

# Medical Anatomy and Physiology: Grades 10-12 (2018)

**Body Plan and Organization-Students will explore and describe the body plan, organization, and homeostasis. 1**

**1 Contrast the sciences of anatomy with physiolog 1.1**

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**2 Describe the six levels of structural organization of the human body and give an example of each level. 1.2**

a Chemical 1.2.A

b Cellular 1.2.B

c Tissue 1.2.C

d Organ 1.2.D

e System 1.2.E

f Organism 1.2.F

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**3 Describe the following: 1.3**

a Metabolism 1.3.A

1 Anabolic process 1.3.A.1

2 Catabolic process 1.3.A.2

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**4 Apply directional terms used in human anatomy. 1.4**

a Posterior/Anterior 1.4.A

b Medial/Lateral 1.4.B

c Proximal/Distal 1.4.C

d Superficial/Deep 1.4.D

e Superior/Inferior 1.4.E

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**5 Apply commonly used planes to divide the body. 1.5**

a Sagittal 1.5.A

b Midsagittal 1.5.B

c Transverse (horizontal) 1.5.C

d Frontal (coronal) 1.5.D

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**6 Identify the body cavities and locate the following organs within each cavity. 1.6**

- a Dorsal Cavity 1.6.A
  - 1 Vertebral - Spinal Cord 1.6.A.1
  - 2 Cranial - Brain 1.6.A.2
- b Ventral Cavity 1.6.B
  - 1 Thoracic - Heart & Lungs 1.6.B.1
    - 1 Mediastinum-heart, bronchi, esophagus, thymus. 1.6.B.1.1
    - 2 Pericardial-heart 1.6.B.1.2
    - 3 Pleural-lungs 1.6.B.1.3
  - c Abdominopelvic Cavity-liver, spleen, intestines, kidneys, stomach 1.6.C
    - 1 Abdominal-liver, spleen, intestines, kidneys, stomach 1.6.C.1
    - 2 Pelvic-intestines, urinary bladder, sex organs 1.6.C.2

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**7 Identify the major organ(s) in each abdominal quadrant. 1.7**

- a RUQ-right upper quadrant-liver, gallbladder, right kidney 1.7.A
- b RLQ-right lower quadrant-cecum, appendix, right ovary 1.7.B
- c LUQ-left upper quadrant-spleen, stomach, left kidney 1.7.C
- d LLQ-lower left quadrant-left ovary 1.7.D

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**8 Examine the relationship between homeostasis and stress. 1.8**

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**9 Differentiate between negative and positive mechanisms. Give examples of each. 1.9**

- a Be able to describe the following: 1.9.A
    - 1 Childbirth 1.9.A.1
    - 2 Breast feeding 1.9.A.2
    - 3 Blood clotting 1.9.A.3
-

**Basic Principles of Body Chemistry-Students will explain basic principles of body chemistry. 2**

**1 Review the following terms and concepts. 2.1**

- a States of Matter 2.1.A
  - b Elements 2.1.B
  - c Basic components of the atom 2.1.C
    - 1 Nucleus 2.1.C.1
    - 2 Electrons 2.1.C.2
    - 3 Protons 2.1.C.3
    - 4 Neutrons 2.1.C.4
  - d Ion 2.1.D
    - 1 Electrolyte 2.1.D.1
- 

**2 Identify the four major elements in the body. 2.2**

- a Carbon 2.2.A
  - b Hydrogen 2.2.B
  - c Oxygen 2.2.C
  - d Nitrogen 2.2.D
- 

**3 Differentiate between: 2.3**

- a Compound 2.3.A
  - b Molecule 2.3.B
- 

**4 Differentiate between: 2.4**

- a Cation 2.4.A
  - b Anion 2.4.B
- 

**5 Describe the characteristics of bonds. (no longer place any emphasis on which is the strongest type) 2.5**

- a Ionic 2.5.A
  - b Covalent 2.5.B
  - c Hydrogen 2.5.C
- 

**6 Define pH. 2.6**

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**7 Categorize the following based on the pH of a solution: 2.7**

- a Acidic 2.7.A
- b Basic 2.7.B
- c Neutral 2.7.C

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**8 Distinguish between "neutral" pH and the "average" pH range of the blood.** 2.8

- a Neutral pH=7.0 2.8.A
  - b Average pH of blood=7.35 to 7.45 2.8.B
- 

**9 Describe the properties of water and how it is utilized in the human body.** 2.9

- a Universal solvent 2.9.A
  - b Transport 2.9.B
  - c Lubricant 2.9.C
  - d Heat capacity 2.9.D
  - e Chemical reactions 2.9.E
- 

**10 Distinguish between:** 2.10

- a Inorganic compounds-do not contain carbon, small molecules, usually form ionic bonds 2.10.A
  - b Organic compounds-usually contain carbon, large molecules, form covalent bonds, flammable 2.10.B
- 

**11 Describe the structures and functions of the following and give an example of each:** 2.11

- a Carbohydrates 2.11.A
  - b Proteins 2.11.B
  - c Lipids 2.11.C
  - d Nucleic acids 2.11.D
    - 1 RNA 2.11.D.1
    - 2 DNA 2.11.D.2
  - e Amino acids 2.11.E
- 

**12 Describe how the body produces energy during cellular respiration.** 2.12

- a  $ATP \leftrightarrow ADP + P + ENERGY$  2.12.A
- 

**Cells-Students will describe basic concepts of structures and functions of cells.** 3

**1 Identify the four principle parts of a generalized animal cell and their functions.** 3.1

- a Nucleus 3.1.A
  - b Cytosol 3.1.B
  - c Organelles 3.1.C
  - d Cell membrane 3.1.D
- 

**2 Describe the structure and function of the cell membrane.** 3.2

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**3 Describe a selectively permeable membrane and factors which influence permeability.** 3.3

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**4 Contrast intracellular and extracellular fluid in terms of location and composition.** 3.4

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**5 Describe each of the following cellular transport processes and classify them as active or passive.** 3.5

a Passive processes 3.5.A

1 Diffusion 3.5.A.1

2 Osmosis 3.5.A.2

3 Facilitated diffusion 3.5.A.3

4 Dialysis 3.5.A.4

5 Filtration 3.5.A.5

b Active processes 3.5.B

1 Phagocytosis 3.5.B.1

2 Exocytosis 3.5.B.2

3 Active transport 3.5.B.

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**6 Review the osmotic effects that occur when a cell is placed in the following:** 3.6

a Isotonic solution 3.6.A

b Hypotonic solution 3.6.B

c Hypertonic solution 3.6.

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**7 Describe the function of the following structures within the cell. 3.7**

- a Nucleolus 3.7.A
- b DNA 3.7.B
- c RNA 3.7.C
- d Gene 3.7.D
- e Chromatin 3.7.E
- f Chromosome 3.7.F
- g Ribosomes 3.7.G
- h Rough endoplasmic reticulum 3.7.H
- i Smooth endoplasmic reticulum 3.7.I
- j Golgi complex 3.7.J
- k Vesicle (vacuole) 3.7.K
- l Lysosomes 3.7.L
- m Peroxisomes 3.7.M
- n Mitochondria 3.7.N
- o Cytoskeleton 3.7.O
  - 1 Microfilaments 3.7.O.1
  - 2 Intermediate filaments 3.7.O.2
  - 3 Microtubules 3.7.O.3
- p Centrosomes 3.7.P
- q Centrioles 3.7.Q
- r Cellular surface variants 3.7.R.
  - 1 Microvilli (absorption) 3.7.R.1
  - 2 Cilia (transports products along the surface of the cell, "crowd surfers") 3.7.R.2
  - 3 Flagella (transports the cell) 3.7.R.

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**8 Compare and contrast: 3.8**

- a Mitosis 3.8.A
  - b Meiosis 3.8.B
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**Histology & Integumentary System- Students will describe basic concepts of structures and functions of histology, and the integumentary system.** 4

**1 Identify the general characteristics and functions of each of the four principle types of tissues.** 4.1

- a Epithelial-strategies for tissue identification (arrangement & cell shape) 4.1.A
  - b Connective-adipose, cartilage, dense fibrous, blood, bone 4.1.B
  - c Muscular-skeletal, smooth, cardiac 4.1.C
  - d Nervous 4.1.D
- 

**2 Contrast the following:** 4.2

- a Exocrine glands 4.2.A
  - b Endocrine glands 4.2.B
- 

**3 Differentiate between the four basic types of membranes.** 4.3

- a Mucous 4.3.A
  - b Serous 4.3.B
  - c Synovial 4.3.C
  - d Cutaneous 4.3.D
- 

**4 Describe the structures and functions of the integumentary system components.** 4.4

- a Skin 4.4.A
  - b Glands 4.4.B
  - c Hair 4.4.C
  - d Nails 4.4.
- 

**5 Describe the major layers of skin.** 4.5

- a Epidermis 4.5.A
  - b Dermis 4.5.B
  - c Subcutaneous (hypodermis) 4.5.C
- 

**6 Describe the functions of the following:** 4.6

- a Sudoriferous (sweat) glands 4.6.A
- b Sebaceous (oil) glands 4.6.B

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**7 Identify the following diseases and disorders of the integumentary system. 4.7**

- a Skin cancers 4.7.A
  - 1 Basal cell carcinoma 4.7.A.1
  - 2 Squamous cell carcinoma 4.7.A.2
  - 3 Malignant melanoma 4.7.A.3
- b Decubitus ulcers 4.7.B
- c Eczema 4.7.C
- d Lesion 4.7.D
- e Burns 4.7.E
  - 1 1st degree 4.7.E.1
  - 2 2nd degree 4.7.E.2
  - 3 3rd degree 4.7.E.3

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**Performance Skills**

- a Students will explore careers in healthcare. Students will participate in a minimum of three career exploration experiences to investigate a variety of health care careers related to therapeutic services, diagnostic services, health informatics, support services, and biomedical research and development pathways. NOTE: Electronically delivered career exploration experiences are permissible.
- b Students will provide an oral and/or written report for each career exploration.

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**Skeletal System-  
Students will describe  
the structures and  
functions of the skeletal  
system and its  
components. 5**

- 1 Identify the general functions of the skeletal system. 5.1**
- 2 Identify the roles of the following in bone growth and ossification: 5.2**
  - a Osteoblasts 5.2.A
  - b Osteocytes 5.2.B
  - c Osteoclasts 5.2.C

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**3 Describe the features of a long bone.** 5.3

- a Periosteum 5.3.A
- b Diaphysis 5.3.B
- c Epiphysis 5.3.C
- d Medullary cavity 5.3.D
- e Red marrow 5.3.E
- f Yellow marrow 5.3.F
- g Articular cartilage 5.3.G
- h Endosteum 5.3.H
- i Compact bone 5.3.I
- j Spongy bone 5.3.J

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**4 Identify the four shapes of bones with characteristics and examples of each.** 5.4

- b Short 5.4.B
- a Long 5.4.A
- c Flat 5.4.C
- d Irregular 5.4.D

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**5 Describe and locate the following bone markings.** 5.5

- a Foramen 5.5.A
- b Meatus 5.5.B
- c Sinus 5.5.C
- d Fossa 5.5.D
- e Condyle 5.5.E
- f Tuberosity 5.5.F
- g Trochanter 5.5.G
- h Tubercle 5.5.H
- i Process 5.5.I

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**6 Describe and differentiate between the following terms:** 5.6

- a Suture 5.6.A
- b Fontanel 5.6.B

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**7 Contrast the axial and appendicular skeletons.** 5.7

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**8 Locate the following bones.** 5.8

- a Mandible 5.8.A
- b Maxilla 5.8.B
- c Zygomatic 5.8.C
- d Frontal 5.8.D
- e Parietal 5.8.E
- f Occipital 5.8.F
- g Sphenoid 5.8.G
- h Ethmoid 5.8.H
- i Hyoid 5.8.I
- j Temporal 5.8.J
- k Clavicle 5.8.K
- l Scapula 5.8.L
- m Sternum 5.8.M
- n Ribs 5.8.N
- o Pubic bone 5.8.O
  - 1 Ilium 5.8.O.1
  - 2 Ischium 5.8.O.2
  - 3 Pubis 5.8.O.3
- p Femur 5.8.P
- q Patella 5.8.Q
- r Tibia 5.8.R
- s Fibula 5.8.S
- t Tarsals 5.8.T
- u Metatarsals 5.8.U
- v Phalanges 5.8.V
- w Humerus 5.8.W
- x Ulna 5.8.X
- y Radius 5.8.Y
- z Carpals 5.8.Z
- aa Metacarpals 5.8.AA
- ab Vertebrae 5.8.AB

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**9 Contrast the average number, location, and function of each of the five groups of vertebrae.** 5.9

- a Cervical 5.9.A
- b Thoracic 5.9.B
- c Lumbar 5.9.C
- d Sacral 5.9.D
- e Coccygeal 5.9.E

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**10 Explain the structural and functional classifications of articulations.** 5.10

- a Fibrous 5.10.A
- b Synovial 5.10.B
- c Cartilaginous 5.10.C
- d Amphiarthrotic 5.10.D
- e Diarthrotic 5.10.E
- f Synarthrotic 5.10.F

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**11 Differentiate between ligaments and tendons.** 5.11

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**12 Identify the following diseases and disorders of the skeletal system.** 5.12

- a Herniated disk 5.12.A
- b Osteoarthritis 5.12.B
- c Osteoporosis 5.12.C
- d Scoliosis 5.12.D
- e Kyphosis 5.12.E
- f Lordosis 5.12.F
- g Spina bifida 5.12.G
- h RA (Rheumatoid arthritis) 5.12.H

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**Muscular System-  
Students will describe  
the structures and  
functions of the  
muscular system and its  
components.** 6

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**1 Identify the general functions of the muscular system.** 6.1

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**2 Describe the four characteristics of muscle tissue.** 6.2

- a Elasticity 6.2.A
- b Excitability (irritability) 6.2.B
- c Extensibility 6.2.C
- d Flexibility 6.2.D

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**3 Contrast the general location, microscopic appearance, control, and functions of the three specific types of muscle tissue.** 6.3

- a Skeletal 6.3.A
  - b Smooth 6.3.B
  - c Cardiac 6.3.C
- 

**4 Contrast thick and thin myofilaments.** 6.4

- a Actin 6.4.A
  - b Myosin 6.4.B
- 

**5 Describe the sliding-filament theory of muscle contraction.** 6.5

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**6 Describe what occurs at the neuromuscular junction.** 6.6

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**7 Define the following terms:** 6.7

- a Origin 6.7.A
  - b Insertion 6.7.B
- 

**8 Explain the role of the following:** 6.8

- a Prime movers (agonists) 6.8.A
- b Antagonists 6.8.B
- c Synergist 6.8.C
- d Fixators 6.8.D

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**9 Describe the locations and functions of the following skeletal muscles: 6.9**

- a Biceps brachii 6.9.A
- b Triceps brachii 6.9.B
- c Brachialis 6.9.C
- d Flexors 6.9.D
- e Extensors 6.9.E
- f Pronator 6.9.F
- g Supinator 6.9.G
- h Rotator cuff 6.9.H
  - 1 Supraspinatus 6.9.H.1
  - 2 Infraspinatus 6.9.H.2
  - 3 Teres minor 6.9.H.3
  - 4 Subscapularis 6.9.H.4
- i Sternocleidomastoid 6.9.I
- j Trapezius 6.9.J
- k Deltoid 6.9.K
- l Diaphragm 6.9.L
- m Rectus abdominis 6.9.M
- n Pectoralis major 6.9.N
- o Latissimus dorsi 6.9.O
- p External oblique 6.9.P
- q Gastrocnemius 6.9.Q
- r Tibialis anterior 6.9.R
- s Soleus 6.9.S
- t Hamstrings 6.9.T
  - 1 Semimembranosus 6.9.T.1
  - 2 Semitendinosus 6.9.T.2
  - 3 Biceps femoris 6.9.T.3
- u Quadriceps 6.9.U
  - 1 Rectus femoris 6.9.U.1
  - 2 Vastus lateralis 6.9.U.2
  - 3 Vastus medialis 6.9.U.3
  - 4 Vastus intermedius 6.9.U.4
- v Gluteus maximus 6.9.V

w Gluteus medius 6.9.W

x Sartorius 6.9.X

y Gracilis 6.9.Y

z Masseter 6.9.Z

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**10 Identify the following diseases and disorders of the muscular system.** 6.10

a Fibromyalgia 6.10.A

b Muscular dystrophy 6.10.B

c Medial tibial stress syndrome 6.10.C

d Compare and contrast the following, describe the three degrees of injury: 6.10.D

1 Sprain 6.10.D.1

2 Strain 6.10.D.2

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**Nervous System/Special Senses-Students will describe the structures and functions of the nervous system and special senses.** 7

**1 Restate the three broad functions of the nervous system.** 7.1

a Sensory 7.1.A

b Integration 7.1.B

c Motor 7.1.C

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**2 Describe the general organization of the nervous system.** 7.2

a Central Nervous System (CNS) 7.2.A

1 Brain 7.2.A.1

2 Spinal Cord 7.2.A.2

b Peripheral Nervous System (PNS) 7.2.B

1 Spinal nerves 7.2.B.1

1 31 pairs 7.2.B.1.1

2 Cranial nerves 7.2.B.2

1 I-XII 7.2.B.2.1

3 Subdivisions 7.2.B.3

1 Autonomic Nervous System (ANS) 7.2.B.3.1

1 Sympathetic 7.2.B.3.1.1

2 Parasympathetic 7.2.B.3.1.2

2 Somatic Nervous System 7.2.B.3.2

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**3 List the functions and structures of neurons and neuroglial cells. 7.3**

- a Neuron 7.3.A
  - b Astrocytes 7.3.B
  - c Microglia 7.3.C
  - d Oligodendrocytes 7.3.D
  - e Ependymal cells 7.3.E
  - f Schwann cells 7.3.F
  - g Satellite cells 7.3.G
- 

**4 Contrast white and gray matter of nervous tissue. 7.4**

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**5 Describe the location and function of CSF. 7.5**

- a Ventricles 7.5.A
    - 1 Choroid Plexus 7.5.A.1
  - b Subarachnoid space 7.5.B
- 

**6 Identify the structures responsible for the maintenance and protection of the central nervous system. 7.6**

- a Meninges 7.6.A
    - 1 Dura mater 7.6.A.1
    - 2 Arachnoid mater 7.6.A.2
    - 3 Pia mater 7.6.A.3
- 

**7 Identify the four principle parts of the brain. 7.7**

- a Cerebrum 7.7.A
  - b Cerebellum 7.7.B
  - c Brain stem 7.7.C
  - d Diencephalon 7.7.D
- 

**8 Describe the functions of the three structures of the brain stem. 7.8**

- a Medulla oblongata 7.8.A
  - b Pons 7.8.B
  - c Midbrain 7.8.C
- 

**9 Describe the structures and functions of the diencephalon. 7.9**

- a Thalamus 7.9.A
- b Hypothalamus 7.9.B

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**10 Describe the locations and functions of the four lobes of the cerebrum.** 7.10

- a Frontal 7.10.A
  - b Parietal 7.10.B
  - c Temporal 7.10.C
  - d Occipital 7.10.D
- 

**11 Explain the major functions of the cerebellum.** 7.11

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**12 Sequence the major events when the nerve impulse (action potential) is initiated and transmitted through a neuron.** 7.12

- a All or None Principle 7.12.A
- 

**13 Explain the role of each of the components of a reflex arc.** 7.13

- a Reflex 7.13.A
  - b Reflex arc 7.13.B
  - c Receptor 7.13.C
  - d Sensory neuron 7.13.D
  - e Association (interneuron) neuron 7.13.E
  - f Motor neuron 7.13.F
  - g Effector 7.13.G
- 

**14 Identify the following diseases and disorders of the nervous system.** 7.14

- a ALS 7.14.A
- b Alzheimer's 7.14.B
- c Bacterial meningitis 7.14.C
- d Cerebral palsy 7.14.D
- e Epilepsy 7.14.E
- f Multiple sclerosis 7.14.F
- g Guillain-Barre syndrome 7.14.G
- h Parkinson's 7.14.H
- i Cerebral Vascular Accident (CVA)-stroke 7.14.I

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**15 Describe the principle anatomical structures of the eye.** 7.15

- a Accessory structures 7.15.A
  - 1 Eyelid 7.15.A.1
  - 2 Conjunctiva 7.15.A.2
  - 3 Lacrimal apparatus 7.15.A.3
  - 4 Extrinsic muscles 7.15.A.4
- b Layers of the eyeball 7.15.B
  - 1 Fibrous tunic 7.15.B.1
    - 1 Sclera 7.15.B.1.1
    - 2 Cornea 7.15.B.1.2
  - 2 Vascular tunic 7.15.B.2
    - 1 Choroid 7.15.B.2.1
    - 2 Ciliary body 7.15.B.2.2
    - 3 Iris 7.15.B.2.3
    - 4 Lens 7.15.B.2.4
    - 5 Pupil 7.15.B.2.5
  - 3 Nervous tunic 7.15.B.3
    - 1 Retina 7.15.B.3.1

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**16 Describe the principle anatomical structures of the ear.** 7.16

- a Outer ear 7.16.A
  - 1 Auricle 7.16.A.1
  - 2 Auditory canal 7.16.A.2
- b Middle ear 7.16.B
  - 1 Tympanic cavity 7.16.B.1
  - 2 Tympanic membrane 7.16.B.2
  - 3 Auditory (Eustachian) tube 7.16.B.3
  - 4 Auditory ossicles 7.16.B.4
    - 1 Malleus 7.16.B.4.1
    - 2 Incus 7.16.B.4.2
    - 3 Stapes 7.16.B.4.3
  - 5 Inner ear 7.16.B.5
    - 1 Bony labyrinth 7.16.B.5.1
    - 2 Membranous labyrinth 7.16.B.5.2
    - 3 Semicircular canals 7.16.B.5.3
    - 4 Vestibule 7.16.B.5.4
    - 5 Cochlea 7.16.B.5.5
    - 6 Organ of Corti 7.16.B.5.6

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**17 Identify the following diseases and disorders associated with special senses.** 7.17

**a** Ametropia-abnormal refracted light 7.17.A

- 1 Myopia 7.17.A.1
- 2 Hyperopia 7.17.A.2
- 3 Presbyopia 7.17.A.3
- 4 Cataracts 7.17.A.4
- 5 Conjunctivitis 7.17.A.5
- 6 Strabismus 7.17.A.6
- 7 Glaucoma 7.17.A.7
- 8 Macular degeneration 7.17.A.8
- 9 Vertigo 7.17.A.9
- 10 Tinnitus 7.17.A.10
- 11 Middle ear infection (Otitis Media) 7.17.A.11
- 12 Deafness 7.17.A.12
  - 1 Conductive 7.17.A.12.1
  - 2 Sensorineural 7.17.A.12.2

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**ENDOCRINE SYSTEM-**  
Students will describe  
the structures and  
functions associated  
with the endocrine  
system. 8

**1 Identify the general functions of the endocrine system.** 8.1

**2 Describe a "hormone" and how it functions in the body.** 8.2

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### 3 Describe a "hormone" and how it functions in the body. 8.3

#### a Hypothalamus 8.3.A

- 1 Growth Hormone Releasing Hormone (GHRH)-targets anterior pituitary 8.3.A.1
- 2 Thyrotropin Releasing Hormone (TRH)-targets anterior pituitary 8.3.A.2
- 3 Corticotropic Releasing Hormone (CRH)-target anterior pituitary 8.3.A.3
- 4 Antidiuretic Hormone (ADH) 8.3.A.4
  - 1 Produced in hypothalamus 8.3.A.4.1
  - 2 Stored in posterior pituitary 8.3.A.4.2
- 5 Oxytocin Hormone (Oxt) 8.3.A.5
  - 1 Produced in hypothalamus 8.3.A.5.1
  - 2 Stored in posterior pituitary 8.3.A.5.2

#### b Pituitary Gland-found in the hypophyseal fossa "Sella Turcica" 8.3.B

- 1 Anterior Pituitary (adenohypophysis) 8.3.B.1
  - 1 Human Growth Hormone (HGH) ☒ 8.3.B.1.1
    - 1 Targets cells stimulating growth 8.3.B.1.1.1
    - 2 Thyroid Stimulating Hormone (TSH) 8.3.B.1.2
      - 1 Targets thyroid gland 8.3.B.1.2.1
      - 3 Adrenocorticotrophic Hormone (ACTH) 8.3.B.1.3
        - 1 Targets adrenal cortex 8.3.B.1.3.1
  - 2 Posterior Pituitary (neurohypophysis) 8.3.B.2
    - 1 Antidiuretic Hormone (ADH) 8.3.B.2.1
      - 1 Neural stimulus releases ADH to target kidneys for water retention 8.3.B.2.1.1
      - 2 Oxytocin Hormone (Oxt) 8.3.B.2.2
        - 1 Neural stimulus releases Oxt to target uterus for child birthing 8.3.B.2.2.1
        - 2 Neural stimulus releases Oxt to target breast tissue for milk letdown 8.3.B.2.2.2

#### c Thyroid Gland-found inferior to the Larynx 8.3.C

- 1 Thyroxine (T4) 8.3.C.1
  - 1 Targets cells increasing metabolism 8.3.C.1.1
- 2 Triiodothyronine (T3) 8.3.C.2
  - 1 Targets cells increasing metabolism 8.3.C.2.1

#### d Adrenal Gland-found atop the kidneys 8.3.D

- 1 o Adrenal Cortex 8.3.D.1
  - 1 Adrenocorticotrophic Hormone (ACTH) 8.3.D.1.1

- 1 Stimulates the release of cortisol 8.3.D.1.1.1
  - 2 Cortisol 8.3.D.1.2
    - 1 Anti-inflammatory by suppressing white blood cells 8.3.D.1.2.1
  - 2 Adrenal Medulla-sympathetic stimulus for sustained "Fight or Flight" 8.3.D.2
    - 1 Epinephrine-adrenaline increasing cell metabolism 8.3.D.2.1
    - 2 Norepinephrine-noradrenaline increasing cell metabolism 8.3.D.2.2
  - e Pancreas Gland-Exocrine/Endocrine gland in LUQ posterior to the stomach 8.3.E
    - 1 Insulin 8.3.E.1
      - 1 Released from Beta cells to target cells to decrease blood sugar 8.3.E.1.1
    - 2 Glucagon 8.3.E.2
      - 1 Released from Alpha cells to break down glycogen to increase blood sugar 8.3.E.2.1
- 

**4 Identify the following diseases and disorders of the endocrine system. 8.4**

- a Dwarfism 8.4.A
  - b Gigantism 8.4.B
  - c Acromegaly 8.4.C
  - d Hypothyroidism 8.4.D
    - 1 Myxedema 8.4.D.1
    - 2 Cretinism-congenital hypothyroidism 8.4.D.2
  - e Hyperthyroidism (Graves' disease) 8.4.E
    - 1 Goiter 8.4.E.1
    - 2 Exophthalmos 8.4.E.2
  - f Diabetes mellitus 8.4.F
    - 1 Type I 8.4.F.1
    - 2 Type II 8.4.F.2
  - g Diabetes insipidus 8.4.G
  - h Cushing's syndrome 8.4.H
- 

**Blood-Students will describe the components and functions associated with blood. 9**

**1 Identify the components of blood and their functions. 9.1**

- a Erythrocytes 9.1.A
  - b Leukocytes 9.1.B
  - c Thrombocytes 9.1.C
  - d Plasma 9.1.D
- 

**2 Describe erythrocytes, including the structure of hemoglobin. 9.2**

---

**3 Define leukocyte and list the two major groups with their cell types and their function.** 9.3

- a Granulocytes 9.3.A
    - 1 Neutrophils 9.3.A.1
    - 2 Basophils 9.3.A.2
    - 3 Eosinophils 9.3.A.3
  - b Agranulocytes 9.3.B
    - 1 Monocytes 9.3.B.1
    - 2 Lymphocytes 9.3.B.2
- 

**4 Describe the process of hemostasis.** 9.4

- a Vascular spasm 9.4.A
  - b Platelet plug formation 9.4.B
  - c Coagulation 9.4.C
- 

**5 Contrast a thrombus and an embolus.** 9.5

---

**6 Identify the antigens found on the erythrocytes and the antibodies that determine the ABO blood types and the Rh factor.** 9.6

---

**7 Identify the following diseases and disorders associated with the blood.** 9.7

- a Anemias 9.7.A
    - 1 Nutritional 9.7.A.1
    - 2 Pernicious 9.7.A.2
    - 3 Hemorrhagic 9.7.A.3
    - 4 Hemolytic 9.7.A.4
    - 5 Sickle cell 9.7.A.5
    - 6 Aplastic 9.7.A.6
    - 7 Hemolytic disease of the newborn 9.7.A.7
    - 8 Hemophilia 9.7.A.8
    - 9 Leukemia 9.7.A.9
    - 10 Mononucleosis 9.7.A.10
    - 11 Polycythemia 9.7.A.11
-

**Lymphatic System-**  
Students will describe  
the structures and  
functions of the  
lymphatic system. 10

**1 Identify the components of the lymphatic system.** 10.1

- a Tonsils 10.1.A
  - b Spleen 10.1.B
  - c Thymus 10.1.C
  - d Lymph nodes 10.1.D
  - e Bone marrow 10.1.E
  - f Lymph vessels 10.1.F
- 

**2 Describe how lymph is moved through the body.** 10.2

---

**3 Contrast antigens and antibodies.** 10.3

---

**4 Describe the general roles of T-cells and B-cells in the immune response.** 10.4

---

**5 Distinguish between active and passive immunity and natural vs. artificial acquisition of immunity.** 10.5

---

**6 Identify the following diseases and disorders associated with the lymphatic system.** 10.6

- a AIDS 10.6.A
  - b Measles 10.6.B
  - c Mumps 10.6.C
  - d Rubella 10.6.D
  - e Tetanus 10.6.E
- 

#### **Performance Skills**

- a Students will select a topic and defend their position on a current medical ethics dilemma.
- 

**Cardiovascular System-**  
Students will describe  
the structures and  
functions of the  
cardiovascular  
system. 11

**1 List the general functions of the cardiovascular system.** 11.1

---

**2 Describe the layers of the heart.** 11.2

- a Epicardium 11.2.A
  - b Myocardium 11.2.B
  - c Endocardium 11.2.C
- 

**3 Identify the chambers of the heart.** 11.3

- a Atria 11.3.A
- b Ventricles 11.3.B

---

**4 Locate the great blood vessels of the heart.** 11.4

- a Superior vena cava 11.4.A
- b Inferior vena cava 11.4.B
- c Pulmonary trunk 11.4.C
- d Pulmonary arteries 11.4.D
- e Pulmonary veins 11.4.E
- f Aorta 11.4.F
- g Branches of the aorta 11.4.G

---

**5 Identify the valves of the heart.** 11.5

- a Tricuspid 11.5.A
- b Pulmonary semilunar 11.5.B
- c Bicuspid (mitral) 11.5.C
- d Aortic semilunar 11.5.D

---

**6 Trace blood flow through the heart.** 11.6

---

**7 Identify the components of the conduction system of the heart and trace the pathway.** 11.7

- a SA node 11.7.A
- b AV node 11.7.B
- c AV bundle 11.7.C
- d Bundle branches 11.7.D
- e Purkinje fibers 11.7.E

---

**8 Sequence the principle events of the cardiac cycle in terms of systole and diastole.** 11.8

---

**9 Define cardiac output and identify factors that influence it.** 11.9

- a Heart rate 11.9.A
- b Stroke volume 11.9.B

---

**10 Contrast the structures and functions of arteries, capillaries, and veins.** 11.10

---

**11 Define pulse and identify the general location of arteries where pulse may be felt.** 11.11

---

**12 Describe blood pressure and how to measure it.** 11.12

---

**13 Contrast pulmonary and systemic circulation.** 11.13

---

**14 Identify the following diseases and disorders of the cardiovascular system.** 11.14

- a Aneurysm 11.14.A
  - b Arteriosclerosis 11.14.B
  - c Atherosclerosis 11.14.C
  - d Cerebrovascular accident/stroke 11.14.D
  - e Coronary artery disease 11.14.E
  - f Hypertension 11.14.F
  - g Murmur 11.14.G
  - h Myocardial infarction 11.14.H
- 

**Respiratory System-**  
Students will describe  
the structures and  
functions associated  
with the respiratory  
system. 12

**1 Identify the general functions of the respiratory system.** 12.1

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**2 Sequence the organs of the respiratory system in the order in which air will pass through them from the exterior.** 12.2

- a Nose/mouth 12.2.A
  - b Pharynx 12.2.B
  - c Larynx 12.2.C
  - d Trachea 12.2.D
  - e Bronchi 12.2.E
  - f Bronchioles 12.2.F
  - g Alveolar duct 12.2.G
  - h Alveoli 12.2.H
- 

**3 Identify the three regions of the pharynx.** 12.3

- a Nasopharynx 12.3.A
  - b Oropharynx 12.3.B
  - c Laryngopharynx 12.3.C
- 

**4 Identify the following anatomical features of the larynx.** 12.4

- a Epiglottis 12.4.A
- b Glottis 12.4.B
- c Hyoid bone 12.4.C
- d Thyroid cartilage 12.4.D
- e Cricoid cartilage 12.4.E
- f True vocal cords 12.4.F
- g False vocal cords 12.4.G

---

**5 Identify the coverings of the lungs and the gross anatomical features of the lungs.** 12.5

- a Apex 12.5.A
  - b Base 12.5.B
  - c Lobes 12.5.C
  - d Visceral pleura 12.5.D
  - e Parietal pleura 12.5.E
  - f Pleural cavity 12.5.F
- 

**6 Identify the site at which gas exchange occurs in the lungs (alveoli).** 12.6

---

**7 Identify the volumes and capacities of air exchanged during ventilation.** 12.7

- a Tidal volume 12.7.A
  - b Vital capacity 12.7.B
- 

**8 Differentiate between the following.** 12.8

- a Ventilation 12.8.A
  - b External respiration 12.8.B
  - c Internal respiration 12.8.C
- 

**9 Describe the effects of carbon dioxide on ventilation.** 12.9

---

**10 Identify the following diseases or disorders of the respiratory system.** 12.10

- a Chronic Obstructive Pulmonary Disorder 12.10.A
    - 1 Emphysema 12.10.A.1
  - b Influenza 12.10.B
  - c Lung cancer 12.10.C
  - d Pneumonia 12.10.D
  - e SIDS 12.10.E
  - f Tuberculosis 12.10.F
  - g Cystic Fibrosis 12.10.G
  - h Respiratory Syncytial Virus (RSV) 12.10.H
  - i Respiratory distress 12.10.I
- 

**Digestive System-**  
Students will describe  
the structures and  
functions associated  
with the digestive  
system. 13

**1 Identify the general functions of the digestive system.** 13.1

---

**2 Contrast chemical and mechanical digestion.** 13.2

---

**3 Differentiate between the following.** 13.3

- a Alimentary canal structures 13.3.A
  - 1 Mouth 13.3.A.1
  - 2 Pharynx 13.3.A.2
  - 3 Esophagus 13.3.A.3
  - 4 Stomach 13.3.A.4
  - 5 Small intestines 13.3.A.5
  - 6 Large intestines 13.3.A.6
  - 7 Rectum 13.3.A.7
  - 8 Anus 13.3.A.8
- b Accessory structures 13.3.B
  - 1 Salivary glands (parotid) 13.3.B.1
  - 2 Pancreas 13.3.B.2
  - 3 Gallbladder 13.3.B.3
  - 4 Liver 13.3.B.4

---

**4 Describe the functions of saliva and salivary amylase in digestion.** 13.4

---

**5 Identify the following parts of a typical tooth.** 13.5

- a Crown 13.5.A
- b Neck 13.5.B
- c Root 13.5.C
- d Gingiva 13.5.D
- e Periodontal ligament 13.5.E
- f Enamel 13.5.F
- g Dentin 13.5.G
- h Pulp 13.5.H
- i Root canal 13.5.I

---

**6 Define the following.** 13.6

- a Deglutition 13.6.A
- b Mastication 13.6.B
- c Maceration 13.6.C
- d Segmentation 13.6.D
- e Peristalsis 13.6.E
- f Haustral churning 13.6.

---

**7 Identify the anatomical features of the stomach.** 13.7

- a Fundus 13.7.A
  - b Body 13.7.B
  - c Pylorus 13.7.C
  - d Rugae 13.7.D
  - e Cardiac sphincter 13.7.E
  - f Pyloric sphincter 13.7.F
- 

**8 Identify the basic components and functions of gastric juice.** 13.8

- a Chief cells 13.8.A
    - 1 Pepsinogen 13.8.A.1
  - b Parietal cells 13.8.B
    - 1 Hydrochloric acid 13.8.B.1
  - c Goblet cells 13.8.C
    - 1 Mucus 13.8.C.1
- 

**9 Identify the location and digestive functions of the pancreas.** 13.9

- a Pancreatic Islets 13.9.A
  - b Acini Cells 13.9.B
- 

**10 Describe the function of bile (emulsification).** 13.10

---

**11 Identify the three sections of the small intestine and describe the functions.** 13.11

- a Duodenum 13.11.A
  - b Jejunum 13.11.B
  - c Ileum 13.11.C
- 

**12 Identify the structures and sections of the large intestine and describe the functions.** 13.12

- a Cecum 13.12.A
- b Colon 13.12.B
  - 1 Ascending 13.12.B.1
  - 2 Transverse 13.12.B.2
  - 3 Descending 13.12.B.3
  - 4 Sigmoid 13.12.B.4
- c Rectum 13.12.C
- d Anal canal 13.12.D

---

**13 Identify the following diseases and disorders of the digestive system. 13.13**

- a Appendicitis 13.13.A
  - b Cirrhosis 13.13.B
  - c Colorectal cancer 13.13.C
  - d Gallstones 13.13.D
  - e Hepatitis 13.13.E
  - f Obesity 13.13.F
  - g Ulcers 13.13.G
  - h Celiac disease 13.13.H
  - i Crohn's disease 13.13.I
  - j Irritable Bowel Syndrome (IBS) 13.13.J
- 

**Urinary System-  
Students will describe  
the structures and  
functions associated  
with the urinary  
system. 14**

**1 Identify the general functions of the urinary system. 14.1**

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**2 Identify the four major organs of the urinary system. 14.2**

- a Kidneys 14.2.A
  - b Ureters 14.2.B
  - c Bladder 14.2.C
  - d Urethra 14.2.D
- 

**3 Identify the gross anatomy of the kidney 14.3**

- a Renal cortex 14.3.A
- b Renal medulla 14.3.B
- c Renal pyramids 14.3.C
- d Renal pelvis 14.3.D
- e Renal capsule 14.3.E
- f Calyces 14.3.F

---

**4 Identify the microscopic structures of the nephron.** 14.4

- a Renal corpuscle 14.4.A
- b Glomerulus 14.4.B
- c Glomerular (Bowman's) capsule 14.4.C
- d Afferent arteriole 14.4.D
- e Efferent arteriole 14.4.E
- f Renal tubule 14.4.F
  - 1 Proximal convoluted tubule 14.4.F.1
  - 2 Descending limb 14.4.F.2
  - 3 Nephron loop 14.4.F.3
  - 4 Ascending limb 14.4.F.4
  - 5 Distal convoluted tubule 14.4.F.5
  - 6 Collecting duct 14.4.F.6
- g Peritubular capillaries 14.4.G

---

**5 Describe the three basic physiological processes and the structures involved in urine formation.** 14.5

- a Filtration 14.5.A
- b Reabsorption 14.5.B
- c Secretion 14.5.C

---

**6 Identify abnormal constituents of urine and possible causes of each.** 14.6

- a Glucose 14.6.A
- b Ketones 14.6.B
- c Erythrocytes 14.6.C
- d Leukocytes 14.6.D
- e Bilirubin 14.6.E
- f Microbes 14.6.F
- g Albumin 14.6.G

---

**7 Describe the methods of fluid intake and output.** 14.7

- a Intake 14.7.A
  - 1 Oral 14.7.A.1
    - 1 Liquid 14.7.A.1.1
    - 2 Solid 14.7.A.1.2
  - 2 Intravenous 14.7.A.2
  - 3 Metabolic 14.7.A.
- b Output 14.7.B
  - 1 Micturition 14.7.B.1
  - 2 Voiding 14.7.B.2
  - 3 Sweat 14.7.B.3
  - 4 Feces 14.7.B.4
  - 5 Exhaled vapor 14.7.B.5

---

**8 Identify the following diseases and disorders associated with the urinary system.** 14.8

- a Cystitis 14.8.A
- b Glomerulonephritis 14.8.B
- c Incontinence 14.8.C
- d Kidney stones 14.8.D
- e Polyuria 14.8.E
- f Renal failure 14.8.F
- g Urinary tract infections (UTI) 14.8.G

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**Reproductive System-**  
Students will describe  
the structures and  
functions associated  
with the reproductive  
system. 15

**1 Identify the general functions of the reproductive system.** 15.1

---

**2 Describe the anatomy of the male genitalia.** 15.2

- a External 15.2.A
  - 1 Penis 15.2.A.1
  - 2 Scrotum 15.2.A.2
  - 3 Testes 15.2.A.3
- b Internal 15.2.B
  - 1 Epididymis 15.2.B.1
  - 2 Ductus deferens 15.2.B.2
  - 3 Ejaculatory duct 15.2.B.3
  - 4 Urethra 15.2.B.4
- c Accessory 15.2.C
  - 1 Seminal vesicles 15.2.C.1
  - 2 Prostate 15.2.C.2
  - 3 Bulbourethral gland 15.2.C.3

---

**3 Identify the function of the testes.** 15.3

---

**4 Identify the functions of testosterone in the male.** 15.4

---

**5 Describe the anatomy of the female reproductive structures.** 15.5

- a External 15.5.A
  - 1 Vulva 15.5.A.1
  - 2 Labia majora 15.5.A.2
  - 3 Clitoris 15.5.A.3
  - 4 Labia minora 15.5.A.4
  - 5 Mons pubis 15.5.A.5
  - 6 Vestibule 15.5.A.6
- b Internal 15.5.B
  - 1 Ovaries 15.5.B.1
  - 2 Uterus 15.5.B.2
  - 3 Uterine tubes 15.5.B.3
  - 4 Vagina 15.5.B.4
- c Accessory 15.5.C
  - 1 Mammary glands 15.5.C.1
  - 2 Perineum 15.5.C.2

---

**6 Identify the functions of the ovaries.** 15.6

---

**7 Identify the structures and functions of the uterine tubes, including fimbriae and infundibulum.** 15.7

---

**8 Describe the structures and function of the uterus.** 15.8

- a Perimetrium 15.8.A
  - b Myometrium 15.8.B
  - c Endometrium 15.8.C
    - 1 Stratum functionalis 15.8.C.1
    - 2 Stratum basalis 15.8.C.2
  - d Fundus 15.8.D
  - e Cervix 15.8.E
- 

**9 Define the menstrual cycle including the ovarian and uterine cycles and changes that occur during menopause.** 15.9

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**10 Describe the physiological effects of estrogens, progesterone and relaxin.** 15.10

---

**11 Contrast the general outcomes of spermatogenesis vs. oogenesis** 15.11

---

**12 Define the following sequence of events that occur during human development.** 15.12

- a Fertilization 15.12.A
  - b Zygote 15.12.B
  - c Implantation 15.12.C
  - d Embryo 15.12.D
  - e Fetus 15.12.E
- 

**13 Identify the principle events associated with the three stages of labor.** 15.13

- a Stage 1-dilation and effacement 15.13.A
- b Stage 2-delivery and birth 15.13.B
- c Stage 3-placental expulsion 15.13.C

---

**14 Identify the following diseases and disorders of the reproductive system. 15.14**

- a Reproductive cancers 15.14.A
  - 1 Breast 15.14.A.1
  - 2 Testicular 15.14.A.2
  - 3 Cervical 15.14.A.3
  - 4 Ovarian 15.14.A.4
  - 5 Prostate 15.14.A.5
  - 6 Uterine 15.14.A.6
- b Endometriosis 15.14.B
- c Impotence 15.14.C
- d Polycystic Ovarian Syndrome 15.14.D
- e Sexually Transmitted Infections (STI) 15.14.E
  - 1 Gonorrhea 15.14.E.1
  - 2 Syphilis 15.14.E.2
  - 3 Genital herpes 15.14.E.3
  - 4 Chlamydia 15.14.E.4
  - 5 Trichomoniasis 15.14.E.5
  - 6 Genital warts 15.14.E.6
  - 7 Human Papilloma Virus (HPV) 15.14.E.7