

Study Guide — HBS Unit 1: Road to Rehabilitation (Mid-Unit Test)

Human Body Systems · Unit 1 — Road to Rehabilitation · Modeled on the PLTW Guided Review format

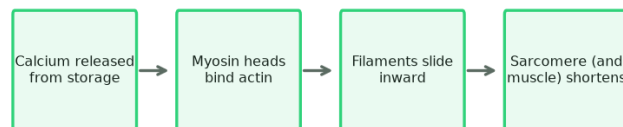
Vocabulary to know cold

Term	Definition
Diaphysis	The shaft (central, tube-like region) of a long bone.
Epiphysis	The rounded end of a long bone, often capped with cartilage.
Compact bone	Dense, strong outer bone tissue that resists bending and stores minerals.
Spongy (cancellous) bone	Lightweight inner bone with red marrow that makes blood cells.
Chondr/o	Combining form meaning cartilage.
Skeletal muscle	Voluntary, striated muscle attached to bone that produces movement.
Sarcomere	The contractile unit of muscle; shortens when actin and myosin slide together.
Antagonist pair	Two muscles that produce opposite movements at a joint (e.g., biceps/triceps).
Hinge joint	A joint allowing flexion/extension in one plane (knee, elbow).
Ball-and-socket joint	A joint allowing movement in all planes plus rotation (shoulder, hip).
Plantar flexion	Pointing the foot/toes downward.
Dorsiflexion	Lifting the foot/toes upward toward the shin.
Strain	Injury to a muscle or tendon.
-itis	Suffix meaning inflammation (e.g., tendinitis, arthritis).

Worked examples (follow the reasoning)

Example 1. Trace a single muscle contraction at the sarcomere level and explain what shortens.

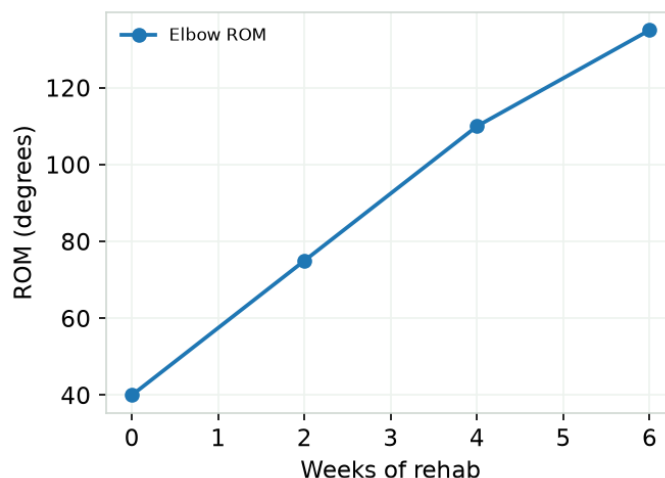
Sliding-filament contraction



- A nerve signal triggers calcium release inside the muscle fiber.
- Calcium exposes binding sites on actin filaments.
- Myosin heads form cross-bridges and pull actin toward the center.
- Actin and myosin overlap more, so the sarcomere shortens and the whole muscle contracts.

Answer: The sarcomere shortens as actin and myosin slide past each other; the filaments themselves do not shrink.

Example 2. A patient's elbow ROM is recorded over a rehab program. Use the data to describe the recovery trend.



- Read the starting value: 40° at week 0.
- Track the increase each interval: 40 → 75 → 110 → 135.
- Calculate total change: 135° – 40° = 95° gained.
- Note the trend is steady and upward, indicating consistent recovery.

Answer: Elbow range of motion improved steadily, gaining 95 degrees over 6 weeks of rehabilitation.

Example 3. Decode and define the term 'oste/o/arthr/itis.'

- Split into parts: oste/o + arthr/o + -itis.
- 'Oste/o' = bone.
- 'Arthr/o' = joint.
- '-itis' = inflammation.
- Combine the parts into a full meaning.

Answer: Osteoarthritis = inflammation of bone and joint (degenerative joint disease affecting bone and cartilage).

Practice questions (with reasoning)

1. Which region of a long bone houses red marrow and is lightweight yet stress-resistant?

- A. Diaphysis compact bone
- B. Spongy bone in the epiphysis
- C. The periosteum
- D. The tendon sheath

Answer: B. Spongy bone, concentrated in the epiphyses, contains red marrow and resists multidirectional stress.

2. Biceps and triceps move the forearm in opposite directions. Together they are an example of:

- A. Synergist muscles
- B. An antagonist pair
- C. Smooth muscle
- D. Fixator muscles

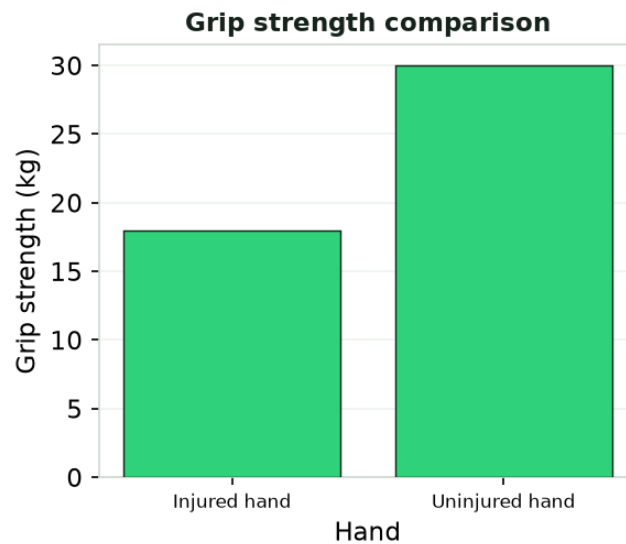
Answer: B. Antagonist pairs produce opposing movements (flexion vs. extension).

3. Which movement decreases the angle at the knee joint?

- A. Extension
- B. Flexion
- C. Abduction
- D. Rotation

Answer: B. Flexion decreases a joint angle; bending the knee is knee flexion.

4. A bar graph shows grip strength (kg): injured hand = 18, uninjured hand = 30. What does this suggest for rehab?



- A. The injured hand is stronger
- B. Both hands are equal
- C. The injured hand has a strength deficit needing rehab
- D. Strength cannot be compared

Answer: C. The injured hand (18 kg) is weaker than the uninjured hand (30 kg), a 12 kg deficit guiding rehabilitation goals.

5. Which term means inflammation of a tendon?

- A. Arthritis
- B. Tendinitis
- C. Osteoporosis
- D. Myalgia

Answer: B. 'Tendin/o' (tendon) + '-itis' (inflammation) = tendinitis.