

Lesson Plan

Skeletal System

Goals of the Lesson

Cognitive: Students will be able to identify the structures of the various bones and joints related to the skeleton. Students will also become familiar with the terms, roots, abbreviations, and disorders related to the skeletal system.

Psychomotor: N/A

Affective: Students will be better able to understand the challenges associated with living with disorders that affect the skeletal system.

Learning Objectives (LO)

- LO-1 Compare the axial skeleton and the appendicular skeleton.
- LO-2 Briefly describe the formation of bone tissue.
- LO-3 Describe the structure of a long bone.
- LO-4 Compare a suture, a symphysis, and a synovial joint.
- LO-5 Describe the structure of a synovial joint.
- LO-6 Identify and use roots pertaining to the skeleton.
- LO-7 Describe six disorders that affect the skeleton and joints.
- LO-8 Interpret abbreviations used in relation to the skeleton.

Assessments

- Module Quiz
- Section I Exam
- Final Exam

Estimated Time on Task

- Learning content, 70 min
- Practice activities, 60 min
- Module quiz, 10 min

Learning Objective 1

Compare the axial skeleton and the appendicular skeleton.

Outline

- Axial skeleton
 - Forms the central core or “axis” of the body’s bony framework
 - The skull
 - The spinal column
 - The thorax
- Appendicular skeleton
 - Attached to the axial skeleton
 - The upper division
 - The lower division

Instructor’s Notes

Resources and Activities

Resources

PPT slides, Pre-test, Practice Activities, Module Quiz, Section II Exam, Final Exam

Activities

1. Use a life-size skeleton to point out the various bones during the discussion.
2. Attach an unlabeled poster of the human skeleton to a soft board. On labels, print the names of various bones forming the skeleton. Distribute the labels randomly. Draw two columns on the board: Axial Skeleton and Appendicular Skeleton. Ask students with the labels to come forward and label the poster correctly and write the name of the bone in the correct column on the board.

Materials

Unlabeled poster of the human skeleton; labels and pins

Web Resources

[How to Memorize Bony Landmarks Quickly and Easily! – Human Anatomy](#)

[The Axial and Appendicular Skeleton – The Law of the 1s and 2s](#)

Learning Objective 2

Briefly describe the formation of bone tissue.

Outline

- Ossification
 - The process of the gradual addition of calcium and phosphorus salts to cartilage
 - This begins before birth and continues to adulthood
 - Bone is living tissue that is constantly being replaced and remodeled throughout life
- Resorption
 - The process of destroying bone so that its components can be taken into the circulation
 - This occurs continuously and is normally in balance with bone formation

Instructor's Notes

Resources and Activities

Resources

PPT slides, Pre-test, Practice Activities, Module Quiz, Section II Exam, Final Exam

Activities

Bring several copies of images of osteoblasts, osteocytes, and osteoclasts. Pass the pictures around the class and allow students to observe the differences among the cells. Divide the class into small groups. Ask students to observe and record some points of structural and functional difference among the cells. Ask a volunteer from each group to present their information to the class.

Materials

Several copies of images of osteoblasts, osteocytes, and osteoclasts

Web Resources

[Cellular Structure of Bone: Khan Academy](#)

Learning Objective 3

Describe the structure of a long bone.

Outline

Instructor's Notes

- The shaft or diaphysis is composed of compact bone tissue
 - Within the shaft is a medullary cavity containing the yellow form of bone marrow, which is high in fat
- At either end, the irregular epiphysis is made of a less dense, spongy bone tissue
 - The spaces in spongy bone contain the blood-forming red bone marrow
 - A layer of cartilage covers the epiphysis to protect the bone surface at a joint
- A thin layer of fibrous tissue, the periosteum, covers the bone's outer surface
 - Nourishes and protects the bone
 - Generates new bone cells for growth and repair
- Between the diaphysis and the epiphysis at each end is the growth region or epiphyseal plate
 - Long bones continue to grow in length at these regions throughout childhood and into early adulthood
 - When the bone stops elongating, this area becomes fully calcified but remains visible at the epiphyseal line

Resources and Activities

Resources

PPT slides, Pre-test, Practice Activities, Module Quiz, Section II Exam, Final Exam

Activities

1. Ask students to form pairs of two and sit with their backs facing each other. One student from each pair must describe the structure of the long bone to the other, while the second student tries to draw and label it from these instructions. After all the pairs have finished, ask them to compare their drawings to Figure 5-5 in the textbook.
2. Display a leg bone of a cow, pig, or sheep. (Note that some butchers will cut them in half for you.) Allow students to observe the various parts of the bone as they are discussed.

Materials

Leg bone from local grocery or butcher; nonsterile gloves; biohazard container

Web Resources

[Structures of a Long Bone](#)

Learning Objective 4

Compare a suture, a symphysis, and a synovial joint.

Outline

- Joints are classified according to the degree of movement they allow
 - Suture: an immovable joint held together by fibrous connective tissue
 - Symphysis: a slightly movable joint connected by fibrous cartilage
 - Synovial joint (diarthrosis): a freely movable joint

Instructor's Notes

Resources and Activities

Resources

PPT slides, Pre-test, Practice Activities, Module Quiz, Section II Exam, Final Exam

Activities

Divide the class into three groups; give each group a medical dictionary. Pin to a soft board an unlabeled poster of the human skeleton. Assign each group a different topic:

- Suture
- Symphysis
- Synovial joint

Ask students to list three examples that can illustrate the joint they have been given. They can do so by referring to the textbook or a medical dictionary. After several minutes, ask a volunteer from each group to present their information to the class. The volunteer must also point to the joint on the labeled poster while reading out its name to clearly indicate the location of the joint.

Materials

Unlabeled poster of the human skeleton; Medical dictionaries

Web Resources

[Stat Pearls: Anatomy, Joints](#)

Learning Objective 5

Describe the structure of a synovial joint.

Outline

- Synovial joints
 - Subject to wear and tear
 - Have protective features
 - The cavity of a synovial joint contains synovial fluid
 - The ends of the articulating bones are cushioned and protected by cartilage
 - A fibrous capsule encloses the joint
 - Synovial joints are stabilized with ligaments, which connect the articulating bones
 - A bursa is a small sac of synovial fluid that cushions an area around a joint

Instructor's Notes

Resources and Activities

Resources

PPT slides, Pre-test, Practice Activities, Module Quiz, Section II Exam, Final Exam

Web Resources

[Synovial Joint - Video Labelling](#)

Learning Objective 6

Identify and use roots pertaining to the skeleton.

Outline

- Roots for bones and joints
- Roots for the skeleton

Instructor's Notes

Resources and Activities

Resources

PPT slides, Pre-test, Practice Activities, Module Quiz, Section II Exam, Final Exam

Activities

Divide the class into several groups. Give each group a medical dictionary. Assign to the groups roots from Tables 5-1 and 5-2 and additional roots from the medical dictionary. Give different roots to each group. Ask students to find examples of medical terms that are built using the assigned roots. Ensure that students form new words (not those already listed in Tables 5-1 and 5-2). They must also find the meanings of the new medical terms. Ask volunteers from each group to present their information to the class.

Materials

Medical dictionaries

Web Resources

[Bones Song](#)

Learning Objective 7

Describe six disorders that affect the skeleton and joints.

Outline	Instructor's Notes
<ul style="list-style-type: none"> • Infection <ul style="list-style-type: none"> • Osteomyelitis • Tuberculosis (TB) may spread to bone, especially long bones (arms and legs) and wrist and ankle bones • Fractures <ul style="list-style-type: none"> • A break in a bone, usually caused by trauma • Effects depend on the location and severity, amount of associated injury, complications, and success of healing • Closed/ simple fracture, the skin is not broken • Open fracture, there is a wound in the skin • Treatment 	<ul style="list-style-type: none"> • Metabolic bone diseases <ul style="list-style-type: none"> • Osteoporosis, Osteopenia • Osteomalacia • Paget disease (osteitis deformans) • Neoplasm <ul style="list-style-type: none"> • Osteogenic sarcoma, Chondrosarcoma • Early surgical removal of malignant bone tumors is important to prevent metastasis • Joint disorders <ul style="list-style-type: none"> • Arthritis • Disorders of the spine <ul style="list-style-type: none"> • Ankylosing spondylitis, Spondylolisthesis • Herniated disk • Curvatures of the spine

Resources and Activities

Resources

PPT slides, Pre-test, Practice Activities, Module Quiz, Section II Exam, Final Exam

Activities

1. Divide the class into small groups. On separate note cards, write down the description of various disorders pertaining to the skeleton or the joints. Ensure that every note card contains the description of a different disorder. Give note cards to each group. Have the students study the assigned note card to determine the name of the disorder. Allow the reference of the textbook and the dictionary. After several minutes, ask volunteers from each group to read out their note card and the name of the disorder to the class.
2. Have students work in groups to compose a pamphlet about an assigned disorder. Assign each group a different disorder.

Materials

Note cards containing descriptions of various disorders pertaining to the skeleton and the joints; Medical dictionaries

Web Resources

[US News Health: A Patient's Guide to Bone and Joint Diseases](#)

Learning Objective 8

Interpret abbreviations used in relation to the skeleton.

Outline

- Abbreviations used in relation to the skeletal system

Instructor's Notes

Resources and Activities

Resources

PPT slide, Pre-test, Practice Activities, Module Quiz, Section II Exam, Final Exam

Activities

Randomly distribute two sets of flash cards: one set with the abbreviations, and a second with the expanded forms. Instruct the students to find their mates. After everyone has found their match, instruct the students to write their abbreviations and meanings on the board. Verify their answers with the dictionary.

Materials

Medical terminology flash cards; Medical dictionaries
