts| Innerconnections: Skin provides protection, contains sensory organs, and helps control body temperature. * Cardiovascular System: Skin blood vessels play role in regulating body temperature. Digestive System: Excess calories may be stored as subcutaneous fat. Vitamin D activated by skin stimulated dietary calcium absorption. * Endocrine System: Hormones help to increase skin blood flow during exercise. Other hormones stimulate either synthesis or decomposition of subcutaneous fat. * Lymphatic System: Skin, acting as barrier, provides important first line of defense for immune system. * Muscular System: Involuntary muscle contractions (shivering) work with skin to control body temperature. Muscles act on facial skin to create expressions. * Nervous System: Sensory receptors provide information about outside world to nervous system.

Nerves control activity of sweat glands. * Reproductive System: Sensory receptors play important role in sexual activity and in suckling reflex. * Respiratory System: Stimulation of skin receptors may alter respiratory rate. * Skeletal System: Vitamin D activated by skin helps provide calcium for bone matrix. * Urinary System: Kidneys helps compensate for water and electrolytes lost in sweat. TABLE 10: Types of Neurons Classified by Structure Multipolar neuron Structural Characteristics: Cell body with many processes,

one of which is an axon, the rest dendrites Location: Most common type of neuron in the brain and spinal cord Bipolar neuron

Structural Characteristics: Cell body with a process, arising from each end, one axon and one dendrite Location: In specialized parts of the eyes, nose, and ears Unipolar neuron Structural Characteristics: Cell body with a single process that divides into two branches and functions as an axon Location: Found in ganglia outside the brain or spinal cord Classified by Function Sensory neuron Functional Characteristics: Conducts nerve impulses from receptors in peripheral body parts into the brain or spinal cord Structural Characteristics: Most unipolar; some bipolar Interneuron Functional Characteristics: Transmits nerve impulses between neurons in the brain and spinal cord Structural Characteristics: Multipolar Motor neuron

Functional Characteristics: Conducts nerve impulses from the brain or spinal cord out to effectors—muscles or glands Structural Characteristics: Multipolar TABLE 10. 2: Types of Neuroglia I. Central Nervous System Astrocytes Characteristics: Star-shaped cells between neurons and blood vessels Functions: Structural support, formation of scar tissue, transport of substances between blood vessels and neurons, communicate with one another and with neurons, mop up excess ions and neurotransmitters, induce synapse formation Oligodendrocytes Characteristics: Shaped like astrocytes, but with fewer cellular processes, occur in rows along axons Functions: Form myelin sheaths in the brain and spinal cord, produce nerve growth factors Microglia

Characteristics: Small cells with few cellular processes and found throughout the CNS Functions: Structural support and phagocytosis (immune protection) Ependyma Characteristics: Cuboidal and columnar cells in the inner lining of the ventricles of the brain and the central canal of the spinal cord Functions: Form a porous layer through which substances diffuse between the interstitial fluid of the brain and spinal cord and the cerebrospinal fluid Peripheral Nervous System Schwann cells Characteristics: Cells with abundant, lipid-rich membranes that wrap tightly around the axons of peripheral neurons Functions: Speed neurotransmission Satellite Cells Characteristics: Small, cuboidal cells that surround cell bodies of neurons in ganglia Functions: Support ganglia in the PNS TABLE 10. : Disorders Associated with Neurotransmitter Imbalances Condition| Symptoms| Imbalance of Neurotransmitter in Brain| Alzheimer disease| Memory loss, depression, disorientation, dementia, hallucinations, death| Deficient acetylcholine| Clinical depression| Debilitating, inexplicable sadness| Deficient norepinephrine and/or serotonin| Epilepsy| Seizures, loss of consciousness| Excess GABA leads to excess norepinephrine and dopamine| Huntington disease| Cognitive and behavioral changes, loss of coordination, uncontrollable dancelike movements, death| Deficient GABA| Hypersomnia| Excessive sleeping| Excess serotonin| Insomnia| Inability to sleep| Deficient serotonin| Mania| Elation, irritability, overtalkativeness, increased movements| Excess norepinephrine| Parkinson disease| Tremors of hands, slowed movements, muscle rigidity| Deficient dopamine| Schizophrenia| Inappropriate emotional responses, hallucinations| Deficient GABA leads to excess dopamine| Tardive dyskinesia| Uncontrollable movements of facial

muscles| Deficient dopamine| TABLE 11. 2: Parts of a Reflex Arc Part| Description| Function|

Receptor| The receptor end of a dendrite or a specialized receptor cell in a sensory organ| Sensitive to a specific type of internal or external change| Sensory neuron| Dendrite, cell body, and axon of a sensory neuron| Transmits nerve impulse from the receptor into the brain or spinal cord| Interneuron| Dendrite, cell body, and axon of a neuron within the brain or spinal cord| Serves as processing center; conducts nerve impulse from the sensory neuron to a motor neuron| Motor neuron| Dendrite, cell body, and axon of a motor neuron| Transmits nerve impulse from the brain or spinal cord out to an effector| Effector| A muscle or gland| Responds to stimulation by the motor neuron and produces the reflex or behavioral action| TABLE 11. 3: Nerve Tracts of the Spinal Cord Tract| Function| Ascending Tracts| 1.

Fasciculus gracilis and fasciculus cuneatus| Conduct sensory impulses associated with the senses of touch, pressure, and body movement from skin, muscles, tendons, and joints to the brain| | 2. Spinothalamic tracts (lateral and anterior)| Conduct sensory impulses associated with the senses of pain, temperature, touch, and pressure from various body regions to the brain| | 3. Spinocerebellar tracts (posterior and anterior)| Conduct sensory impulses required for the coordination of muscle movements from muscles of the lower limbs and trunk to the cerebellum| Descending Tracts| 1. Corticospinal tracts (lateral and anterior)| Conduct motor impulses associated with voluntary movements from the brain to skeletal muscles| | 2.

Reticulospinal tracts (lateral, anterior, and medial)| Conduct motor impulses associated with the maintenance of muscle tone and the activity of sweat glands from the brain| | 3. Rubrospinal tracts| Conduct motor impulses associated with muscular coordination and the maintenance of posture from the brain| TABLE 11. 5: Functions of the Cerebral Lobes Lobe| Functions| Frontal lobes| Association areas carry on higher intellectual processes for concentrating, planning, complex problem solving, and judging the consequences of behavior. | | Motor areas control movements of voluntary skeletal muscles. | Parietal lobes| Sensory areas provide sensations of temperature, touch, pressure, and pain involving the skin. | Association areas function in understanding speech and in using words to express thoughts and feelings. | Temporal lobes | Sensory areas are responsible for hearing. | | Association areas interpret sensory experiences and remember visual scenes, music, and other complex sensory patterns. | Occipital lobes | Sensory areas are responsible for vision. | | Association areas combine visual images with other sensory experiences. | TABLE 11. 8: Subdivisions of the Nervous System 1. Central nervous system (CNS) a. Brain b. Spinal cord 2. Peripheral nervous system (PNS) c. Cranial nerves arising from the brain 1. Somatic fibers connecting to the skin and skeletal muscles 2. Autonomic fibers connecting to viscera d.

Spinal nerves arising from the spinal cord 3. Somatic fibers connecting to the skin and skeletal muscles 4. Autonomic fibers connecting to viscera TABLE 11. 7: Major Parts of the Brain Part| Characteristics| Functions| 1. Cerebrum| Largest part of the brain; two hemispheres connected by the corpus callosum| Controls higher brain functions, including interpreting sensory

impulses, initiating muscular movements, storing memory, reasoning, and determining intelligence| 2. Basal nuclei (ganglia)| Masses of gray matter deep within the cerebral hemispheres| Relay stations for motor impulses originating in the cerebral cortex and passing into the brainstem and spinal cord| 3.

Diencephalon| Includes masses of gray matter (thalamus and hypothalamus)| The thalamus is a relay station for sensory impulses ascending from other parts of the nervous system to the cerebral cortex; the hypothalamus helps maintain homeostasis by regulating visceral activities and by linking the nervous and endocrine systems| 4. Brainstem – Connects the cerebrum to the spinal cord| a. Midbrain| Contains masses of gray matter and bundles of nerve fibers that join the spinal cord to higher regions of the brain| Contains reflex centers that move the eyes and head, and maintains posture| | b. Pons| A bulge on the underside of the brainstem that contains masses of gray matter and nerve fibers| Relays nerve impulses to and from the medulla oblongata and cerebrum; helps regulate rate and depth of breathing| | c.

Medulla oblongata| An enlarged continuation of the spinal cord that extends from the foramen magnum to the pons and contains masses of gray matter and nerve fibers| Conducts ascending and descending impulses between the brain and spinal cord; contains cardiac, vasomotor, and respiratory control centers and various nonvital reflex control centers| 5. Cerebellum| A large mass of tissue inferior to the cerebrum and posterior to the brainstem; includes two lateral hemispheres connected by the vermis| Communicates with other parts of the CNS by nerve tracts; integrates sensory information

concerning the position of body parts; and coordinates muscle activities and maintains posture| TABLE 12. 2: Receptors Associated with General Senses Type| Function| Sensation|

Free nerve endings (mechanoreceptors)| Detect changes in pressure| Touch, pressure| Tactile corpuscles (mechanoreceptors)| Detect objects moving over the skin| Touch, texture| Lamellated corpuscles (mechanoreceptors)| Detect changes in pressure| Deep pressure, vibrations, fullness in viscera| Free nerve endings (thermoreceptors)| Detect changes in temperature| Heat, cold| Free nerve endings (pain receptors)| Detect tissue damage| Pain| Free nerve endings (mechanoreceptors)| Detect stretching of tissues, tissue spasms| Visceral pain| Muscle spindles (mechanoreceptors)| Detect changes in muscle length| None| Golgi tendon organs (mechanoreceptors)| Detect changes in muscle tension| None| TABLE 11. 9: Functions of Cranial Nerves Nerve| Function| I Olfactory| * Sensory fibers transmit impulses associated with the sense of smell. | II Optic| * Sensory fibers transmit impulses associated with the sense of vision. | III Oculomotor| * Motor fibers transmit impulses to muscles that raise the eyelids, move the eyes, adjust the amount of light entering the eyes, and focus the lenses. Some sensory fibers transmit impulses associated with proprioceptors. | IV Trochlear| * Motor fibers transmit impulses to muscles that move the eyes. * Some sensory fibers transmit impulses associated with proprioceptors. | V Trigeminal| Ophthalmic division| * Sensory fibers transmit impulses from the surface of the eyes, tear glands, scalp, forehead, and upper eyelids. | | Maxillary division| * Sensory fibers transmit impulses from the upper teeth, upper gum, upper lip, lining of the palate, and skin of the face. | | Mandibular

division| * Sensory fibers transmit impulses from the scalp, skin of the jaw, lower teeth, lower gum, and lower lip. Motor fibers transmit impulses to muscles of mastication and to muscles in the floor of the mouth. | VI Abducens| * Motor fibers transmit impulses to muscles that move the eyes. * Some sensory fibers transmit impulses associated with proprioceptors. | VII Facial| * Sensory fibers transmit impulses associated with taste receptors of the anterior tongue. * Motor fibers transmit impulses to muscles of facial expression, tear glands, and salivary glands. | VIIIVestibulocochlear| Vestibular branch| * Sensory fibers transmit impulses associated with the sense of equilibrium. | | Cochlear branch| * Sensory fibers transmit impulses associated with the sense of hearing. IX Glossopharyngeal| * Sensory fibers transmit impulses from the pharynx, tonsils, posterior tongue, and carotid arteries. * Motor fibers transmit impulses to salivary glands and to muscles of the pharynx used in swallowing. | X Vagus| * Somatic motor fibers transmit impulses to muscles associated with speech and swallowing; autonomic motor fibers transmit impulses to the viscera of the thorax and abdomen. * Sensory fibers transmit impulses from the pharynx, larynx, esophagus, and viscera of the thorax and abdomen. | XI Accessory| Cranial branch| * Motor fibers transmit impulses to muscles of the soft palate, pharynx, and larynx. | | Spinal branch| * Motor fibers transmit impulses to muscles of the neck and back; some proprioceptor input. XII Hypoglossal| * Motor fibers transmit impulses to muscles that move the tongue; some proprioceptor input. | Table 11. 10: Effects of Autonomic Stimulation on Various Visceral Effectors Effector Location| Response to Sympathetic Stimulation| Response to Parasympathetic Stimulation| Integumentary system| Apocrine glands|

Increased secretion| No action| | Eccrine glands| Increased secretion (cholinergic effect)| No action| Special senses| Iris of eye| Dilation| Constriction| | Tear gland| Slightly increased secretion| Greatly increased secretion| Endocrine system| Adrenal cortex| Increased secretion| No action| | Adrenal medulla| Increased secretion| No action|

Digestive system| Muscle of gallbladder wall| Relaxation| Contraction| | Muscle of intestinal wall| Decreased peristaltic action| Increased peristaltic action| | Muscle of internal anal sphincter| Contraction| Relaxation| | Pancreatic glands| Reduced secretion| Greatly increased secretion| | Salivary glands| Reduced secretion| Greatly increased secretion| Respiratory system| Muscles in walls of bronchioles| Dilation| Constriction| Cardiovascular system| Blood vessels supplying muscles| Constriction (alpha adrenergic) Dilation (beta adrenergic)| No action| | Blood vessels supplying skin| Constriction| No action| | Blood vessels supplying heart (coronary arteries)| Constriction (alpha adrenergic) Dilation (beta adrenergic)| No action| | Muscles in wall of heart| Increased contraction rate| Decreased contraction rate| Urinary system| Muscle of bladder wall| Relaxation| Contraction| | Muscle of internal urethral sphincter| Contraction| Relaxation| Reproductive system| Blood vessels to penis and clitoris| No action| Dilation leading to erection of penis and clitoris| | Muscles associated with internal reproductive organs| Male ejaculation, female orgasm| | Types of Smell and Taste Disorders| Smell| Taste| Loss of sensation| Anosmia| Ageusia| Diminished sensation| Hyposmia| Hypogeusia| Heightened sensation| Hyperosmia| Hypergeusia| Distorted sensation| Dysosmia| Dysgeusia| TABLE 10. 3: Events Leading to Nerve Impulse Conduction 1. Nerve cell membrane maintains resting

potential by diffusion of Na+ and K+ down their concentration gradients as the cell pumps them up the gradients. 2. Neurons receive stimulation, causing local potentials, which may sum to reach threshold. 3.

Sodium channels in the trigger zone of the axon open. 4. Sodium ions diffuse inward, depolarizing the membrane. 5. Potassium channels in the membrane open. 6. Potassium ions diffuse outward, repolarizing the membrane. 7. The resulting action potential causes an electric current that stimulates adjacent portions of the membrane. 8. Action potentials occur sequentially along the length of the axon as a nerve impulse. TABLE 10. 7: Events Leading to Neurotransmitter Release 1. Action potential passes along an axon and over the surface of its synaptic knob. 2. Synaptic knob membrane becomes more permeable to calcium ions, and they diffuse inward. 3.

In the presence of calcium ions, synaptic vesicles fuse to synaptic knob membrane. 4. Synaptic vesicles release their neurotransmitter by exocytosis into the synaptic cleft. 5. Synaptic vesicles become part of the membrane. 6. The added membrane provides material for endocytotic vesicles. TABLE 11. 1: Partitions of the Dura Mater * Falx cerebelli: Separates the right and left cerebellar hemispheres * Falx cerebri: Extends downward into the longitudinal fissure, and separates the right and left cerebral hemispheres * Tentorium cerebelli: Separates the occipital lobes of the cerebrum from the cerebellum TABLE 12. 4: Steps in the Generation of Sensory Impulses from the Ear 1.

Sound waves enter the external acoustic meatus. 2. Waves of changing pressures cause the tympanic membrane to reproduce the vibrations coming

from the sound-wave source. 3. Auditory ossicles amplify and transmit vibrations to the end of the stapes. 4. Movement of the stapes at the oval window transmits vibrations to the perilymph in the scala vestibuli. 5. Vibrations pass through the vestibular membrane and enter the endolymph of the cochlear duct. 6. Different frequencies of vibration in endolymph move specific regions of the basilar membrane, stimulating specific sets of receptor cells. 7. A receptor cell depolarizes; its membrane becomes more permeable to calcium ions. 8.

In the presence of calcium ions, vesicles at the base of the receptor cell release neurotransmitter. 9. Neurotransmitter stimulates the ends of nearby sensory neurons. 10. Sensory impulses are triggered on fibers of the cochlear branch of the vestibulocochlear nerve. 11. The auditory cortex of the temporal lobe interprets the sensory impulses. TABLE 10. 4: Some Neurotransmitters and Representative Actions * Neurotransmitter Acetylcholine * Location CNS * Major Actions Controls skeletal muscle actions * Location PNS * Major Actions Stimulates skeletal muscle contraction at neuromuscular junctions. May excite or inhibit at autonomic nervous system synapses * Biogenic amines * Neurotransmitter Norepinephrine * Location: CNS Major Actions: Creates a sense of well-being; low levels may lead to depression * Location: PNS * Major Actions: May excite or inhibit autonomic nervous system actions, depending on receptors * Neurotransmitter Dopamine * Location CNS * Major Actions Creates a sense of well-being; deficiency in some brain areas associated with Parkinson disease * Location PNS * Major Actions Limited actions in autonomic nervous system; may excite or inhibit, depending on receptors * Neurotransmitter Serotonin *

Location CNS * Major Actions Primarily inhibitory; leads to sleepiness; action is blocked by LSD, enhanced by selective serotonin reuptake inhibitor antidepressant drugs * Neurotransmitter Histamine * Location CNS Major Actions Release in hypothalamus promotes alertness Amino Acids * Neurotransmitter GABA * Location CNS * Major Actions Generally inhibitory * Neurotransmitter Glutamate * Location CNS * Major Actions Generally excitatory Neuropeptides * Neurotransmitter Enkephalins, endorphins * Location CNS * Major Actions Generally inhibitory; reduce pain by inhibiting substance P release * Neurotransmitter Substance P * Location PNS * Major Actions Excitatory; pain perception Gases * Neurotransmitter Nitric oxide * Location CNS * Major Actions May play a role in memory * Location PNS * Major Actions Vasodilation TABLE 10. 6: Drugs That Alter Neurotransmitter Levels

Drug| Neurotransmitter Affected| Mechanism of Action| Effect| Tryptophan| Serotonin| Stimulates neurotransmitter synthesis| Sleepiness| Reserpine| Norepinephrine| Decreases packaging of neurotransmitter into vesicles| Decreases blood pressure| Curare| Acetylcholine| Blocks receptor binding| Muscle paralysis| Valium| GABA| Enhances receptor binding| Decreases anxiety| Nicotine | Acetylcholine| Activates receptors| Increases alertness| | Dopamine| Elevates levels| Sense of pleasure| Cocaine| Dopamine| Blocks reuptake| Euphoria| Tricyclic antidepressants | Norepinephrine| Blocks reuptake| Antidepressant| | Serotonin| Blocks reuptake| Antidepressant| Monoamine oxidase inhibitors| Norepinephrine| Blocks enzymatic degradation of neurotransmitter in presynaptic cell| Antidepressant| Selective serotonin reuptake inhibitors| Serotonin| Blocks reuptake|

Antidepressant, Anti-anxiety agent| Dual reuptake inhibitors| Serotonin, norepinephrine| Blocks reuptake| Mood elevation| TABLE 11. 4: Structural Development of the Brain

Embryonic Vesicle| Spaces Produced| Regions of the Brain Produced| Forebrain (prosencephalon)| Anterior portion (telencephalon)| Lateral ventricles| Cerebrum Basal nuclei| | Posterior portion (diencephalon)| Third ventricle| Thalamus Hypothalamus Posterior pituitary gland Pineal gland| | Midbrain (mesencephalon)| Cerebral aqueduct| Midbrain| Hindbrain (rhombencephalon)| Anterior portion (metencephalon)| Fourth ventricle| Cerebellum, pons| | Posterior portion (myelencephalon)| Fourth ventricle| Medulla oblongata| TABLE 11. 6: Sleep Disorders Disorder| Symptoms| Percent of Population| Fatal familial insomnia| Inability to sleep, emotional instability, hallucinations, stupor, coma, death within thirteen months of onset around age fifty, both slow-wave and REM sleep abolished. | Very rare| Insomnia| Inability to fall or remain asleep. | 10%| Narcolepsy| Abnormal REM sleep causes extreme daytime sleepiness, begins between ages of fifteen and twenty-five. | 0. 02–0. 06%| Obstructive sleep apnea syndrome| Upper airway collapses repeatedly during sleep, blocking breathing.

Snoring and daytime sleepiness. | 4–5%| Parasomnias| Sleepwalking, sleeptalking, and night terrors. | ; 5% of children| REM-sleep behavior disorder| Excessive motor activity during REM sleep, which disturbs continuous sleep. | Very rare| Restless legs syndrome| Brief, repetitive leg jerks during sleep. Leg pain forces person to get up several times a night. | 5. 5%| Sleep paralysis| Inability to move for up to a few minutes after awakening or when falling asleep. | Very rare| TABLE 12. 1: Information Flow

from the Environment Through the Nervous System Information Flow| Smell| Taste| Sight| Hearing| TABLE 12. 5: Muscles Associated with the Eyelids and Eyes

Skeletal Muscles Name| Innervation| Function| Smooth Muscles Name| Innervation| Function| Muscles of the eyelids| | | Ciliary muscles| Oculomotor nerve (III) parasympathetic fibers| Relax suspensory ligaments| Orbicularis oculi| Facial nerve (VII)| Closes eye| Iris, circular muscles| Oculomotor nerve (III) parasympathetic fibers| Constrict pupil| Levator palpebrae superioris| Oculomotor nerve (III)| Opens eye| Iris, radial muscles| Sympathetic fibers| Dilate pupil| Extrinsic muscles of the eyes| | | | | | Superior rectus| Oculomotor nerve (III)| Rotates eye upward and toward midline| | | | Inferior rectus| Oculomotor nerve (III)| Rotates eye downward and toward midline| | | | Medial rectus| Oculomotor nerve (III)| Rotates eye toward midline| | | | Lateral rectus| Abducens nerve (VI)| Rotates eye away from midline| | | | Superior oblique| Trochlear nerve (IV)| Rotates eye downward and away from midline| | | | Inferior oblique| Oculomotor nerve (III)| Rotates eye upward and away from midline| | | | TABLE 12. 6: Layers of the Eye

Layer/Tunic| Posterior Portion| Function| Anterior Portion| Function| Outer layer| Sclera| Protection| Cornea| Light transmission and refraction| Middle layer| Choroid coat| Blood supply, pigment prevents reflection| Ciliary body, iris| Accommodation; controls light intensity| Inner layer| Retina| Photoreception, impulse transmission| None| | | | | | As one author has noted, “ Generations of biology and medical students have relied on mnemonic (memory-aiding) phrases and ditties, ranging from sublimely silly

to the unprintably ribald, to help them remember the cranial nerves... “[1] The cranial nerves are: I – Olfactory nerve II – Optic nerve III – Oculomotor nerve IV – Trochlear nerve/pathic nerve V – Trigeminal nerve/dentist nerve VI – Abducens nerve VII – Facial nerve VIII – Vestibulocochlear nerve/Auditory nerve IX – Glossopharyngeal nerve X – Vagus nerve

XI – Accessory nerve/Spinal accessory nerve XII – Hypoglossal nerve [edit]Mnemonics for the nerves A mnemonic uses, at the least, the first letter of each of the 12 nerves, in order. Examples listed below are those that have been published in textbooks: On Old Olympus’ Towering Top, A Finn And German Viewed Some Hops[2][3] Other variations have been composed more informally by individual persons and propagated to attain widespread notability, such as the ones below: Old Open Oceans Trouble Tribesmen About Far Ventures, Global Vacations, Accusing Hydrophobia Oh, Oh, Oh, To Touch And Feel Virgin Girls Vagina, And Hymen/Hooters Oh, Oh, Oh, To Touch And Feel Vagina, God Vaginas Are Hot

Orange Oregon O-lineman Tried Track And Field, Victory Gave Virginia School Honor On Occasion Olsen Twins Try Anal Fucking Versus Giving Very Awesome Handjobs Once One Openly Told Tourists About Fighting Vampires Gobling Various Antelope Herds On Old Olympus’ Towering Top, A Friendly Viking Grew Vines And Hops Oh Once One Takes The Anatomy Final Very Good Vacations Are Heavenly. Oh, Oh, Oh, To Touch And Feel Very Good’ Velvet Aah Hah Oh, Oh, Oh, To Touch And Feel A Guy’s Vein And Hotdog Oh, Oh, Oh, To Touch And Feel Very Good Vibes AHhhh One Of Old Trained Teacher Ask For A Girl Vadai And Halva Oh, Oh, Oh, To Touch And Fondle A Gorgeous Very Super Human Oh, Oh, Oh, To Touch And Feel Very Green

Vegetables, Such Heaven Oh, Oh, Oh, To Take A Family Vacation! Go Vegas After Hours

Oh, Oh, Oh, They Traveled And Found Voldemort Guarding Very Secret Horcruxes/Hallows Old Opie Occasionally Tries Trigonometry And Feels Very Gloomy, Vague And Hypoactive Old Oprah Occasionally Trots Triumphantly About, Farting Velveeta Globs, Vaunting Accolades Hysterically Oh, Oh, Oh, To Touch And Feel Vintage Green Velvet, Simply Heaven Old, Oliver, Ogg, Traveled, To, Africa, For, Very, Good, Vacations, And, Holidays Once On October Thirteenth, Troublesome Abductors Filched Various Golden Valuables And Heirlooms Oprah Ought Order Tasty Treats And Finally Value Growing Voluptuous And Happy Old Officers Often Trust The Army For A Glory Vague And Hypothetical [edit]Mnemonics for the type of nerve

Mnemonics for the type of nerve or its function rely upon the letters S, M and B for sensory, motor or both. The mnemonics to remember the types of cranial nerves can be chosen from: S = Sensory M = Motor B = Both (sensory + motor) A common mnemonic for the functions of the first through twelfth nerves, is “ Some Say Marry Money, But My Brother Says Big Business Makes Money. ” [2] Another common variation of this is “ Some Say Marry Money, But My Brother Says Big Brains Matter Most. ” (or Big/Bouncy Boobs) (or Big Bucks) Some Say Money Matters, But My Brother Says Big Boobs Matter More. ” (or Bouncy Boobs) Some Say Money Matters, But My Brother Says Baked Brownies Matter Most. ” Some Say Mind Matters, But My Brother Says Big Boobs Matter More. (or Bouncy Boobs) Silly Superman Made Mortal Brothers Make Bets Since Both Boys Made Money” Some Say Money Matters, But My Beloved Says Being Beloved Matters More. ” Or to include

the three Trigeminal branches: Some say money matters, some say men, my brother says big brains matter most. [edit]Mnemonics for the foramina To remember the skull foramina (plural of foramen) from which exit the 12 cranial nerves, the following statements may be used: Cleaners Only Spray Smelly Stuff Right On Smelly Idiots In J. Jonah Jameson High Carl Only Swims South. Silly Roger Only Swims In Infiniti Jacuzzis. Jane Just Hitchhikes. Carlos Only Smokes Spliff Since Rastaman Offered Skunk In Indigenous Jamaica. Jamaican Joint Heaven. for Cribriform plate (Olfactory), Optic anal (Optic), Superior Orbital Fissure (Oculomotor), Superior Orbital Fissure (Trochlear), Superior Orbital Fissure (Trigeminal – Ophthalmic), Foramen Rotundum (Trigeminal – Maxillary), Foramen Ovale (Trigeminal – Mandibular), Superior Orbital Fissure (Abducens), Internal Acoustic Meatus (Facial), Internal Acoustic Meatus (Vestibulocochlear), Jugular Foramen (Glossopharyngeal), Jugular Foramen (Vagus), Jugular Foramen (Accessory), Hypoglossal Canal (Hypoglossal) INNERCONNECTIONS: * Integumentary System: * Nervous System – Sensory receptors provide nervous system with information about outside world * Lymphatic System * Nervous System – Stress may impair immune response * Muscular System: * Nervous System – Nerve impulses control movement and carry information about position of body parts * Skeletal System: * Nervous System – Bones protect brain and spinal cord and help maintain plasma calcium, important to neuron function. * Digestive System Nervous System – Nervous system can influence digestive function. * Respiratory System * Nervous System – The nervous system alters respiratory activity to control oxygen levels and blood pH. * Endocrine System * Nervous System – The hypothalamus controls secretion of many hormones. * Urinary System * Nervous System – Nerve impulses affect urine

production and elimination * Cardiovascular System * Nervous System – Nerve impulses help control blood flow and blood pressure * Reproductive System * Nervous System – The nervous system plays a role in egg and sperm formation, sexual pleasure, childbirth, and nursing Astrocyte – star-shaped neuroglial cell Auditory—pertaining to hearing.

Axon – cylindrical nerve process that carries impulses away from neuron cell body Bipolar neuron – neuron with two processes extending from cell body Choroid coat—middle, vascular layer of the eye. Choroid plexus—mass of specialized capillaries associated with spaces in the brain. Cochlea—coiled tube in the inner ear. Cornea—transparent outer layer in the anterior portion of the eye Dendrite – branched nerve process that serves as receptor surface of neuron Encephalitis—inflammation of the brain Ependymal – neuroglial cells that line spaces in brain and spinal cord Flaccid paralysis—paralysis characterized by loss of tone in muscles innervated by damaged axons. Funiculus—major nerve tract or bundle of myelinated axons within the spinal cord. Ganglion—mass of neuron cell bodies.

Iris—colored, muscular part of the eye. Labyrinth—complex system of connecting chambers and tubes of the inner ear. Lacri mal gland—tear gland Levator palpebrae superioris—muscle associated with the eyelid Macula lutea—yellowish spot on the retina. Maculalutea—yellowish spot on the retina. Malleus—one of the three bones in the middle ear Meninges—membranous coverings of the brain and spinal cord. Motor neuron – neuron that stimulates muscle to contract gland to release secretion Multipolar neuron – neuron with many process extending from cell body Neurilemma –

sheath that surrounds myelin of nerve cell process Olfactory—pertaining to the sense of smell.

Oligodendroctye – small neuroglial cell with few cellular processes Optic chiasma—X-shaped structure produced by the crossing over of optic nerve fibers Orbicularis oculi—muscle associated with the eyelid Peripheral nervous system – portion of nervous system that consists of nerves branching from brain and spinal cord Photoreceptors—specialized structures in the eye responsive to light Salutatory conduction – nerve impulse conduction in which impulse seems to jump from node to node along nerve fiber Sclera—tough, outer protective layer of the eye. Sensory neuron – neuron that can be stimulated by sensory receptor and conducts impulse into brain or spinal cord Synapse – junction between two neurons Thermoreceptor—receptor sensitive to changes in temperature. Tympanic membrane—eardrum.

Unipolar – neuron with only one process extending from cell body Vitreous humor—clear, jellylike substance within the eye. adipose tissue—tissue that stores fat. aerobic respiration—respiratory process that requires oxygen. albinism—condition characterized by a lack of pigment in skin, hair, and eyes. anabolism—cellular processes in which smaller molecules are used to build up larger ones. anaerobic respiration—respiratory process that does not require oxygen. anatomy—study of structure, which often involves cutting or removing body parts. apoptosis—a form of cell death in which cells are shed from a developing structure. appendicular—pertaining to the upper limbs and lower limbs. biochemistry—branch of science dealing with the chemistry of life forms. atabolism—cellular processes in which larger molecules are broken down into smaller ones. cerebrum—largest part of the

brain. chondrocyte—cartilage cell coenzyme—substance that unites with a protein to complete the structure of an active enzyme molecule. covalent bond—chemical bond produced when two atoms share electrons. cranial—pertaining to the part of the skull that surrounds the brain. cytoplasm—fluid (cytosol) and organelles between the cell membrane and nuclear envelope. deamination—process that removes nitrogen-containing portions of amino acid molecules. dermis—inner layer of the skin. disaccharide—compound whose molecules are composed of two sugar units bound together. orsal—position toward the back of the body. electrolyte—substance that dissolves in water and releases ions. endoplasmic reticulum—membranous complex in the cytoplasm. enzyme—protein that speeds up a chemical reaction without itself being consumed. epidermis—outer layer of the skin. epithelial tissue—tissue that covers all free body surfaces glycogen—complex carbohydrate composed of glucose molecules bound together in a particular way. hair follicle—tubelike depression in which a hair develops. histology—study of composition and function of tissues holocrine gland—gland that discharges the entire cell containing the secretion. homeostasis—maintenance of a stable internal environment. omeostasis—maintenance of a stable internal environment. hyaline cartilage—flexible tissue containing chondrocytes hypertonic—solution that has a greater osmotic pressure than the cytosol. hypotonic—solution that has a lesser osmotic pressure than the cytosol. intercalated disc—band between adjacent cardiac muscle cells interphase—stage between mitotic divisions of a cell. isotonic—solution that has an osmotic pressure equal to that of the cytosol. isotope—atom that has the same atomic number as another atom but a different atomic weight. keratin—protein produced as epidermal cells die and harden. lipids—group of

organic compounds that includes fats. ysosome—organelle containing enzymes that break down proteins, carbohydrates, and nucleic acids. macrophage—large phagocytic cell. melanin—dark pigment produced by certain cells. metabolism—chemical changes that occur within the body. mitosis—stage of cell division when chromosomes condense. monosaccharide—compound whose molecule consists of a single sugar unit. monosaccharide—molecule consisting of a single sugar unit. mutation—change in genetic information. nasal—pertaining to the nose. neuroglia—cells that support neurons; part of nervous tissue. neuron—nerve cell nucleus—central core of an atom. orbital—pertaining to the portion of skull that encircles an eye. sseous tissue—bone tissue osteocyte—bone cell parietal membrane—membrane that lines the wall of a cavity. pelvic cavity—basin-shaped cavity enclosed by the pelvic bones. pericardial membrane—membrane that surrounds the heart. pericardium—membrane that surrounds the heart. phagocyte—cell that engulfs and destroys foreign particles phagocytosis—process by which a cell takes in solid particles. physiology—study of body functions. pinocytosis—process by which a cell takes in tiny droplets of liquid. pleural membrane—membrane that encloses the lungs within the rib cage. polyunsaturated—molecule that has many double bonds between its carbon atoms. ore—opening by which a sweat gland communicates to the skin’s surface. prophase—first stage of mitosis. pseudostratified epithelium—tissue with cells that appear to be in layers, but are not. ribosome—tiny, spherical organelle composed of protein and RNA that supports protein synthesis. sebaceous gland—gland that secretes an oily substance squamous epithelium—tissue with flattened or scalelike cells. stratified epithelium—tissue with cells in layers striated muscle—tissue

whose cells have alternating light and dark cross-markings. subcutaneous—beneath the skin. substrate—substance upon which an enzyme acts. superior—referring to a body part located above another. ynthesis—process by which substances are united to form a new type of substance. vesicle—small, saclike organelle that contains substances to be transported within the cell or secreted. acetabulum—depression of the hip bone that articulates with the head of the femur. axial skeleton—upright portion of the skeleton that supports the head, neck, and trunk osteoblast—cell that will form bone tissue carpals—wrist bones. osteoclast—cell that breaks down bone tissue clavicle—bone that articulates with the sternum and scapula condyle—rounded, bony process cribriform plate—portion of the ethmoid bone with many small openings coracoid process—beaklike process of the scapula rista galli—bony ridge that projects upward into the cranial cavity. fovea capitis—pit in the head of a femur glenoid cavity—depression in the scapula that articulates with the head of a humerus inter vertebral disc—structure between vertebrae intramembranous bone—bone that forms within sheetlike masses of connective tissue lamella—thin, bony plate odontoid process—toothlike process of the second cervical vertebra auditory meatus—canal of the temporal bone that leads inward to parts of the ear hematopoiesis—process that forms blood cells anular ligament—ring-shaped band of connective tissue below the elbow joint that encircles the head of the radius. arthrology—study of joints and ligaments repatellar bursa—fluid-filled sac between the skin and the patella medial condyle—rounded bony process at the distal end of the femur fovea capitis—pit in the head of the femur to which a ligament is attached glenoid cavity—depression in the scapula that articulates with the head of the humerus glenoidal labrum—rim of fibrocartilage attached to

the margin of the glenoid cavity : synovial fluid—thick fluid in a joint cavity that resembles egg white suture—type of joint in which flat bones are interlocked by a set of tiny bony processes intercalated disc—membranous band that connects cardiac muscle cells syndesmosis—type of joint in which the bones are held together by long fibers of connective tissue. synergist—muscle that works with a prime mover, producing a movement fasciculus—bundle of muscle fibers myogram—recording of a muscular contraction intercalated disc—membranous band that connects cardiac muscle cells muscular hypertrophy—enlargement of muscle fibers canaliculus—tubular passage isotonic contraction—contraction during which the tension in a muscle remains unchanged myofibril—contractile fiber of a muscle cell latent period—period between a stimulus and the beginning of a muscle contraction sarcoplasmic reticulum—network of membranous channels within a muscle fiber sarcoplasm—substance (cytoplasm) within a muscle fiber. ynergist—muscle that works with a prime mover, producing a movement tetanic contraction—sustained muscular contraction isotonic contraction—contraction during which the tension of a muscle remains unchanged muscular hypertrophy—enlargement of muscle fibers voluntary muscle—muscle that can be controlled by conscious effort acetabulum—depression of the hip bone that articulates with the head of the femur. axial skeleton—upright portion of the skeleton that supports the head, neck, and trunk. osteoblast—cell that will form bone tissue canaliculus—tubular passage. carpals—wrist bones. osteoclast—cell that breaks down bone tissue. clavicle—bone that articulates with the sternum and scapula condyle—rounded, bony process oracoid process—beaklike process of the scapula cribriform plate—portion of the ethmoid bone with many small openings

crista galli—bony ridge that projects upward into the cranial cavity fovea capitis—pit in the head of a femur glenoid cavity—depression in the scapula that articulates with the head of a humerus inter vertebral disc—structure between vert