

A & P 1 –Unit 3 Exam Review

Mary Stangler Center for Academic Success

This review is meant to highlight basic concepts from unit 3. It does not cover all concepts presented by your instructor. Refer back to your notes, unit objectives, labs, handouts, etc. to further prepare for your exam.

1. Joint Tissues: fill in the blank to identify the tissues found at joints:
 - a. _____ - Scattered cells; densely packed protein fibers running in same direction; not much ground substance; Tendons and ligaments
 - b. _____ - Cells (chondrocytes) and large bundles of collagen fibers running in parallel rows, Intervertebral discs; pubic symphysis
 - c. _____ - Cells (chondrocytes) in lacunae (spaces) in glassy-looking matrix (fibers not visible); articular cartilage at joints; costal cartilage of ribs; rings around trachea and bronchi; larynx; fetal skeleton; growth plates of long bones
2. Describe the 4 major classes of joints:
 - a. Bony joints –
 - b. Fibrous joints –
 - c. Cartilaginous joint –
 - d. Synovial joint –
3. Describe and give an example of each of the following fibrous joints;
 - a. Sutures:
 - b. Gomphoses:
 - c. Syndesmoses:
4. Describe and give an example of each of the following cartilaginous joints:
 - a. Synchondroses:
 - b. Symphyses:
5. Describe the structures of a synovial joint:
 - a. Joint Capsule –
 - b. Fibrous Capsule –
 - c. Synovial Membrane –
 - d. Joint Cavity –

- e. Synovial Fluid –
 - f. Articular Cartilage –
6. Synovial Joints Accessories– define the following:
- a. Ligament – attaches _____
 - b. Tendon – attaches _____
 - c. Bursa – _____ filled with synovial fluid
 - d. Articular Disc – _____ between bones
 - e. Meniscus (pl. Menisci) – fibrocartilage pads at knee joint
7. Types of Synovial Joints – Describe the 6 types of joints and give an example of each:
- a. Gliding (plane) joint:
 - b. Hinge joint:
 - c. Pivot joint:
 - d. Ellipsoid (condyloid) joint:
 - e. Saddle joint:
 - f. Ball and socket joint:
8. USE YOUR NOTES and TERMS LIST TO STUDY THE STRUCTURES OF THE KNEE.
9. Why is exercise important for the maintenance of articular cartilage?
10. Joint disorders: Fill in the blank to identify the disorder:
- a. _____ - Autoimmune attack – antibodies attack synovial membrane and cause inflammation, Enzymes degrade articular cartilage, Connective tissue fills joint capsule
 - b. _____ Wear-and-tear – articular cartilage wears away with age, Exposed bone tissue develops spurs
 - c. _____ -Tearing of ligament fibers or meniscus pads, Heal slowly – no blood vessels
11. General Joint Movement – circle the correct choice or fill in the blank to give the correct movement:
- a. Abduction - Movement *away/toward* midline of body
 - b. Adduction -Movement *away/toward* midline of body
 - c. Circumduction - One end of an appendage remains stationary, other end makes a _____ motion

- d. Depression - *raising/lowering* body part vertically
- e. Dorsiflexion – “*pulling toes back*”/“*pointing toes downward*”
- f. Elevation – *raising/lowering* body part vertically
- g. Eversion turning soles *in/out*
- h. Extension – *increase/decreases* joint angle
- i. Flexion – *increases/decreases* joint angle (hinge joints)
- j. Hyperabduction - _____ arm overhead (in frontal plane)
- k. Hyperadduction - _____ legs, fingers
- l. Hyperextension – Further *extension/flexion* of joint beyond zero position
- m. Inversion – turning soles *in/out*
- n. Lateral excursion - left or right movement of mandible” *away from*”/ “*back to*” zero position
- o. Medial excursion – left or right movement of mandible” *away from*”/ “*back to*” zero position
- p. Plantar flexion - “*pulling toes back*”/“*pointing toes downward*”
- q. Pronation - forearm movement that turns palm to face *anteriorly/posteriorly*
- r. Protraction – *anterior/posterior* movement of a body part in horizontal plane
- s. Retraction - *anterior/posterior* movement of a body part in the horizontal plane
- t. Rotation - Movement in which body part spins about an _____
- u. Supination – forearm movement that turns palm to face *anteriorly/posteriorly*

12. Define the following muscle terms:

- a. Origin
- b. Belly
- c. Insertion

13. Define the following functional groups of muscles and match the definitions to the correct movements.

- a. Prime mover(agonist)
- b. Synergist
- c. Antagonist

14. Determine which is an example of an intrinsic or extrinsic muscle:

- a. The Opponens Pollicis is muscle that has it's origin and insertion within the hand. Intrinsic/extrinsic?
- b. The brachialis is a muscle that is found on the upper arm, but causes the forearm to move. Intrinsic/extrinsic?

15. 15. USE YOUR NOTES and TERMS LIST TO STUDY THE MUSCLES.

16. Organelles & Structures of Muscle Cells – Name the following muscle structures.

- a. _____ - Dilated end-sacs of SR, cross all the way through muscle fiber (cell)
- b. _____ - cytoplasm of muscle fiber (cell)
- c. _____ - plasma membrane of muscle fiber (cell)
- d. _____ - smooth ER of muscle fiber (cell)
- e. _____ - red protein pigment with iron, used for oxygen storage
- f. _____ -Tube-shaped infoldings of sarcolemma, penetrate all the way through muscle fiber (cell)
- g. _____ - starch for glucose storage, polymer of glucose molecules

17. Use the following terms in sentences or a diagram to describe the organization of muscular tissue.

Actin, Endomysium, Epimysium, Fascia, Fascicle, Muscle, Muscle fiber (cell), Myofibril, Myofilaments, myosin, Perimysium, Sarcoplasm, Tendon

18. Use the following terms in sentences and/or a diagram to describe the structure of a sarcomere and why skeletal muscle has a striated appearance.

A-band, Actin, H-band, I-band, M-line, Myosin, Sarcomere, Striations, Titin/Connectin, Z-disc

19. Name the components of the neuromuscular junction and answer the question.

- a. What is the function of the neuromuscular junction?
- b. _____ - Proteins in muscle fiber (cell) plasma membrane for ACh to bind to
- c. _____ - Swollen end of nerve fiber, filled with neurotransmitter Acetylcholine
- d. _____ - enzyme which breaks down ACh after contraction, causing relaxation
- e. _____ - Gap between synaptic knob and muscle fiber (cell) sarcolemma

20. Sliding Filament Theory – Give a brief summary of what happens to the sarcomere during muscle contraction:

21. Muscle contraction and relaxation: answer the questions for each section?

Excitation: passing the action potential from the nerve fiber to the muscle fiber

- a. Name the molecule... it is released from the synaptic knob of the neuron into the synapse, it travels across the synaptic cleft and binds to the receptor proteins of the sarcolemma. _____

Excitation-Contraction Coupling: the action potential created at the sarcolemma spreads and prepares myofilaments to contract

- b. Name the molecule...it is released from the terminal cisternae of SR, it binds to troponin which pulls tropomyosin off of the active sites of actin, exposing them. _____

Contraction: the muscle fiber develops tension and may shorten.

- c. Name the protein...this protein makes up the thick filament, its head forms a cross-bridge with actin, it pulls on actin to shorten the sarcomere and cause muscle contraction. _____
- d. Describe the role ATP plays in this process.

Relaxation: the muscle fiber relaxes and returns to its resting length.

- e. When nerved signals cease, ACh release stops and it is broken down by AChE, calcium leaves troponin and is pumped back into the cisternae, thin filaments slide back over thick filaments as the _____ is returned to resting length.

22. Phases of a Muscle Contraction – give a brief explanation of each phase:

- a. Stimulus Phase:
- b. Latent Period:
- c. Contraction Phase:
- d. Relaxation Phase:

23. Answer the following questions regarding motor units, recruitment, and contraction

- a. What is a motor unit?
- b. Circle one...A *small*/*large* motor unit has little fine motor control and innervates 1000+ muscle fibers.
- c. What is the process of summoning more motor units in an effort to strengthen contraction?
- d. What is the term for the minimum stimulus (nerve signal) needed to produce a contraction?

24. Muscle contraction types and myograms: name the type of muscular contraction.

- a. _____ - Stimuli are coming so fast the muscle has no time to relax at all, twitches fuse into a smooth prolonged contraction.
- b. _____ - muscle recovers fully between twitches, but each one develops more tension than the last, stimuli are arriving rapidly so not all calcium is reabsorbed, myogram has a staircase look
- c. _____ - each stimulus causes a quick cycle of contraction and relaxation of the same strength, full recovery between cycles, calcium is fully reabsorbed
- d. _____ - each new stimulus arrives before previous twitch is over, each new twitch piggy-backs the last one and creates higher tension, muscle only relaxes partially between contractions

25. Phases of Muscle Contractions: determine the type.

- a. _____ Muscle Contraction ("Same length") – muscle tension increases without changing the length of the muscle
- b. _____ Muscle Contraction ("Same strength") - contraction occurs with a change in muscle length but it maintains the same tension.
- c. With which one do we see actual movement?

26. Fill in the blanks to explain the various methods by which a skeletal muscle meets its energy needs.

- a. Myoglobin supplies _____ for aerobic respiration at the start of a 100m dash.
- b. The phosphagen system takes a phosphate from _____ to make ATP (during short bursts of intense activity).

Name and give the chemical equation (include # of ATP's) for the ATP pathway described here...

- c. _____ is used for short-term energy needs, it kicks in after the phosphagen system is exhausted, but before the heart and lungs can get the oxygen demand of the muscles caught up.
- d. _____ is used for long term energy needs, 40 or so seconds into an activity the heart and lungs catch up with the oxygen demand and deliver it quickly enough to maintain this process.

27. Slow-Twitch & Fast-Twitch Muscle Fibers

Slow Twitch – Slow Oxidative, Type I

- a. What type of respiration are these fibers good for?
- b. Describe the structure of this muscle cell.

Fast Twitch – Fast Glycolytic, Type II

- c. What type of respiration are these fibers good for?
- d. Describe the structure of this muscle cell.

28. Name the following muscle conditions.

- a. _____ -stiffening of muscles 3-4 hours after death
- b. _____ - autoimmune disorder, WBC's attack ACh receptors at neuromuscular junction, results in muscle paralysis, drooping eyelids
- c. _____ - overstretching/tearing of muscle fibers/tendons
- d. _____ - Polio virus infects and kills motor neurons
- e. _____ - Inflammation of flexor tendons and transverse carpal ligament puts pressure on median nerve
- f. _____ - Affects children, defective dystrophin proteins make muscles ineffective
- g. _____ - Lack of ATP causes muscle to remain in state of contraction
- h. _____ - affects muscle contraction/ATP synthesis/nerve signal transmission due to buildup of lactic acid, depleted glucose/glycogen/electrolytes/Ach
- i. _____ - fasciae of arm and leg muscles enclose muscle compartment very tightly
- j. _____ - *Clostridium botulinum* toxin blocks release of ACh release at neuromuscular junction, form of food poisoning
- k. _____ - *Clostridium tetani* toxin prolongs muscle contractions, stepping on a rusty nail