MODULE 1

All multiple choice questions have one answer unless otherwise specified. Choose the best response to the question with the information provided.

1. What is the study of the structure of the human body?

A. Anatomy
B. Physiology
C. Anabolism
D. Catabolism
E. Metabolism

A. Anatomy

2.

B. The liver

is an example of the organ level of organization in the human body

A. Sodium
B. The liver
C. Mitochondria
D. The skeletal system
E. Epithelium

3. What is the breakdown of nutrients?

A. Anatomy
B. Physiology
C. Anabolism
D. Catabolism
E. Metabolism

D. Catabolism

1. List the four basic types of tissues.

Epithelium, muscle, connective, and nervous tissue

2. List the three layers of the skin in order from **deep** to **superficial**. *The deepest layer of the skin should be at the top of your list. To receive credit the layers must be in this order.*

hypodermis (inner, also called subcutaneous tissue layer)
dermis (middle layer)
epidermis (outer layer)
**MUST be in this order (top to bottom) to receive credit*

3. Testosterone contributes to muscle strength and bone mass. Based upon your learning of metabolism, would it be considered an anabolic or catabolic hormone? Explain why.

Anabolic because it is building new tissues from smaller cells and using energy to do so.

Note: Essay answers must clearly be in your own words. All multiple choice questions have one answer unless otherwise specified. Choose the best response to the question with the information provided.

1. What anatomical orientation term is used to indicate "toward the front of the body"?
A. Superior
B. Inferior
C. Ventral
D. Dorsal
E. Medial

C. Ventral

2. What anatomical orientation term is used to indicate "toward the upper part of a structure"?
A. Superior
B. Inferior
C. Ventral
D. Dorsal
E. Medial

A. Superior

3. What anatomical orientation term is used to indicate "away from the head end"?

Inferior/Caudal

4. What anatomical orientation term is used to indicate "further from the origin of the body part"?

Distal

5. You are looking at a diagram of a patient standing in anatomical position. On the sheet of paper containing the diagram, which thumb points to the left side of the paper, right or left?

Right

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1. Are the arms part of the axial or appendicular region of the body?

Appendicular

2. A patient is standing in anatomical position. The patient moves his hand to scratch his nose. What anatomical action term is best used to indicate the motion occurring at his elbow?
A. Flexion
B. Extension
C. Elevation
D. Depression
E. Abduction

A. Flexion (“closing of a joint”)

3. What anatomical action term is used to indicate "movement away from midline"?
A. Flexion
B. Extension
C. Elevation
D. Depression
E. Abduction

E. Abduction

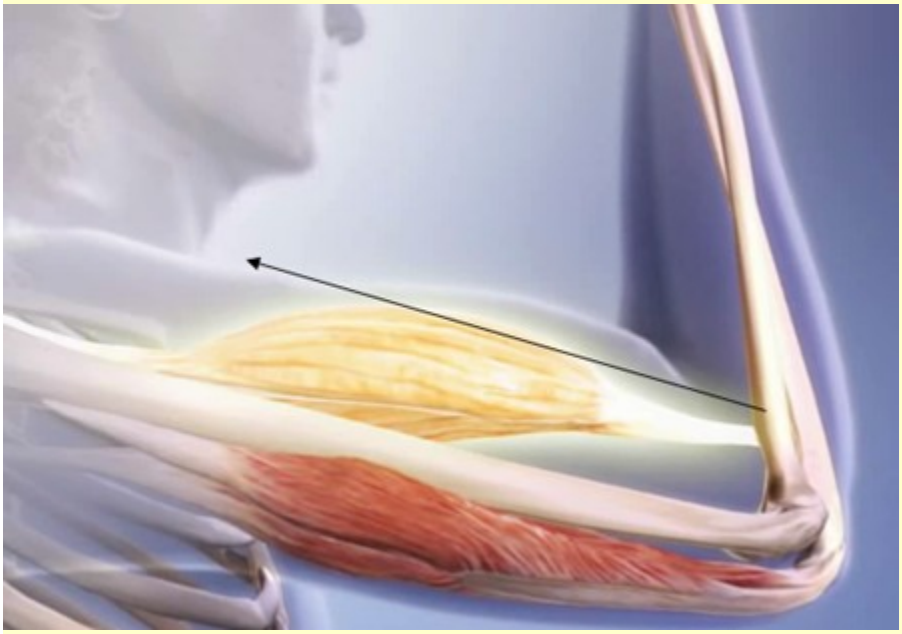
Note: Essay answers must clearly be in your own words. All multiple choice questions have one answer unless otherwise specified. Choose the best response to the question with the information provided.

1. Describe the position of the epigastric region relative to the umbilical region in anatomical position terms. Use a full sentence for your description.

The epigastric region is superior to the umbilical region.
(OR) The umbilical region is inferior to the epigastric region.

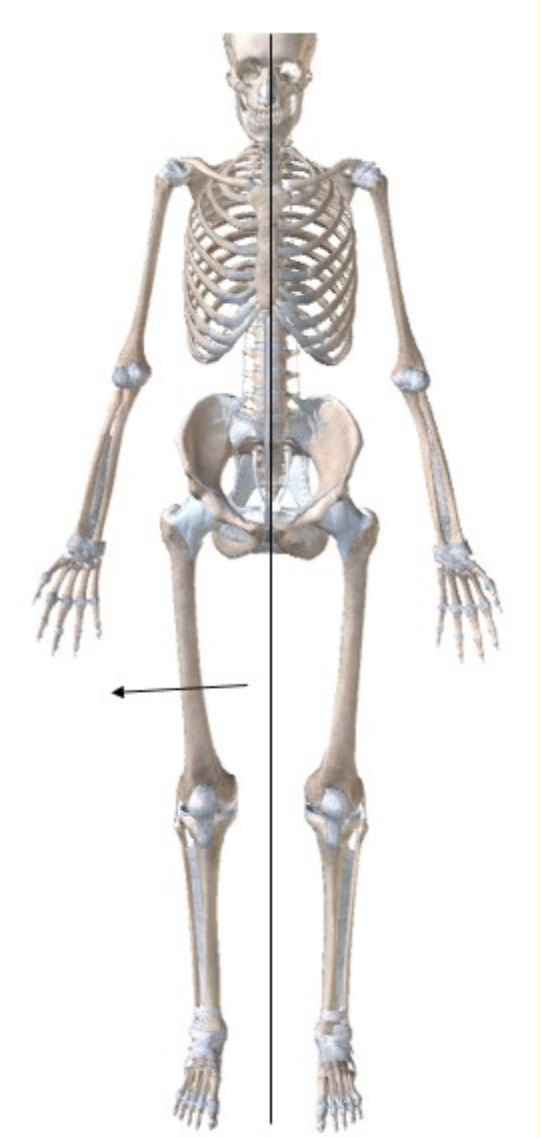
2. Which anatomical action is occurring at the elbow joint, in the direction of the arrow?

(Elbow) Flexion



3. Look at the figure below. The right femur is moved in the direction of the arrow. What anatomical action term best describes this movement?

Abduction (The femur is moving away from midline)



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1. List two organs contained in the pelvic cavity.

The pelvic cavity contains the bladder, reproductive organs and the rectum

2. True or False: The ventral body cavity contains the cranial cavity, the thoracic cavity, and the abdominal cavity. If your answer is false, rephrase the statement to make it a true statement.

False. The ventral cavity contains the thoracic cavity and the abdominal cavity. (It does not contain the cranial cavity)

Note: Essay answers must clearly be in your own words. All multiple choice questions have one answer unless otherwise specified. Choose the best response to the question with the information provided.

1. The body is divided into anterior and posterior sections by what type of plane?

Frontal (coronal)

2. A section that is diagonal between horizontal and vertical planes is called what?

Oblique

3. Look at the diagram below. What type of plane is shown?

Sagittal (Specifically, a midsagittal plane)

Note: Essay answers must clearly be in your own words. All multiple choice questions have one answer unless otherwise specified. Choose the best response to the question with the information provided.

1. Using the letters given, match the cell with the type of solution it has been placed in:

A cell beginning to swell — A. Isotonic

A red blood cell placed in ocean water — B. Hypertonic

A cell containing an equal amount of solute as the solution — C. Hypotonic

C. A cell beginning to swell
B. A red blood cell placed in ocean water
A. A cell containing an equal amount of solute as the solution

2. Using the letters given, match each molecule/item with its typical means of entering a cell. You will need to use some means of entry more than once.

Oxygen — A. Diffusion

Lipid-soluble molecules — B. Facilitated diffusion

Bacteria — C. Endocytosis

Polar molecules

A. Oxygen
A. Lipid-soluble molecules
C. Bacteria
B. Polar molecules

3. Which one of the following is not true of active transport?

A. Active transport occurs against the concentration gradient
B. Carrier proteins move particles from greater concentration to lesser
C. The sodium-potassium pump is an example
D. additional energy is required to drive this process

B. Carrier proteins move particles from greater concentration to lesser

4. List the three organelles, in order, involved in the synthesis, transport and shipping of proteins.

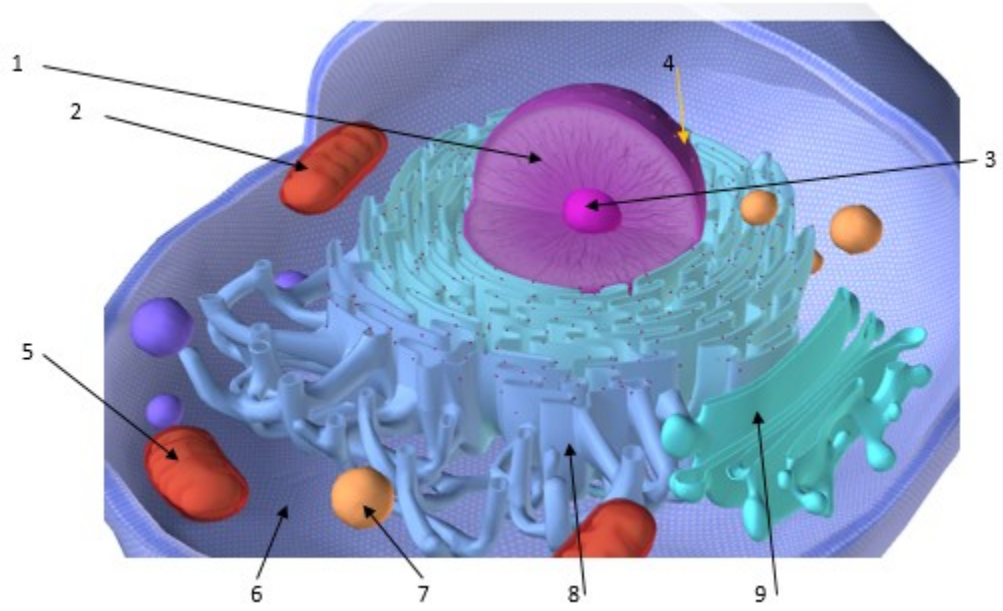
A. rough ER, Golgi complex, lysosomes
B. ribosomes, rough ER, Golgi complex
C. ribosomes, smooth ER, Golgi complex
D. rough ER, Golgi complex, vacuole

B. ribosomes, rough ER, Golgi complex

Note: Essay answers must clearly be in your own words. All multiple choice questions have one answer unless otherwise specified. Choose the best response to the question with the information provided.

1.Label the 5 organelles listed below:
3:
4:
5:
7:
8:

3: Nucleolus
4: Nuclear Envelope
5: Mitochondria
7: Lysosome
8: Endoplasmic Reticulum (ER)



2. True or False?

a. The purpose of cellular respiration is to produce ADP. (T or F)

b. Peripheral proteins are found on the outer surface of a cell membrane. (T or F)

c. Exocytosis is the process that occurs to bring biomacromolecules inside the cell. (T or F)

d. Receptor-mediated endocytosis uses a signaling molecule from another cell, binding to the cell membrane to bring about changes within the cell proteins. (T or F)

e. Endocytosis is a passive process. It does not require cellular energy expenditure.(T or F)

A: T B: T C: F D: T E: F

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e. Endocytosis is a passive process. It does not require cellular energy expenditure.(T or F)

a. FALSE (ATP is produced, not ADP)

b. TRUE (Peripheral proteins can be found on the outer or inner surface, but do not span across the entire membrane).

c. FALSE (This process is called endocytosis)

d. TRUE

e. FALSE (Endocytosis is an active process and requires cellular energy)

Note: Essay answers must clearly be in your own words. All multiple choice questions have one answer unless otherwise specified. Choose the best response to the question with the information provided.

1. In your own words, discuss Tay-Sachs disease. What organelle within the cell is impacted? What are the symptoms of the disease and why do they occur?

(1)Lysosomes
(2) buildup of toxic lipids inside the cell (biomacromolecules)
(3) disability and death
In the genetic disease known as Tay-Sachs, one of the normally present digestive enzymes inside lysosomes is lacking. Thus, a toxic lipid in the brain cells cannot be broken down. The resulting buildup of lipids in these cells can cause intellectual disability and death.

2. You are observing two cells under the microscope. They are the same type of eukaryotic cell but one appears much larger. Based on appearance alone, which one would you expect to be carrying out respiration at a more active rate, the larger or smaller cell? Explain why.

The smaller cell. Cells need to remain relatively small because as a cell expands the amount of surface area relative to the volume of the cell decreases. The smaller cell is more active because relative to its volume, its surface area is larger than a bigger cell. With a larger surface area (relative to its volume) this allows the metabolic processes to occur faster.

Module 2

Note: Essay answers must clearly be in your own words. All multiple choice questions have one answer unless otherwise specified. Choose the best response to the question with the information provided.

1. How many lobes does the right human lung have?

Three Lobes

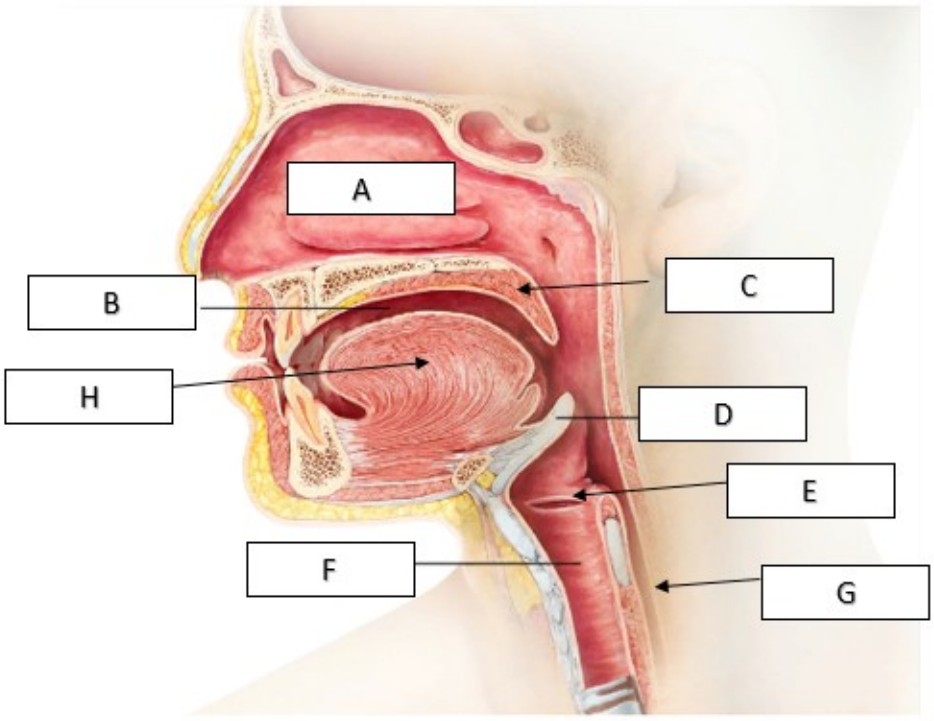
2. Air (and not food) pass in which of the following areas:
A. Esophagus
B. Nasopharynx
C. Oropharynx
D. Both A. and C.

B. Nasopharynx

3. Rings of cartilage line much of the respiratory tract. In which of one the following would cartilage NOT be found?
A. Trachea
B. Larynx
C. Bronchi
D. Alveoli

D. Alveoli

Label the following five items from the diagram:



Label B-
Label D-
Label E-
Label F-
Label G-

Label B: Oral Cavity
Label D: Epiglottis (not glottis)
Label E: Glottis (not epiglottis)
Label F: Trachea
Label G: Esophagus

Note: Essay answers must clearly be in your own words. All multiple choice questions have one answer unless otherwise specified. Choose the best response to the question with the information provided.

1. Explain what happens to the soft palate during swallowing. Why?

The upward movement of the soft palate prevents food or liquid from entering the nasal passages during swallowing.

2. Explain at least two differences between Type I and Type II alveolar cells.

a. Type I form the very thin simple squamous epithelium of the alveoli in junction with capillaries. Make up roughly 95% of alveolar epithelial cells.

b. Type II produce and secrete pulmonary surfactant which is needed throughout the alveolar surface to keep the alveoli open. In addition, Type II cells can divide to replace damaged Type I cells. Make up roughly 5% of alveolar epithelial cells.

Answer the following five true or false questions:

1. Negative pressure is used to move air into the lungs.

True

2. During exhalation the diaphragm contracts to actively push air out of the lungs.

False (during inhalation)

3. During inhalation the rib cage lifts in an upward motion to open and expand the lungs.

True

4. As the thoracic cavity expands and lung volume increases, the density of the gases filling the lungs *decreases*.

True

5. When the diaphragm rises, thoracic pressure increases and air naturally flows out of the lungs.

True (air naturally flows out of the lungs because of the pressure difference)

Answer the following five multiple choice questions:

1. Boyle's law states that gas volume is
A. Directly proportional to temperature
B. Inversely proportional to temperature
C. Directly proportional to pressure
D. Inversely proportional to pressure
E. Both A and B

D. Inversely proportional to pressure

2. Typical respiratory epithelium contains all of the following, except which one?
A. cilia
B. layers
C. tall, narrow cells
D. mucus producing cells
E. goblet cells

B. layers

3. Which cells are most abundant within the alveoli?
A. Macrophages
B. Type 1 alveolar cells
C. Type 2 alveolar cells
D. Erythrocytes
E. Ciliated columnar cells

A. Macrophages

4. Which one of the following is not true of the respiratory physiology?
A. Tidal volume is the maximum amount of air able to be inhaled beyond normal inhalation
B. Tidal volume is the amount of air inhaled and exhaled in one cycle of quiet breathing
C. Inspiratory reserve volume is the maximum amount of air able to be inhaled beyond normal inhalation
D. Expiratory reserve volume is the maximum amount of air able to be exhaled beyond normal exhalation

A. Tidal volume is the maximum amount of air able to be inhaled beyond normal inhalation

5. Which one of the following is true of the respiratory physiology calculations?
(*You may find it helpful to draw the respiratory physiology diagram on a piece of scratch paper.*)
A. Vital Capacity (**VC**) = ERV+TV
B. Total Lung Capacity (**TLC**) = VC +RV
C. Inspiratory Capacity (**IC**) = TV+RV
D. Functional Residual Capacity (**FRC**) = IRV + TV

B. Total Lung Capacity (TLC) = VC +RV

Answer the following five true or false questions:

1. Typical respiratory epithelium contains cells where only some of the pseudostratified columnar cells touch the basement membrane.

False -all pseudostratified cells touch the basement membrane.

2. The vestibule is the most external portion of the nasal cavity.

True

3. The vestibule is lined with typical respiratory epithelium.

False- stratified squamous epithelium is found in the vestibule.

4. The fossae is another name for the pleural cavities.

False

5. The bronchioles are surrounded by capillaries for gas exchange.

False

Matching:

A. Emphysema
B. Cystic Fibrosis
C. Pulmonary edema
D. Pleurisy

The pleural space fills with air, pus or blood.

D. Pleurisy

This condition results from fluid-filled alveoli.

C. Pulmonary edema

This condition results in a loss of alveoli.

A. Emphysema

This hereditary illness results in excess mucus.

B. Cystic Fibrosis

Answer the following three questions:

1. The pressure of three gases equals 1 atmosphere. What is the partial pressure of oxygen (in mmHG) if nitrogen is 300 mmHg and carbon dioxide is 350 mmHg? To receive full credit you must show your work.

110 mmHG
1atm= 760 mmHg
300 mmHg + 350 mmHG + X = 760 mmHg
OR: 760 - 300-350= 110 mmHG

2. Why would warming air be beneficial to gas exchange?

It would expand the air to make it more available for gas exchange.

3. Explain why incomplete ventilation is important for effective gas exchange.

Incomplete ventilation helps to maintain a constant temperature within the lungs. The increased temperature allows for greater gas exchange.

Answer the following three questions:

1. From widest to narrowest, the branches of the bronchial tree are:
A. Secondary bronchi, tertiary bronchi, primary bronchi, bronchioles
B. Bronchioles, primary bronchi, secondary bronchi, tertiary bronchi
C. Tertiary bronchi, secondary bronchi, primary bronchi, bronchioles
D. Primary bronchi, secondary bronchi, tertiary bronchi, bronchioles

D. Primary bronchi, secondary bronchi, tertiary bronchi, bronchioles

2. In gas exchange (external respiration):
A. Carbon dioxide diffuses from alveoli into capillaries, oxygen diffuses from capillaries into alveoli
B. Oxygen and carbon dioxide is carried from alveoli into the bronchioles
C. Oxygen diffuses from alveoli into capillaries, carbon dioxide diffuses from capillaries into alveoli
D. Oxygen is chemically transformed into carbon dioxide within the alveoli

C. Oxygen diffuses from alveoli into capillaries, carbon dioxide diffuses from capillaries into alveoli

3. The purpose of alveolar macrophages is to:
A. Produce a lipoprotein
B. Form a thin, simple squamous epithelium of the alveoli
C. Produce mucous in order to trap bacteria
D. Act as the primary immune defense within the alveoli

D. Act as the primary immune defense within the alveoli

Answer the following essay question (10 points):

1. Muscular dystrophy is a neuromuscular disease which restricts the lungs from fully expanding due to muscular weakness. If a person is diagnosed with muscular dystrophy:

1) Which of the following statements regarding pulmonary function would be true?
2) Explain your answer.

A. Inspiratory capacity would be abnormally low
B. Vital capacity would abnormally high
C. Total lung capacity would remain the same

A. Inspiratory capacity would be abnormally low
Vital capacity would decrease because there is a decreased ability to bring in as much air compared to normal values because of muscular weakness.
Inspiratory Capacity (IC) = TV+IRV (or) VC-ERV
Decreased VC, decreased IC

MODULE 3

Note: Essay answers must clearly be in your own words. All multiple choice questions have one answer unless otherwise specified. Choose the best response with the information provided.

Answer the following two questions:

1. Explain why a patient with liver disease would have intolerance to fatty foods.

The liver produces bile which breaks down fats. If it is not producing bile (or less bile), fats will not be broken down effectively.

2. Explain in detail how the stomach contents enter the small intestine.

The pyloric sphincter (valve), located at the base of the stomach, relaxes causing a small quantity of chyme to pass through the opening into the first part of the small intestine.
This initiates a reflex that causes the muscles of the sphincter to contract and close the opening temporarily. Then the sphincter relaxes again and allows more chyme to enter.

Look carefully at the diagram below. Label the following 5 organs of the digestive system.

To receive credit for the intestines you must label the specific region.

3:

Stomach

4:

Gallbladder

7:

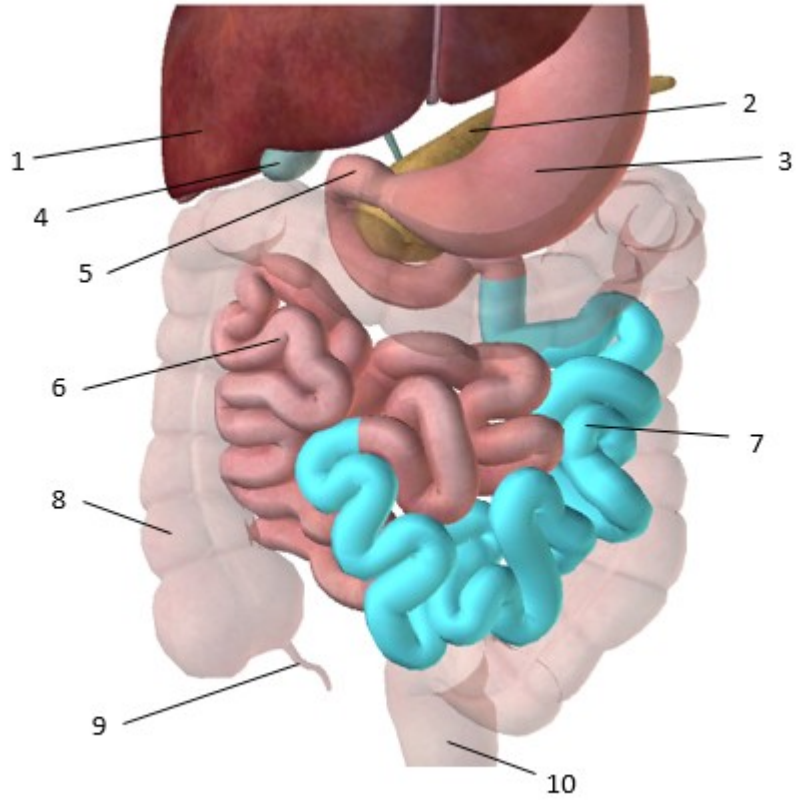
Jejunum (not small intestine)

9:

Appendix (not large intestine)

10:

Rectum (not large intestine)



Answer the following two questions:

1. A doctor is looking to prescribe a larger dose of a vitamin that would not easily cause vitamin toxicity. What type of vitamin would be the best to prescribe? Explain your answer.
A. Water soluble vitamin
B. Fat soluble vitamin
C. All of the above

A. Water soluble vitamin. Fat soluble vitamins are stored within the body's fat stores making it harder for the body to rid itself of them.

2. Explain which digestive system functions are carried out by the large intestine.

Absorption: In the large intestine water and electrolytes are reabsorbed and vitamins are absorbed.

Defecation: Feces travel to the rectum where it is excreted via the anus.

Note: Essay answers must clearly be in your own words.

Answer the following essay question:

1. Name and explain the four main functions performed by the digestive system.

The digestive system has four main roles that it performs: ingestion, digestion, absorption, and defecation.

Ingestion is when food enters the mouth.

Digestion or food breakdown occurs when food is moved, mixed, and exposed to enzymes along the gastrointestinal tract. Digestion can be divided into two parts: mechanical and chemical digestion. Mechanical digestion occurs when food is broken down into smaller pieces. This occurs when the teeth chew food, when the stomach mixes food, and as food is moved along the gastrointestinal tract. Chemical digestion is the breakdown of food by enzymes.

Absorption is the process of moving digested food into the blood stream.

Defecation is the excretion of indigestible food from the anus.

Answer the following three questions:

1. Match the digestive organ with the one substance it produces: (4 points):

Pancreas

F. Lipase

Liver

D. Urea

Mouth

B. Salivary amylase

A. Chyme
B. Salivary amylase
C. Vitamin E
D. Urea
E. Pepsinogen
F. Lipase

2. What is the purpose of the hormone Ghrelin?
A. Increase hunger, decrease satiety
B. Increase hunger, increase satiety
C. Decrease hunger, increase satiety
D. Decrease hunger, decrease satiety

A. Increase hunger, decrease satiety

3. Which of the following statements is false?
A. Taste buds are located on the surface of the mouth and the wall of the pharynx.
B. The ileocecal valve controls the entrance of chyme into to the small intestine.
C. The gall bladder, teeth, and tongue are considered accessory organs to the digestive system.
D. The alimentary canal is a continuous muscular tube, open at both ends.

B. The ileocecal valve controls the entrance of chyme into to the small intestine. (It controls the entrance to the large intestine)

Answer the following five true or false questions:

1. Lipids can be divided into three categories: saturated fat, unsaturated fat, and cholesterol.

True

2. Anabolism combines smaller molecules to make larger molecules.

True

3.The nasopharynx is the most superior region of the pharynx.

True

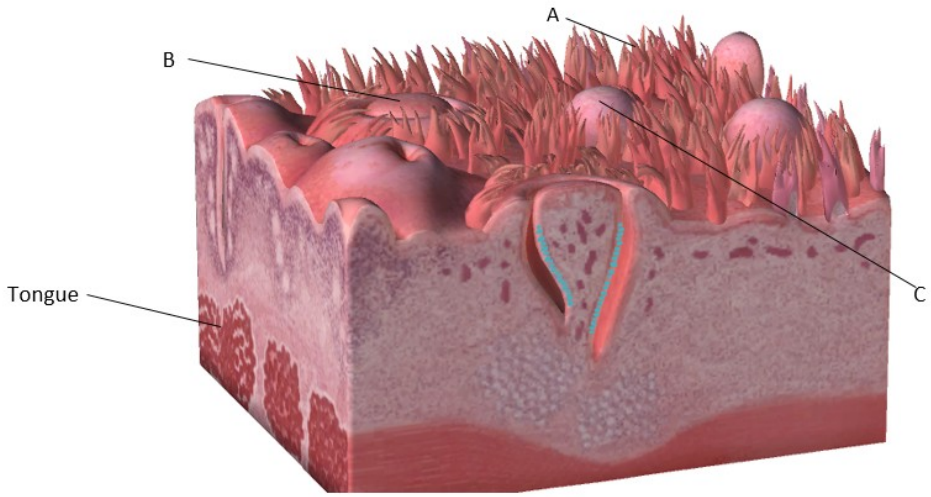
4. The pharynx has three types of skeletal muscle: circumferential, longitudinal and oblique.

False (It only has two; it does not include an oblique layer)

5. The digestive work of salivary amylase is an example of mechanical digestion.

False (Chemical digestion)

1. Label the following three types of raised bumps on the tongue. **Describe the purpose of type B.**



A:

Filiform papillae

B:

Circumvallate papillae

C:

Fungiform papillae

Describe B:

Papillae are raised bumps on the tongue. The three types of papillae help to grip food on the tongue: circumvallate, fungiform and filiform. Circumvallate papillae contain taste buds.

Answer the following three questions:

1. Which of the following statements is true concerning glycolysis?
A. Pyruvic acid are broken down into glucose.
B. Two ATP molecules are formed in first breakdown of glucose.

C. Glucose is broken down into three pyruvate molecules.
D. Glucose is broken down into two sucrose molecules.

B. Two ATP molecules are formed (True)

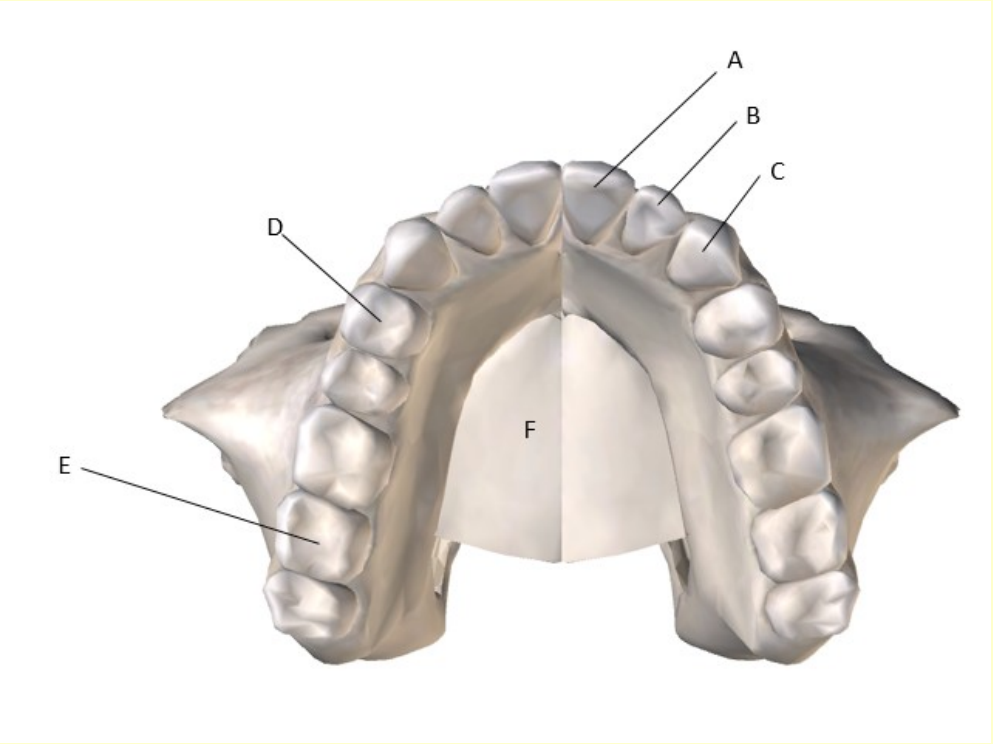
2. Which of the following statements is true concerning the second stage of glucose breakdown?
A. This is also known as proton motive force.
B. Fermentation takes place here with oxygen present.
C. Two additional ATP are formed along with other electron carriers.
D. Glucose molecules are formed.

C. Two additional ATP are formed along with other electron carriers. (True)

3. Which of the following statements is false concerning the Electron Transport System?
A. Anaerobic respiration is more efficient than aerobic respiration.
B. Approximately a total of 34 ATP are formed.
C. Protons are pumped out of the inner mitochondrial membrane.
D. The proton motive force forms ATP molecules.

A. Anaerobic respiration is more efficient than aerobic respiration (false)

Label the diagram below, including left or right. **Describe tooth (A).**



A:

Left Central Incisor

C:

Left Canine (cuspid)

E:

Right Molar

F:

Maxilla (Hard Palate)

Describe tooth type A:

Chisel-shaped for biting food

Match the five structures with the best description:

1. Uvula:
A. Connects mouth to esophagus
B. Forms food into a bolus
C. Attaches to the lesser omentum
D. Stores glycogen and produces urea
E. Attached to the soft palate

E. Attached to the soft palate

2. Small Intestine:
A. First section is called the jejunum
B. Contains the LES
C. Attaches to the greater omentum
D. Pancreas secretions enter here via Hepatopancreatic ampulla
E. Secretes Vitamin K

D. Pancreas secretions enter here via Hepatopancreatic ampulla

3. Muscularis externa (layer of tissue):
A. Made of two layers of muscle
B. Innermost layer
C. Secretes mucous
D. Contains blood and lymph vessels
E. Begins in the mouth

A. Made of two layers of muscle

4. Dentin:
A. Upper portion of gums
B. Outermost layer
C. Bone-like substance
D. Hard connective tissue
E. Contains longitudinal muscle

C. Bone-like substance

5. Common Bile Duct
A. Contains lymph vessels and nerve
B. Joins with the thoracic duct
C. Enters the ileum
D. Contains secretions from the pancreas
E. Contains secretions from the gallbladder

E. Contains secretions from the gallbladder

MODULE 4

Answer the following five questions:

1. Which of the following statements is TRUE concerning the function bones?
A. Flat bones are long and thin, such as the ulna.
B. Long bones have an irregular structure
C. The carpals are an example of short bones.
D. Vertebrae are an example of sesamoid bone.

C. The carpals are an example of short bones.

2. Which of the following statements is FALSE concerning bones?
A. Bones are not completely smooth surfaces.
B. A foramen is a projection for a tendon or ligament attachment.
C. A process is an elevation found in bone.
D. Bones are a storage site for phosphorus and calcium.

B. A foramen is a projection for a tendon or ligament attachment.

3. Which of the following statements is FALSE about the skeletal system?
A. The two main divisions of the skeletal system are: lumbar and thoracic.
B. The two main divisions of the skeletal system are: axial and appendicular.
C. The lumbar division of the skeleton is included in the appendicular skeleton.
D. The axial skeleton includes the laryngeal skeleton.
E. B. and D. are false
F. A. and C are false

F. A. and C. are false

4. The cranium is formed by _____ bones; the facial skeleton contains _____ bones.
A. 22; 14
B. 3; 6
C. 8; 14
D. 14; 8

C. 8; 14

5. What bone is highlighted in blue in the figure below? (superior/internal view)

Ethmoid bone

1. Label the following bones of the skeleton from the figure below:
1:

Frontal bone (or frontal sinuses)

3:

Maxilla

5:

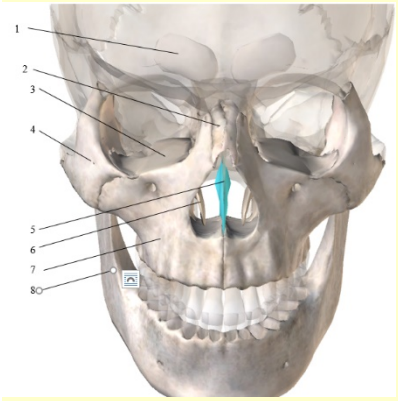
Vomer

7:

Maxilla

8:

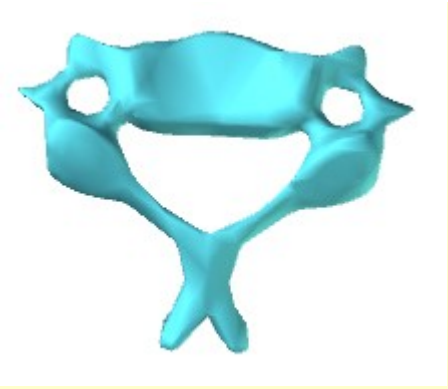
Mandible



Answer the following three questions:

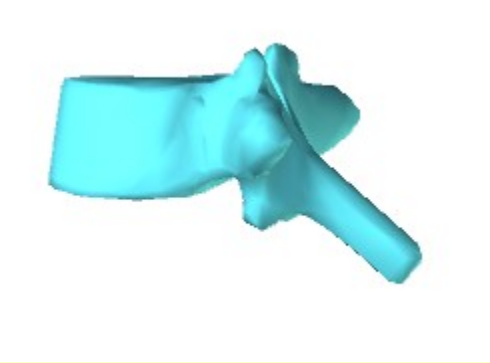
1. Label the following vertebrae as:
A= Cervical
B= Thoracic
C= Lumbar

A (Cervical)



2. Label the following vertebrae as:
A= Cervical
B= Thoracic
C= Lumbar

B (Thoracic)



3. What is the name of the foramina in the figure below?
1:

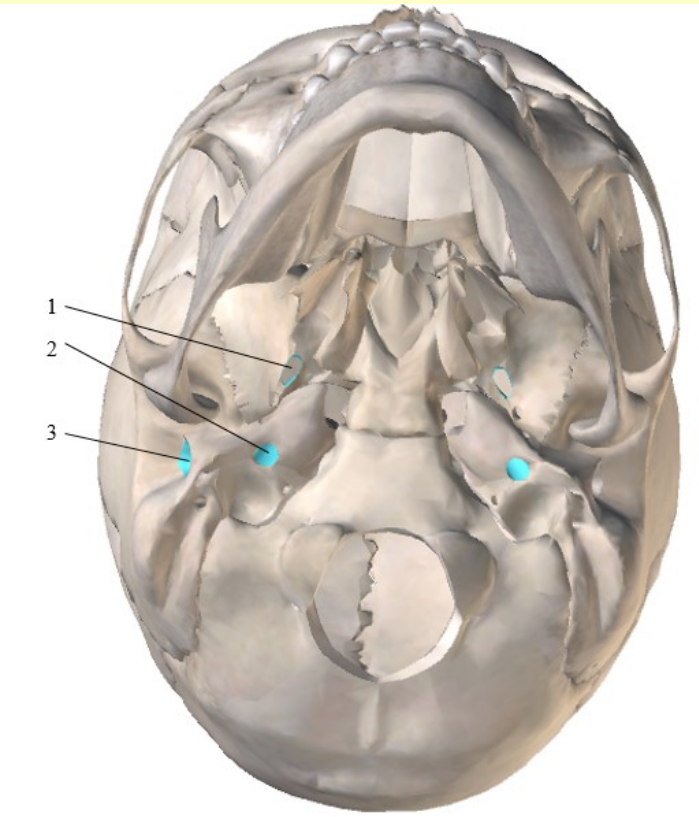
Foramen ovale

2:

Carotid canal

3:

External acoustic meatus



1. Label the following bone **landmarks:**
B:

Supraspinatus fossa

D:

Acromion

E:

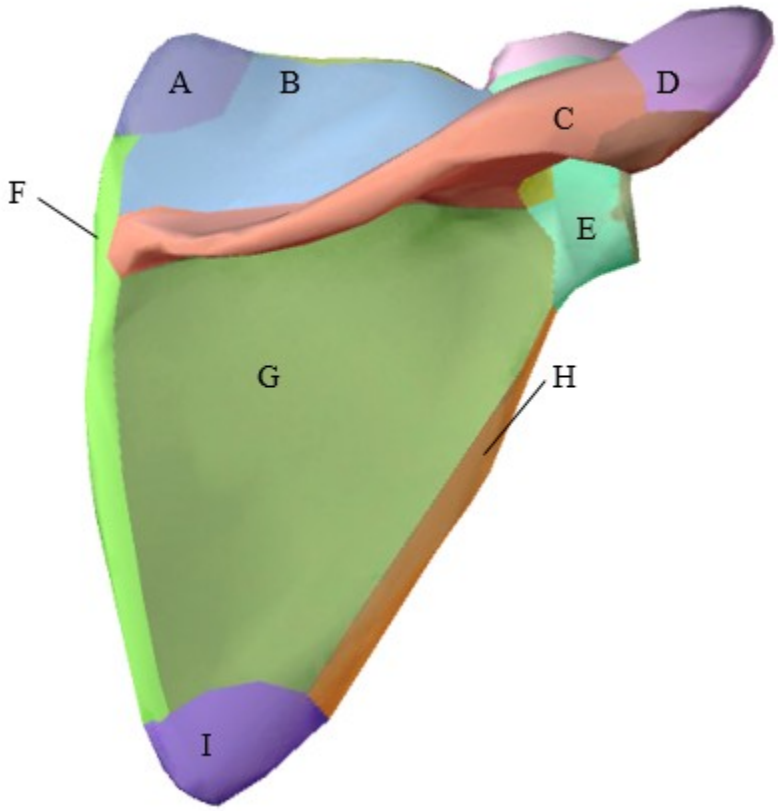
Neck

H:

Lateral border

I:

Inferior angle



Answer the following three questions:

1. Which of the following statements is TRUE about the scapula?
A. The clavicle connects to the scapula anteriorly near the midline of the human body.
B. The medial border of the scapula connects directly to the neck of the scapula.
C. The subscapular fossa is located on the anterior side of the scapula.
D. The scapula articulates with the clavicle at the neck of the scapula.

C. The subscapular fossa is located on the anterior side of the scapula.

2. Which of the following statements is FALSE about the humerus?
A. The trochlea articulates with the ulna.
B. The head of the humerus articulates with the ulna.
C. The capitulum articulates with the radius.
D. The medial epicondyle is the prominent bone landmark of the medial side of the elbow (in anatomical position).
E. A. and B. are false

B. The head of the humerus articulates with the ulna.
(The head of the humerus articulates with the scapula)

3. What two bones meet at the glenohumeral joint? In your own words, why is this joint prone to dislocation?

Humerus and scapula

The structure of the shoulder permits movement of the arm in almost any direction but provides little stability. The glenohumeral joint is prone to dislocation because it is held in place primarily by muscular and ligament attachment with very little bony stability.

1. Label the bones in the figure below:
A:

Pisiform

B:

Hamate

C:

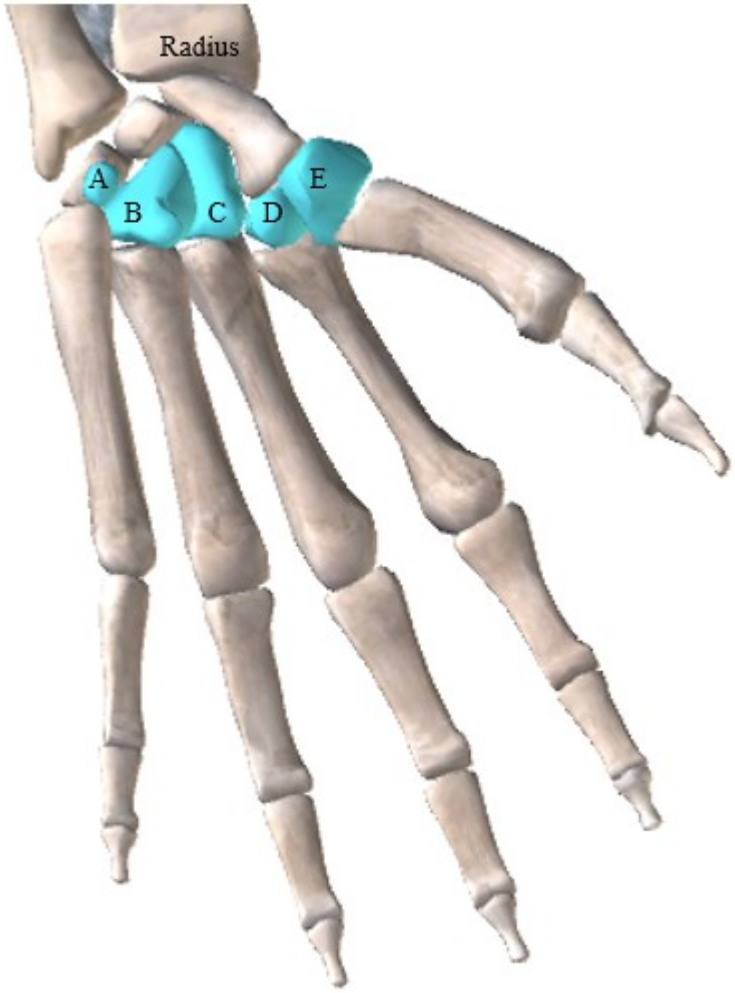
Capitate

D:

Trapezoid

E:

Trapezium



2. Label the bones in the figure below:
A:

Cuboid

C:

Intermediate cuneiform

D:

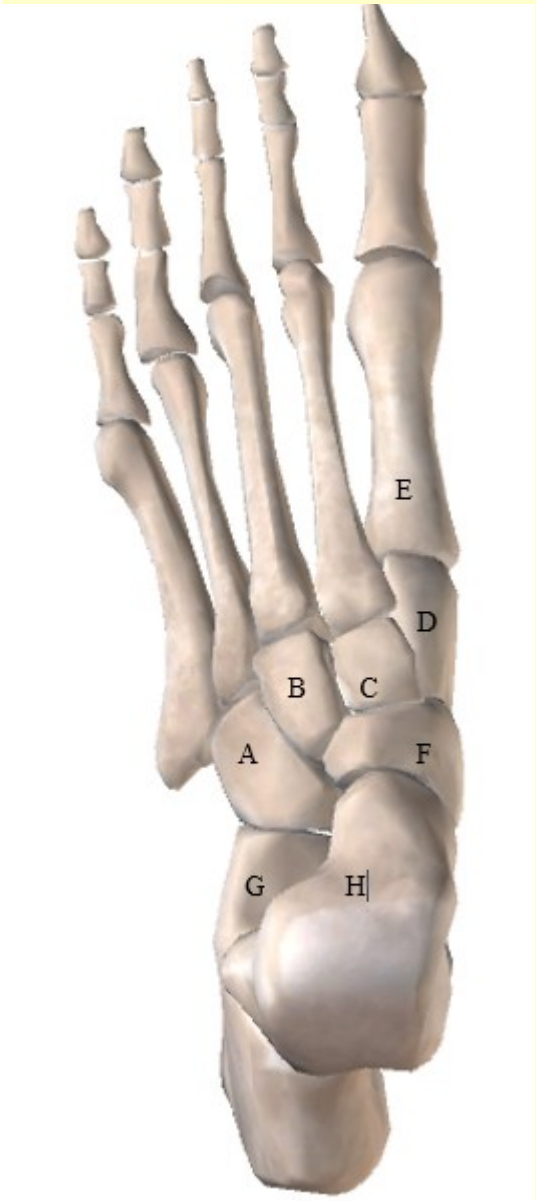
Medial Cuneiform

F:

Navicular

G:

Calcaneus



Answer the following five questions:

1. Yellow bone marrow:
A. is found primarily in long bones.
B. is found primarily in short and flat bones.
C. is found primarily in newborns, not adults.
D. produces red blood cells.

A. is found primarily in long bones.

2. The diaphysis of a bone:
A. is found at the ends of long bones.
B. contains the articular cartilage at joint articulations.
C. contains the proximal epiphysis.
D. is the center length of a bone.
E. both A. and C.

D. is the center length of a bone.

3. Compact bone:
A. forms the exterior of bones.
B. forms the interior of bones.
C. is lighter than spongy bone.
D. contains numerous bars and plates with irregular spaces.
E. both B. and D.

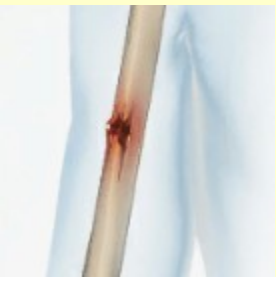
A. forms the exterior of bones.

4. Intramembranous ossification is the formation of _____ from _____:
A. a growth plate; the center of a bone.
B. long bones; hyaline cartilage.
C. flat bones; connective tissue.
D. a primary ossification center; a cartilaginous disc.
E. both A. and C.

C. flat bones; connective tissue

5. What term *best* describes the type of fracture pictured below?

Greenstick (the bone is broken, but not all the way across)



Answer the following two questions:

1. A patient has a diagnosis of osteoporosis. (1) In your own words, describe this diagnosis and (2) What type of bone cell would they be lacking? Explain your answer.

(1) Osteoporosis is a bone tissue disease. When bone tissue degenerates faster than is replaced, the bones become weak. Brittle bones cause increased pain and are more likely to fracture.
(2) They would have decreased osteoblasts which are responsible for bone repair. The bone repair would be unable to keep up with the ongoing breakdown of bone which is done by the work of osteoblasts.

2. Your patient has back pain due to a herniated disc. (1) In your own words explain what it means to have a herniated disc. (2) As reviewed in the module, discuss one treatment option to address your patient's pain.

(1) A herniated disc is an injury to the intervertebral disc, where the center portion of the disc bulges into the vertebral foramen, causing pain.
(2) Explanation of
1- Physical therapy for strengthening to support back ligaments.
OR 2- Surgery to fuse two vertebrae together.

Answer the following two questions:

1. A patient has a diagnosis of osteoporosis. (1) In your own words, describe this diagnosis and (2) What type of bone cell would they be lacking? Explain your answer.
Osteoporosis is a bone disease resulting from bone degeneration. This is a condition in which bones become weak and brittle. Patients are lacking osteoblasts, which build up bone cells. In this disease, new bone creation cannot keep up with old bone removal.

2. Your patient has back pain due to a herniated disc. (1) In your own words explain what it means to have a herniated disc. (2) As reviewed in the module, discuss one treatment option to

address your patient's pain.
Herniated disc is when the disc between the vertebrae slips and presses on the spinal cord or nerves. This causes the pain. This condition can be treated in a few ways. One form is physical therapy in strengthening the muscles in the area. Surgery is an option, resulting in removing the disc yet having to fuse together the vertebrae.

1. Matching: Match the joint with the correct joint classification (A-F).
***NOTE:** Some joints may fall into more than one category. Mark all that apply.

A= Fibrous B= Cartilaginous C= Synovial D= Hinge E= Ball-and-Socket F=Saddle

1. Elbow joint

C, D (Synovial, Hinge)

2. Thumb joint

C, F (Synovial, Saddle)

3. Hip joint

C, E (Synovial, Ball and socket)

4. Vertebral joint

B (Cartilaginous)

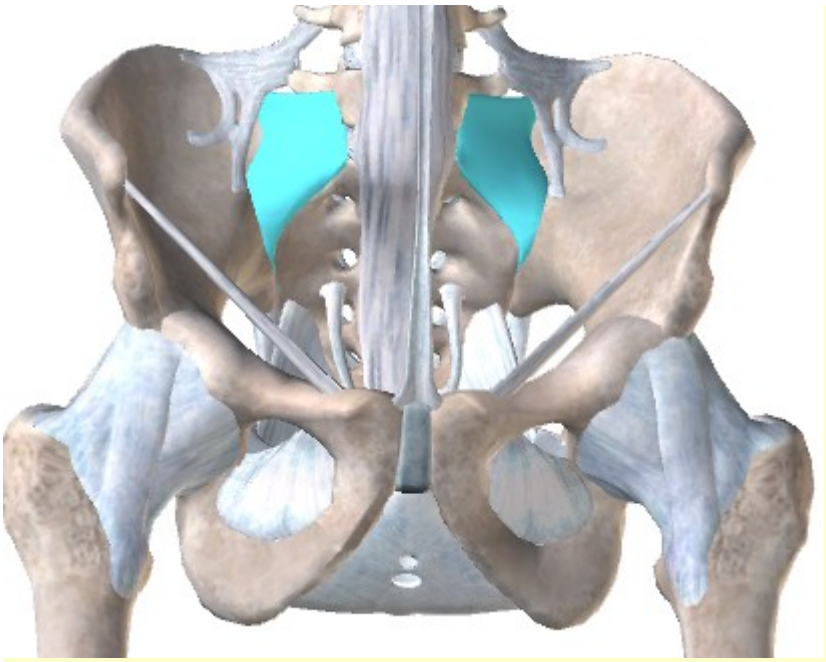
5. Cranial joints

A (Fibrous)

Answer the following three questions:

1. Name the ligament highlighted in blue in the figure below:

Anterior sacroiliac ligament

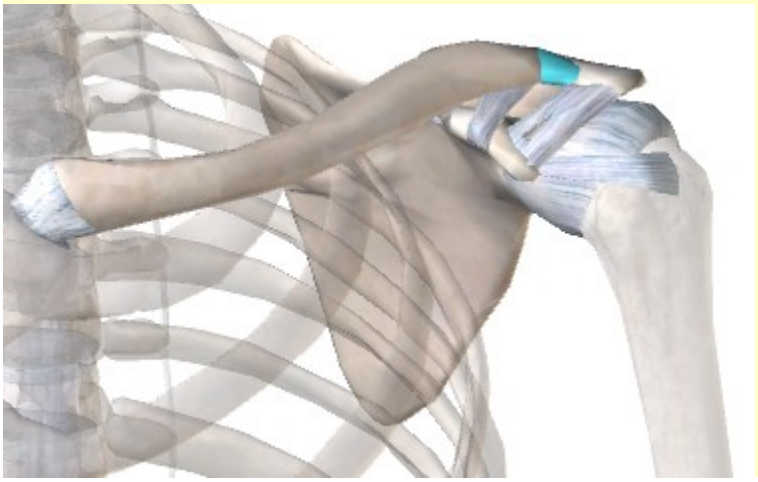


2. Name the ligament highlighted in blue in the figure below:

MCL (Medial collateral/tibial ligament)

3. Name the ligament highlighted in blue in the figure below:

Acromioclavicular ligament



MODULE 5

Note: Essay answers must clearly be in your own words. All multiple-choice questions have one answer unless otherwise specified. Choose the best response with the information provided.

Answer the following five true or false questions:

1. There are five types of muscle tissue found in the body.

False, only 3

2. Cardiac and smooth muscle tissue are both under involuntary control.

True

3. The musculocutaneous nerve is part of the central nervous system.

False- this is a peripheral nerve

4. A motor signal is a signal that is sent from a muscle to the central nervous system.

False- this is sensory input

5. The cervical plexus contains nerves that innervate the thigh.

False

Note: Essay answers must clearly be in your own words. All multiple-choice questions have one answer unless otherwise specified. Choose the best response with the information provided.

Answer the following five short-answer questions:

1. Tendons connect which types of tissue?

Connect muscle to bone

2. Acetylcholine is what type of substance?

Neurotransmitter

3. During a muscle contraction which protein myofilament contains cross-bridges?

Myosin

4. What is the name of the thick myofilament?

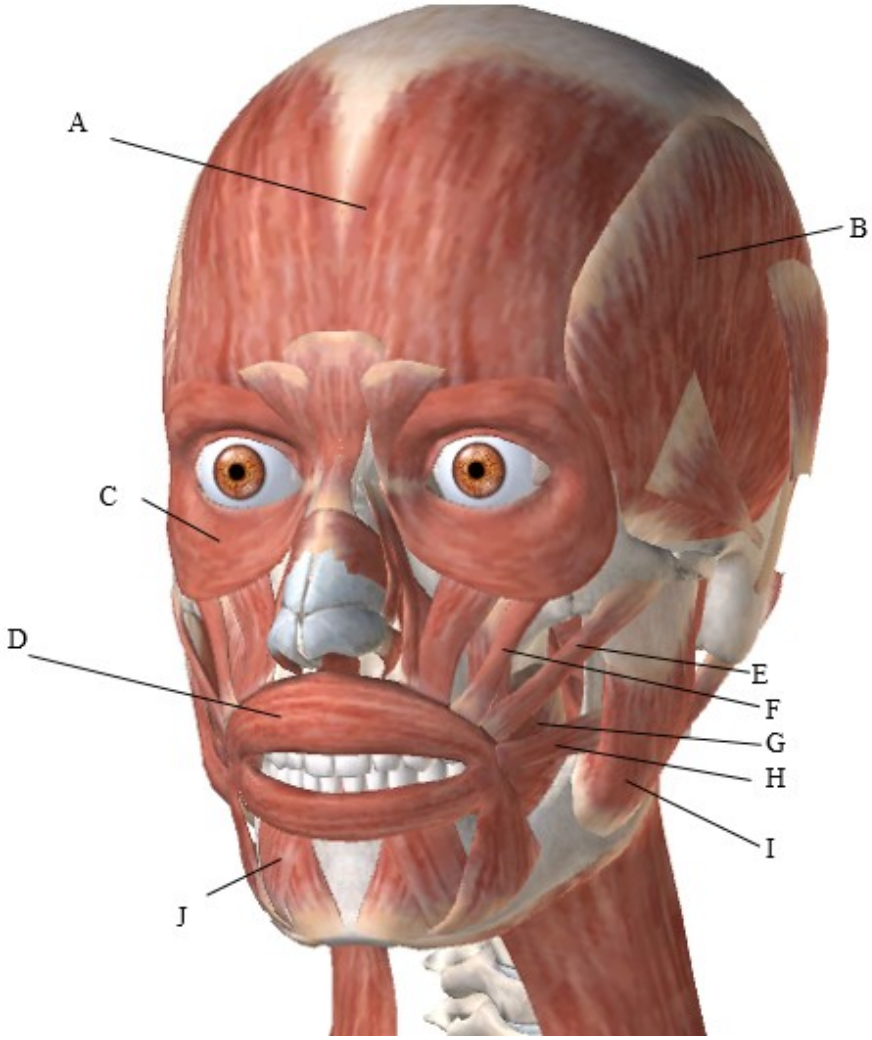
Myosin

5. What must occur for a muscle contraction to stop?

Calcium ions must be pumped back into the sarcoplasmic reticulum

5. What must occur for a muscle contraction to stop?
Contraction stops when nerve impulses no longer stimulate the muscle fiber. Calcium ions return to the sarcoplasmic reticulum and the muscle then relaxes

Note: Essay answers must clearly be in your own words. All multiple-choice questions have one answer unless otherwise specified. Choose the best response with the information provided.



Label the following five muscles:

B:

Temporalis

C:

Orbicularis oculi

E:

Zygomaticus major

G:

Buccinator

J:

Depressor labii inferioris

Fill in the following muscle chart (10 blank spaces):

Muscle	Origin	Insertion	Action	Innervation
Flexor digitorum superficialis	-------	----------	1._____	2._____
Pronator Teres	-------	3._____	4._____	5._____
Vastus Medialis	6._____	----------	7._____	----------
Peroneus Brevis	8._____	9._____	----------	10._____

1.

Flexion of the wrist and digits 2-5

2.

Median nerve

3.

Mid-lateral surface of radius

4.

Pronation

5.

Median nerve

6.

Intertrochanteric line of femur

7.

Knee extension

8.

Lateral, distal fibula

9.

Lateral side of 5th metatarsal

10.

Superficial peroneal nerve

Answer the following five questions:

1. Your patient sustained an injury to their facial nerve (CN VII). Which actions would be impaired?

A. Eye closure
B. Raising eyebrows
C. Jaw closure
D. Neck flexion
E. A&B
F. C&D

E.A&B (Orbicularis oculi & frontalis)

2. Your patient is having difficulty when asked to bring his chin to his chest. He is also having difficulty turning his face from side to side. What muscle is most likely impaired?

A. Thyrohyoid
B. Semispinalis capitis
C. Splenius Capitis
D. Sternocleidomastoid
E. Scalenes

D. Sternocleidomastoid (Bilateral neck flexion, unilateral turns face)

3. A person sustained a back injury to the muscle group closest to the spine. What muscle group was injured?
A. Longissimus
B. Spinalis
C. Sternocleidomastoid
D. Iliocostalis
E. Rectus abdominis

B. Spinalis

4. True or False: When a muscle contracts, the Z lines within a sarcomere come closer together towards the M line.

True

5. True or False: The I bands contain thick filaments.

False (I bands contain thin filaments)

Answer the following five questions:

1. Which muscle contracts to enable the main effort required to stand on your toes?
A. Biceps femoris
B. Quadriceps
C. Gastrocnemius
D. Tibialis anterior

C. Gastrocnemius

2. When gluteus maximus contracts, which bone is pulled posteriorly by this muscle?

A. Tibia
B. Ilium
C. Ulna
D. Femur

D. Femur

3. When flexor digitorum profundus contracts, what action(s) occurs?

A. Wrist flexion
B. Elbow flexion
C. Flexion of digits 2-5
D. Flexion of digit 1
E. A&D
F. B&C

E. A&C (Wrist flexion, flexion of digits 2-5)

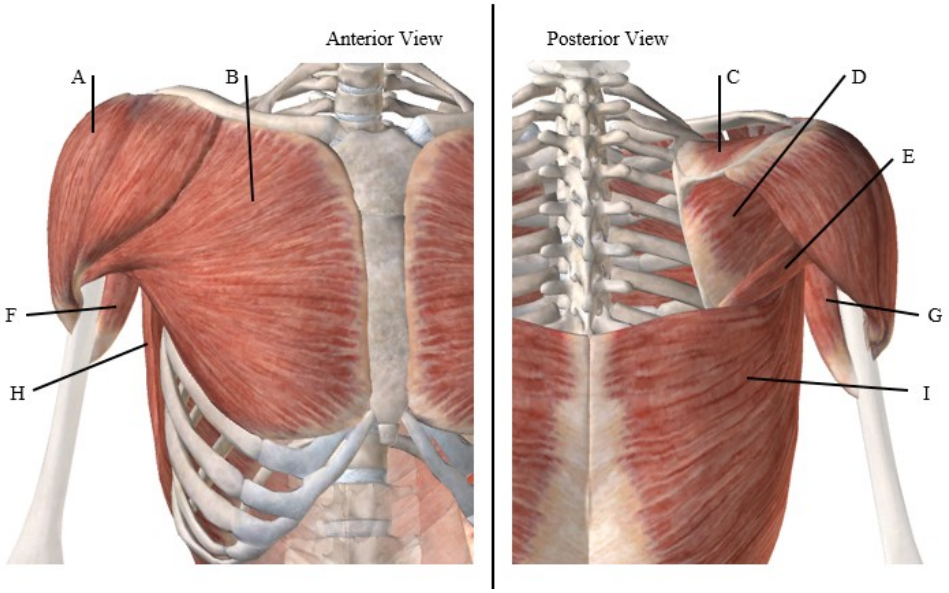
4. Contraction of _____ results in _____?
A. obturator externus, spine flexion
B. obturator externus, spine extension
C. iliacus, hip flexion
D. iliacus, hip extension

C. iliacus, hip flexion

5. When piriformis contracts, what action(s) will not occur at the hip?
A. Internal rotation
B. Lateral rotation
C. Adduction
D. Flexion
E. Extension
F. A&D
G. B&E

F. A&D (Internal rotation, flexion do not occur)

Use the figure answer the following five questions:



1. Which muscle has origins on both the clavicle and scapula? (specify letter on diagram with the name of the muscle for full credit)

A (Deltoid)

2. Which muscle is innervated by the thoracodorsal nerve? (specify letter on diagram with the name of the muscle for full credit)

H or I (Lats)

3. What is the name of muscle D? (specify letter on diagram with the name of the muscle for full credit)

Infraspinatus

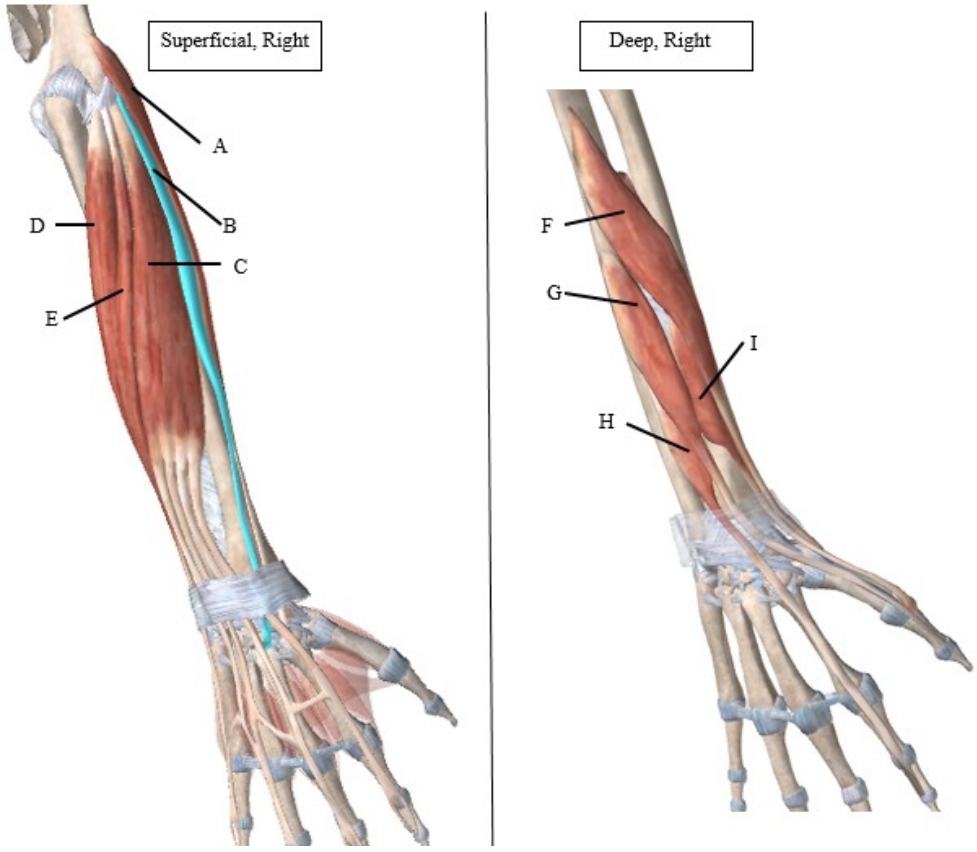
4. What is the innervation of muscle D? (specify letter on diagram with the name of the muscle for full credit)

Suprascapular nerve

5. What is the insertion of muscle E? (specify letter on diagram with the name of the muscle for full credit)

Intertubercular groove of humerus
(Teres major)

Use the figure to label the following six muscles: (Viewed posteriorly)



A:

Extensor carpi radialis longus

C:

Extensor digitorum

D:

Extensor Carpi Ulnaris

F:

Abductor pollicis longus

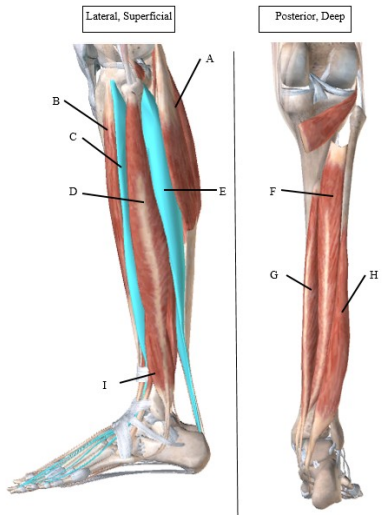
H:

Extensor indicis

I:

Extensor pollicis brevis

Use the figure to label the following six muscles:



D:

Peroneus (fibularis) longus

E:

Soleus

F:

Tibialis posterior

G:

Flexor digitorum longus

H:

Flexor hallucis longus

I:

Peroneus (fibularis) brevis

Answer the following essay question:

Describe how acetylcholine, sodium ions and calcium ions work together to enable a muscle contraction.

Acetylcholine (a special chemical called a neurotransmitter) is released from a motor nerve at the neuromuscular junction (or NMJ).
Acetylcholine binds to receptors on the muscle fiber that cause sodium channels to open. Sodium ions rush inside the cell, triggering an action potential which eventually reaches the sarcoplasmic reticulum.
Calcium ions are released from the sarcoplasmic reticulum of the muscle cell, causing a muscle contraction to occur.

Describe how acetylcholine, sodium ions and calcium ions work together to enable a muscle contraction.

For a muscle contraction, first a nerve signal is sent to the muscle fiber. Once this signal reaches the muscle fiber, acetylcholine is released from the motor nerve ending. Acetylecholine binds to

the muscle cell and triggers the sodium channels to open and release sodium ions. The presence of sodium causes calcium ions to be released. With presence of calcium, cross bridges (myosin filaments) bend and attach to actin. The cross bridges then bend again, pulling actin along. This pull movement of the actin by myosin produces a muscle contraction.

MODULE 6

Answer the following questions.

1. Explain two reasons why a woman with low levels of LH would not be able to become pregnant.

(1) LH acts on the ovary to cause ovulation to occur. (2) LH causes progesterone release to facilitate potential fertilization of the egg and pregnancy. Progesterone is a key hormone for the maintenance of pregnancy.

2. Would you expect a male to have estrogen in their bloodstream? Explain why or why not.

(1)Yes. Both male and female bodies produce "all" the sex hormones. However, the ratios are different.
(2) The adrenal glands are largely responsible for producing this "opposite" hormone that the testis would not.

1. Explain two reasons why a woman with low levels of LH would not be able to become pregnant.

LH, luteinizing hormone, stimulates the ovaries in females. Low levels of LH can indicate a problem with the ovaries. This can result in problems with ovulation. Low levels of LH can also indicate a problem with the pituitary gland, which is the master gland that produces LH.

Label the endocrine glands (A-C)

A:

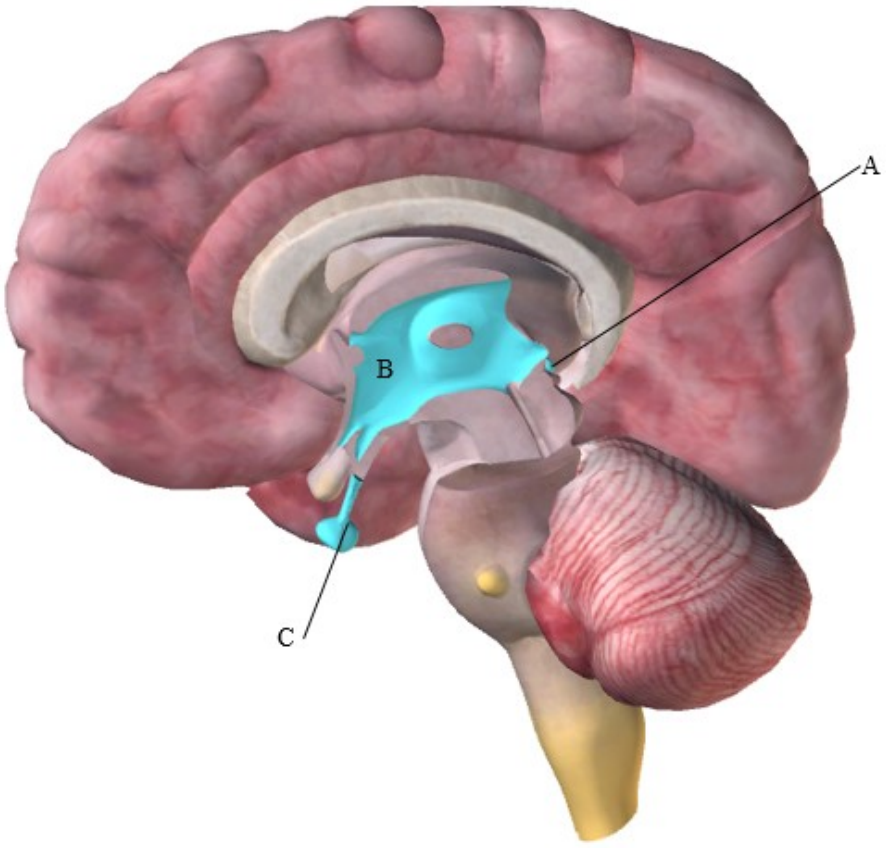
Pineal gland

B:

Hypothalamus

C:

Pituitary gland



1. Explain the concept of positive feedback. Give an example of a hormone that works through positive feedback.

1- Positive feedback is the action of a hormone increasing the production of that hormone. (This is the opposite of negative feedback).

2- One example is the action of oxytocin causing the uterus to contract during labor. Oxytocin enhances the effect of the uterus contractions, causing more oxytocin to be released. The positive feedback loop is stopped once the baby is born and the uterus no longer needs to contract, stopping the production of oxytocin.

Positive feedback system increases the amount of the hormone that is regulated. An example of a hormone that works through positive feedback is oxytocin. This hormone is involved with childbirth by causing the uterus to contract. As the uterus is contracting, this causes more oxytocin to be released. The feedback is stopped once the baby is born and the uterus does not need to contract. This stops the release of oxytocin.

Answer the following five questions:

1. This type of hormone is derived from proteins:

A. Peptide hormones
B. Catecholamines
C. Steroid hormones
D. Tyrosine

A. Peptide hormones

2. Growth hormone_____

A. is most active during adulthood.
B. is produced by the anterior pituitary gland.
C. underproduction is called acromegaly.
D. A &C

B. is produced by the anterior pituitary gland.

3. Neurosecretory cells are a part of what endocrine organ?

A. Thalamus
B. Pituitary
C. Cerebellum
D. Hypothalamus

D. Hypothalamus

4. Which hormone production is decreased with sunlight?

A. MSH –melanocyte stimulating hormone
B. melatonin
C. cortisol
D. GH -Growth hormone

B. melatonin

5. The posterior pituitary stores these two hormones:
A. ADH and Prolactin
B. TSH and LH
C. LH and FSH
D. ADH and Oxytocin

D. ADH and oxytocin

1. List the hormone best describes each of the four statements below:

A. I lower the level of calcium in the blood by depositing calcium into bone.

Calcitonin

B. I am the secreted by the pituitary and stimulate the gonads.

FSH or LH (Gonadotropic hormones)

C. I am secreted by the pituitary to stimulate the adrenal cortex.

ACTH

D. I secreted by the alpha cells of the pancreas.

Glucagon

Answer the following question.

1. Explain in detail how PTH and calcitonin work to maintain calcium balance.

Calcitonin: produced by the thyroid glands, deposits calcium into bone. Calcitonin opposes the action of PTH. When the blood calcium level reaches the appropriate level through all these means, the parathyroid glands stop producing PTH through negative feedback.
PTH: produced by the parathyroid glands increase the amount of calcium in the blood. (Any one of the following explanations of PTH is acceptable)
PTH stimulates the increased absorption of calcium from the intestines.
PTH retains calcium through excreting phosphate at the kidneys.
In the bones, PTH promotes the activity of osteoclasts to demineralize of the bone, increasing the amount of calcium in the blood.

With the influence of PTH, calcium levels in the blood increase while phosphate levels decrease. PTH is released by the parathyroid glands. Calcitonin works in opposite to PTH. Calcitonin lowers or decreases the level of calcium in the blood. Calcitonin is produced by the thyroid gland.

Answer the following multiple choice questions:

1. Which hormone/s are involved in milk production?

A. Thyroxin
B. Oxytocin
C. Prolactin
D. B &C
E. A&B

C. Prolactin

2. Which cells mature in the thymus?

A. B cells
B. T cells
C. Red blood cells
D. the islets of Langerhans
E. A & B

B. T Cells

3. Iodine is needed to produce which hormone/s?

A. T3/T4
B. Gonadotropic
C. ACTH
D. TSH
E. A & D

A. T3/T4

4. Which of the following is NOT a function of oxytocin?

A. Uterine contraction
B. Bone growth
C. Milk letdown
D. Given to aide in childbirth process

B. Bone growth

5. Which hormones are produced in the anterior pituitary?

A. TSH, MSH, and calcitonin
B. ADH, GH, and prolactin
C. PTH, TSH, and FH
D. ACTH, GH, and prolactin

D. ACTH, GH, and prolactin

Answer the following question:

1. Explain in detail why the thyroid becomes enlarged during an iodine deficiency?

When there is a low level of thyroxin in the blood, the anterior pituitary continues to produce TSH. The thyroid responds by increasing in size and producing a goiter, but this increase in size is ineffective because active thyroxin cannot be produced without iodine.

When iodine is lacking in the diet, the thyroid enlarges in what is called a goiter. This occurs because of the relationship with the thyroid and anterior pituitary gland. When the level of Thyroxin (produced by thyroid and contains iodine) is low in the blood, the anterior pituitary gland still produces TSH. The thyroid responds by enlarging and developing a goiter.

Matching each of the following conditions with the <u>one</u> best explanation (1-5):

1. Congenital hypothyroidism

C. Low thyroxin production since birth

2. Pituitary giant

A. Overproduction of GH as a child

3. Acromegaly

H. Overproduction of GH as an adult

4. Tetany

F. Results if PTH is not produced in response to low blood calcium

5. Anemia

E. Lack of erythropoietin to act on the bone marrow

A. Overproduction of GH as a child
B. Underproduction of GH as a child
C. Low thyroxin production since birth
D. High thyroxin production since birth
E. Lack of erythropoietin to act on the bone marrow
F. Results if PTH is not produced in response to low blood calcium
G. Results if calcitonin is not produced in response to low blood calcium
H. Overproduction of GH as an adult

Answer the following five questions.

1. In addition to the endocrine system, the pancreas is also part of which system?

A. Excretory
B. Nervous
C. Circulatory
D. Digestive

D. Digestive

2. Which part of the adrenal glands is vital to life?

A. Cortex
B. Medulla
C. The entire gland
D. None of adrenal gland is vital to life

A. Cortex

3. Which of the following is **false** regarding aldosterone?

A. It is a regulated by the concentration of sodium.
B. It causes the kidneys to excrete potassium and retain sodium.
C. It causes the kidneys to retain potassium and excrete sodium.
D. It is a mineralocorticoid.
E. It increases blood pressure

C. It causes the kidneys to retain potassium and excrete sodium.

4. If you were calcium deficient, which *condition* would occur in your body if there was no hormonal compensation?

A. Anemia
B. Tetany
C. Acromegaly
D. Jet lag

B. Tetany

5. Which of the following is **true** regarding estrogen?
A. Production is highest in childhood.
B. It causes growth of the uterus and vagina.
C. It decreases fat storage.
D. It causes females to have a narrower pelvis (compared to males).

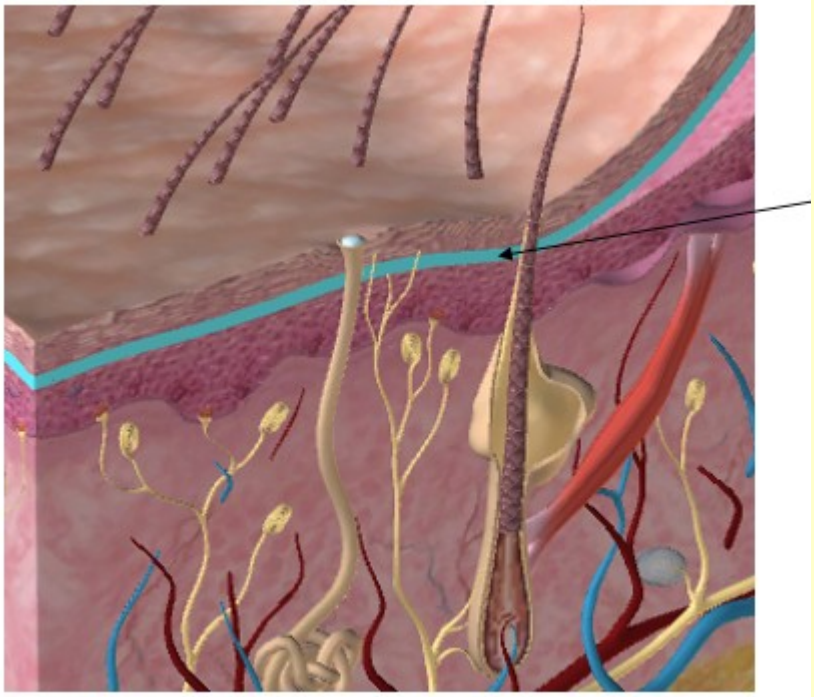
B. It causes growth of the uterus and vagina.

MODULE 7

Answer the following two questions.

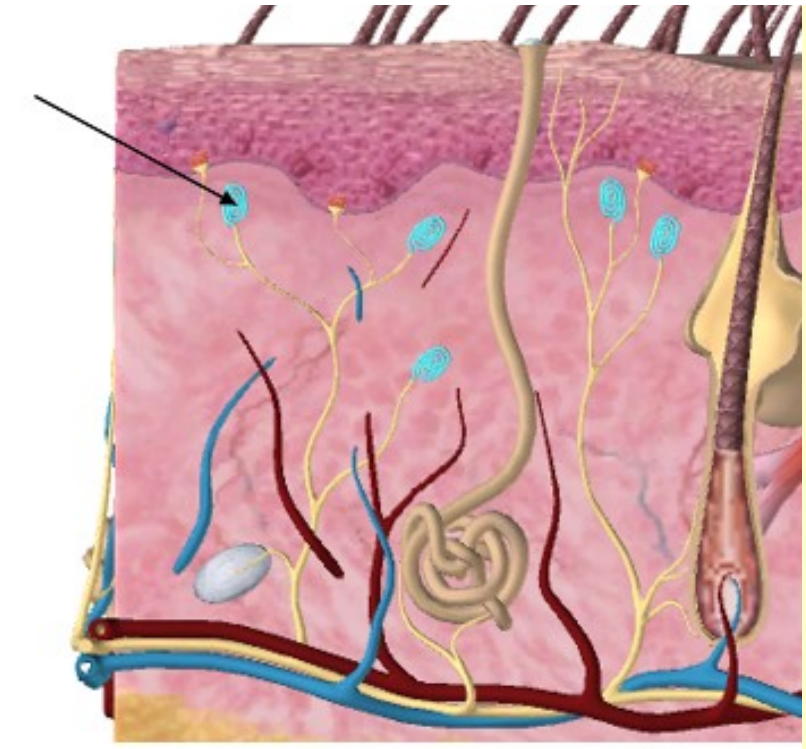
1. Identify the region **and** the layer of skin that is highlighted in blue. (Also indicated by the arrow, below) ***NOTE:** To receive full credit you must label two regions.

Stratum granulosum; Epidermis
(Must have both for full credit)



2. A- Identify the sensory cell receptor highlighted in blue, below, also indicated by the arrow.
   B- What sensory information is detected by this type of receptor?

A) Meisner's corpuscles;
B) Detects light touch and vibration (mechanoreceptor)



Answer the following multiple choice questions:

1. The layers of the epidermis, from deep to superficial are:
A. Stratum corneum, stratum granulosum, stratum spinosum, stratum basale.
B. Stratum basale, stratum spinosum, stratum granulosum, stratum corneum.
C. Stratum basale, stratum granulosum, stratum corneum, Stratum spinosum.
D. Stratum corneum, stratum spinosum, stratum granulosum, stratum basale.

B. Stratum basale, stratum spinosum, stratum granulosum, stratum corneum

2. Exocrine glands secrete _____; Endocrine glands secrete ____.
A. for body-wide distribution, into an epithelial lining
B. into an epithelial lining, for body-wide distribution
C. through a duct, into the bloodstream
D. into the bloodstream, through a duct
E. A&D
F. B&C

F. B&C

3. Which of the following is false regarding the epidermis:
A. It is avascular.
B. As cells divide they are pushed towards the basement membrane.
C. The cells of the stratum basale cells have a high rate of cell division.
D. Epidermal ridges form a person's fingerprints.

B. As cells divide they are pushed towards the basement membrane.
(False, as cells divide they are pushed towards the external surface of the stratum corneum)

1. Match the cell (#1-4) with its single best description (A-F), using each letter only once.

1. Fibroblasts

B. Produces collagen

2. Keratinocytes

E. Produces a protein to protect the skin

3. Langerhans cells

A. Assists in immune responses

4. Melanocytes

F. Produces a pigment that absorbs UV rays

A. Assists in immune responses
B. Produces collagen
C. Detects light touch
D. Detects pain
E. Produces a protein to protect the skin
F. Produces a pigment that absorbs UV rays

Answer the following three questions:

1. A person touches a hot cup of coffee. What type of sensory organ detects this information?

Thermoreceptor

2. Merkel cells are embedded in what layer of the skin?

Epidermis

3. In your own words, how can the skin be used to determine if a person is dehydrated?

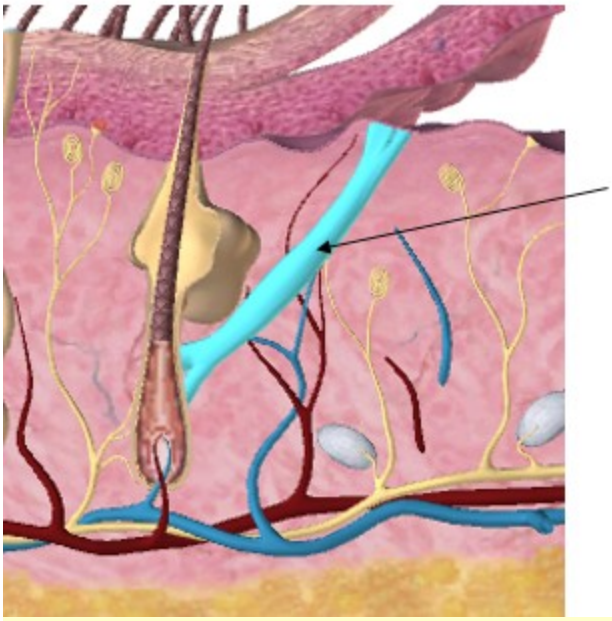
A person who is dehydrated has decreased water content in the dermal layer of their skin. A person can be tested for dehydration by pinching the skin on the back of the hand. One indicator of dehydration is when the skin does not recoil back to its normal shape but instead stays "ridged".

Dehydration can be tested in a person by pinching the skin on the back of the hand. If the skin does not recoil back to normal and stays pinched, that is one indication of dehydration.

Answer the following two questions:

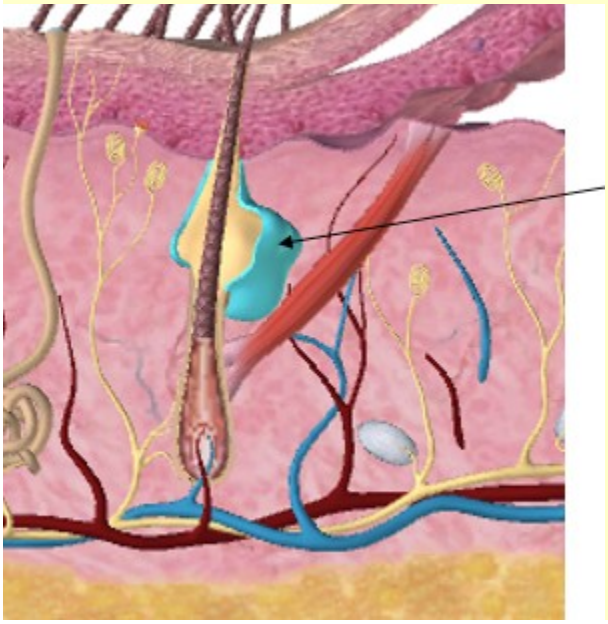
1. What is the name and function of the structure below? (Highlighted in blue, also indicated by the arrow)

Arrector pili, a smooth muscle which connects to each hair follicle. It contracts when the body is cold or experiences emotional responses.



2. What is the name and function of the structure below? (Highlighted in blue, also indicated by the arrow)

Sebaceous gland (oil gland) produces oil (sebum) to protect the skin and hair from drying.



Answer the following five questions:

1. All of the following are functions of skin except:
A. Absorb UV rays
B. Produce vitamin C
C. Thermoregulation
D. Protection for underlying tissues

B. Produce vitamin C

2. The thickest region of the dermis is the:
A. Reticular
B. Papillary
C. Basement membrane
D. Subcutaneous
E. None of the above are layers of the dermis

A. Reticular

3. The hypodermis is comprised mainly of:
A. Adipocytes
B. Reticular cells
C. Dermatomes
D. Sebaceous glands

A. Adipocytes

4. What is a contusion?
A. A third degree burn
B. An infection in the epidermis
C. Damage to a broken blood vessel
D. Subcutaneous injection

C. Damage to a broken blood vessel

5. Information from a dermatome travels to:
A. The brain
B. A hair follicle
C. A gland
D. The skin

A. The brain

1. This injury, seen below, is best described as what degree of burn? Explain what layer/s of skin are damaged in this type of burn.

Second-degree burn, also called a partial thickness burn
The epidermis and dermis layers of the skin was damaged.
(Optional: The burned area burned becomes red and painful, forming blisters)

Answer the following clinical case scenario:

1. Your patient was injured in a house fire. The skin sustained damage through the epidermis, dermis, hypodermis, and some muscle tissue.

1- What degree of burn best describes your patient's injury?

2- Would your patient experience pain in the injured area? Why or why not?

-4th degree

-No, fourth-degree burns damage the epidermis, the dermis, the hypodermis, and underlying tissue such as muscle or bone. Because the nerve endings are destroyed there is no sensation in the affected burn area.

1) This patient has fourth degree burn.

2)Sense the nerve endings are destroyed in the affected area, the patient will not feel pain in that area.

Answer the following four questions:

1. This part of a hair contains blood and nervous supply:

A. Bulb

B. Root

C. Shaft

D. Keratin

A. Bulb

2. Hair is made up of:

A. Living epidermal cells converted to collagen

B. Dead epidermal cells converted to collagen

C. Living epidermal cells converted to keratin

D. Dead epidermal cells converted to keratin

D. Dead epidermal cells converted to keratin

3. Nails are hard, dead cells which have been converted to _____

A. Keratin

B. Collagen

C. Calcium

D. Corneum

A. Keratin

4. The nail _____ is a portion of the nail not visible.
A. cuticle
B. body
C. root
D. lunula

C. root

Answer the following five questions:

1. Why would a person receive a skin graft?

(1) Skin grafting decreases recovery time and prevents infection
OR
(2) If skin has been damaged severely and/or covers a large surface area

Skin graft may be required if the skin has been severely damaged or if a burn covers a large area. Skin grafting is a treatment that can be used with burn victims to help in damaged skin recovery. Its when healthy skin is grafted on top of damaged skin.

2. What substance from the blood accumulates to form a clot?
A. White blood cells
B. Red blood cells
C. Macrophages
D. Platelets

D. Platelets

3. Mast cells secrete what chemical?
A. Collagen
B. Histamine
C. Platelets
D. Heparin

B. Histamine

4. Macrophages_____
A. secrete histamine.
B. remove fibroblasts.

C. engulf bacteria.
D. replace old tissue matrix.

C. engulf bacteria.

5. A scar _____.
A. is called clotting.
B. maintains full function of the original tissue.
C. is an overgrowth of fibrous connective tissue.
D. supports the tissue matrix until the old cells are developed.

C. is an overgrowth of fibrous connective tissue.