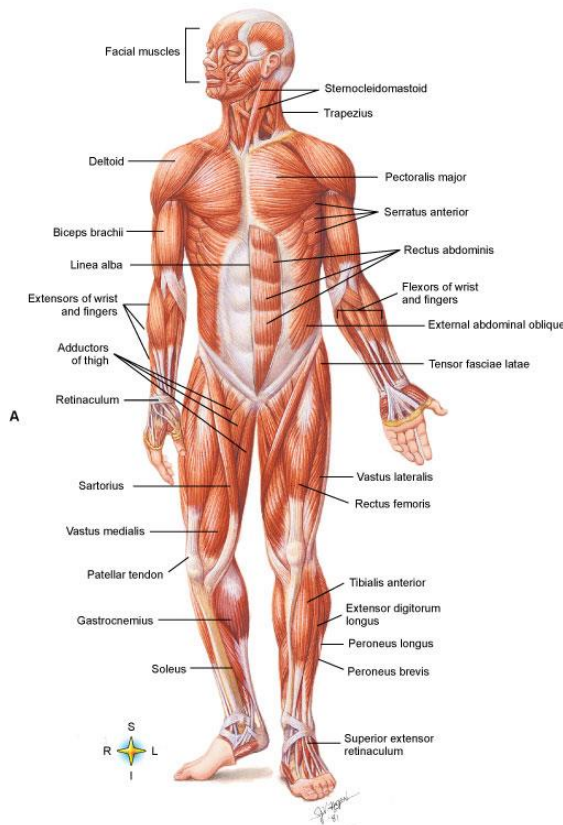
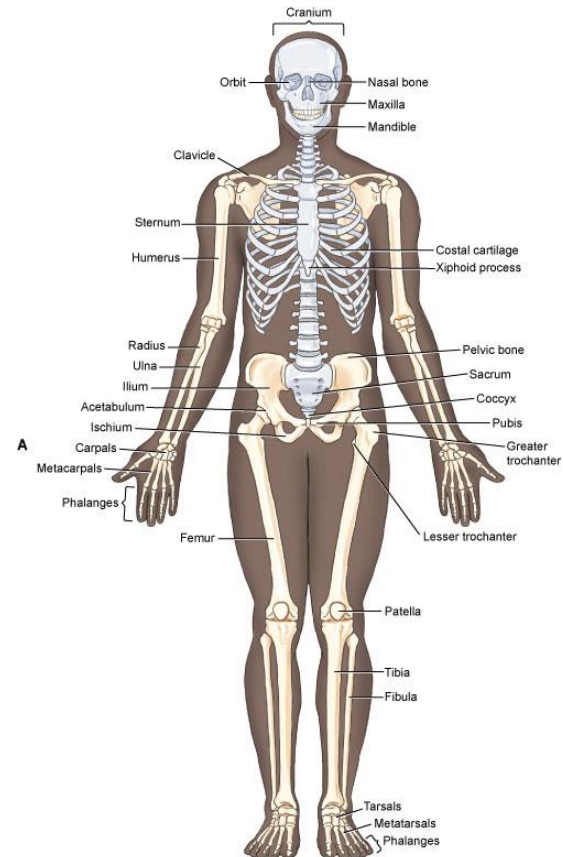


Chapter 14

Musculoskeletal System



Copyright © 2012, 2009, 2005, 2002, 1998, 1994, 1989, 1985 by Mosby, Inc., an affiliate of Elsevier Inc.



Copyright © 2012, 2009, 2005, 2002, 1998, 1994, 1989, 1985 by Mosby, Inc., an affiliate of Elsevier Inc.

Chapter 14

Objective 1: Identify organs and structures of the musculoskeletal system.

Musculoskeletal System

- The musculoskeletal system consists of muscle, bones, bone marrow, joints, cartilage, tendons, ligaments, and bursae.
- The adult human skeleton contains 206 bones and more than 600 muscles.
- Joints are located where two or more bones meet and contain cartilage and bursae.

Functions of the Musculoskeletal System

- Movement, posture, joint stability, and heat production.
- Provide a framework for the body, protect the soft body parts such as the brain, store calcium, and produce blood cells.
- The organs and structures of the musculoskeletal system work together to protect, support, and move the body.

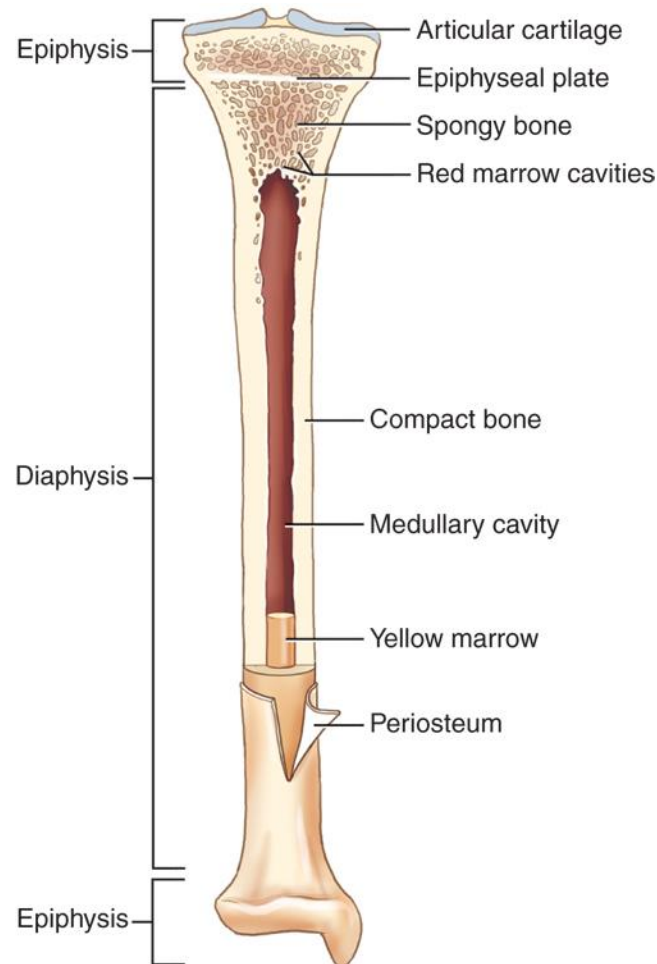
Bone Structure

- **periosteum:** outermost layer of the bone, made up of fibrous tissue
- **compact bone:** dense, hard layers of bone tissue that lie underneath the periosteum
- **cancellous (spongy) bone:** contains small spaces like a sponge and is encased in the layers of compact bone
- **endosteum:** membranous lining of the hollow cavity of the bone

Bone Structure (*cont'd*)

- **diaphysis:** shaft of the long bones
- **epiphysis:** ends of the long bone
- **bone marrow:** material found in the cavities of bones
 - **red marrow:** thick, bloodlike material found in flat bones and the ends of long bones (location of blood cell formation)
 - **yellow marrow:** soft, fatty material found in the medullary cavity of long bones

Bone Structure (*cont'd*)



Skeletal Bones

- maxilla: upper jawbone
- mandible: lower jawbone

Skeletal Bones (*cont'd*)

- **vertebral column:** made up of bones called vertebrae (*pl.*) or vertebra (*sing.*) through which the spinal cord runs. It protects the spinal cord, supports the head, and provides points of attachment for ribs and muscles.
 - **cervical vertebrae (C1-C7):** first set of 7, forming the neck
 - **thoracic vertebrae (T1-T12):** second set of 12 vertebrae

Skeletal Bones (*cont'd*)

- **vertebral column (*cont'd*)**
 - **lumbar vertebrae (L1-L5):** third set of 5 larger vertebrae; forms the inward curve of spine
 - **sacrum:** next 5 vertebrae, which fuse together
 - **coccyx:** 4 vertebrae fused together to form the tailbone
 - **lamina:** part of the vertebral arch

Skeletal Bones (*cont'd*)

- **clavicle (2):** collarbone
- **scapula (2):** shoulder blade
- **sternum:** breastbone
- **upper extremities:** arm and hand bones

humerus (2)

carpals (16)

ulna (2)

metacarpals (10)

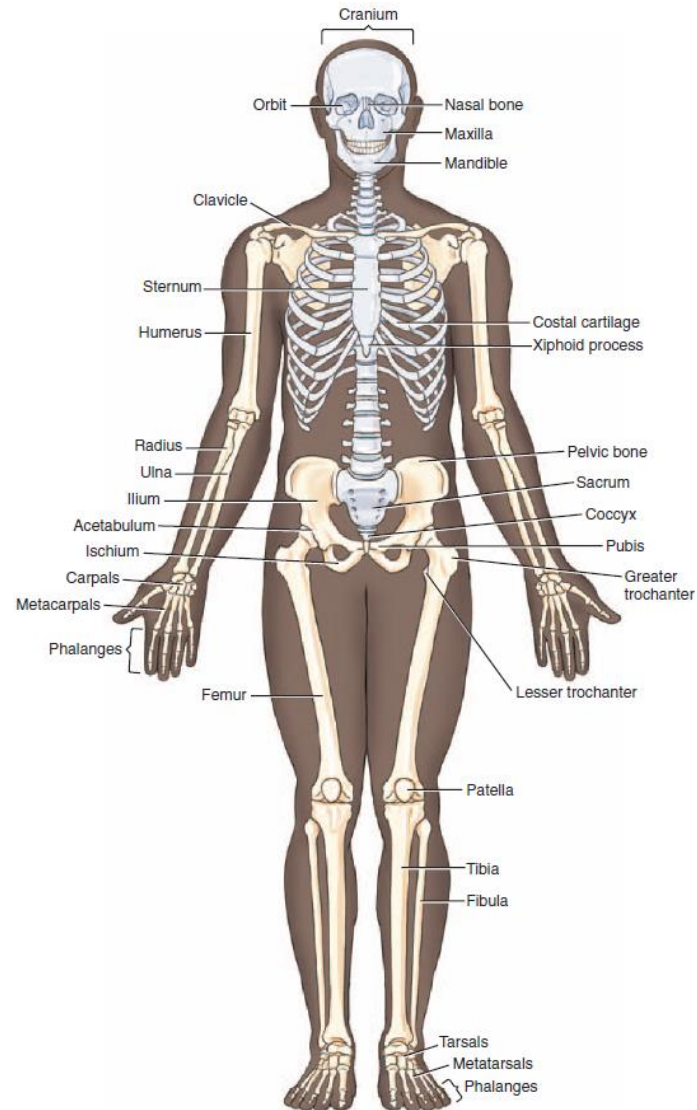
radius (2)

phalanges (28)

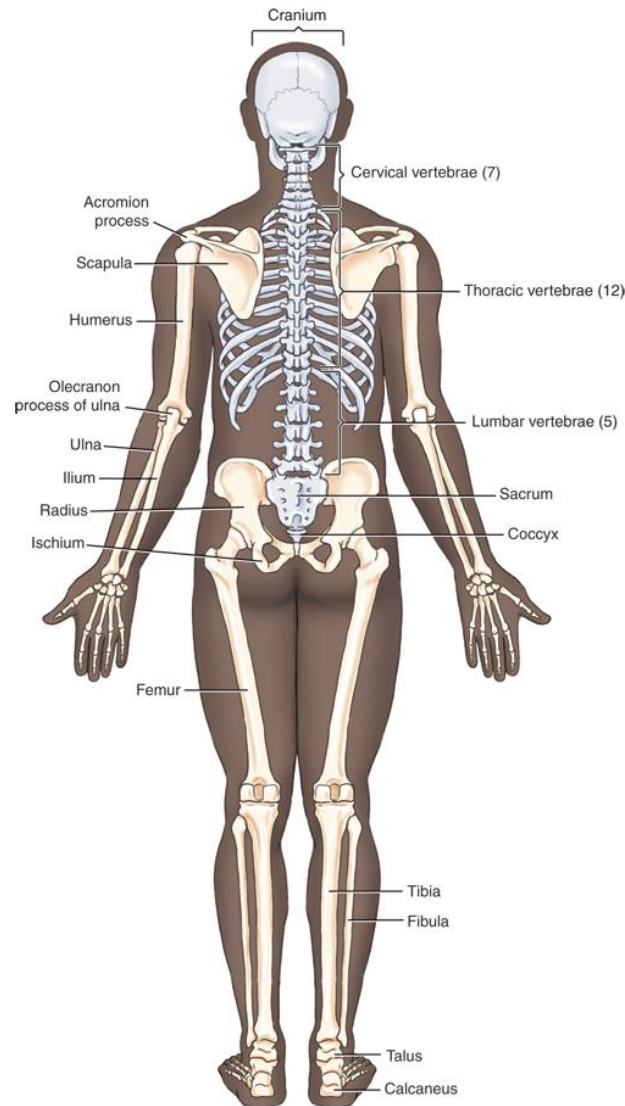
Skeletal Bones (*cont'd*)

- **pelvic bones** (three pairs fused together)
 - ilium (2)
 - ischium (2)
 - pubis (2)
- **lower extremities:** leg and foot bones
 - femur (2)
 - patella (2)
 - tibia (2)
 - fibula (2)
 - tarsals (4)
 - metatarsals (10)
 - phalanges (28)

Skeleton (Anterior View)



Skeleton (Posterior View)



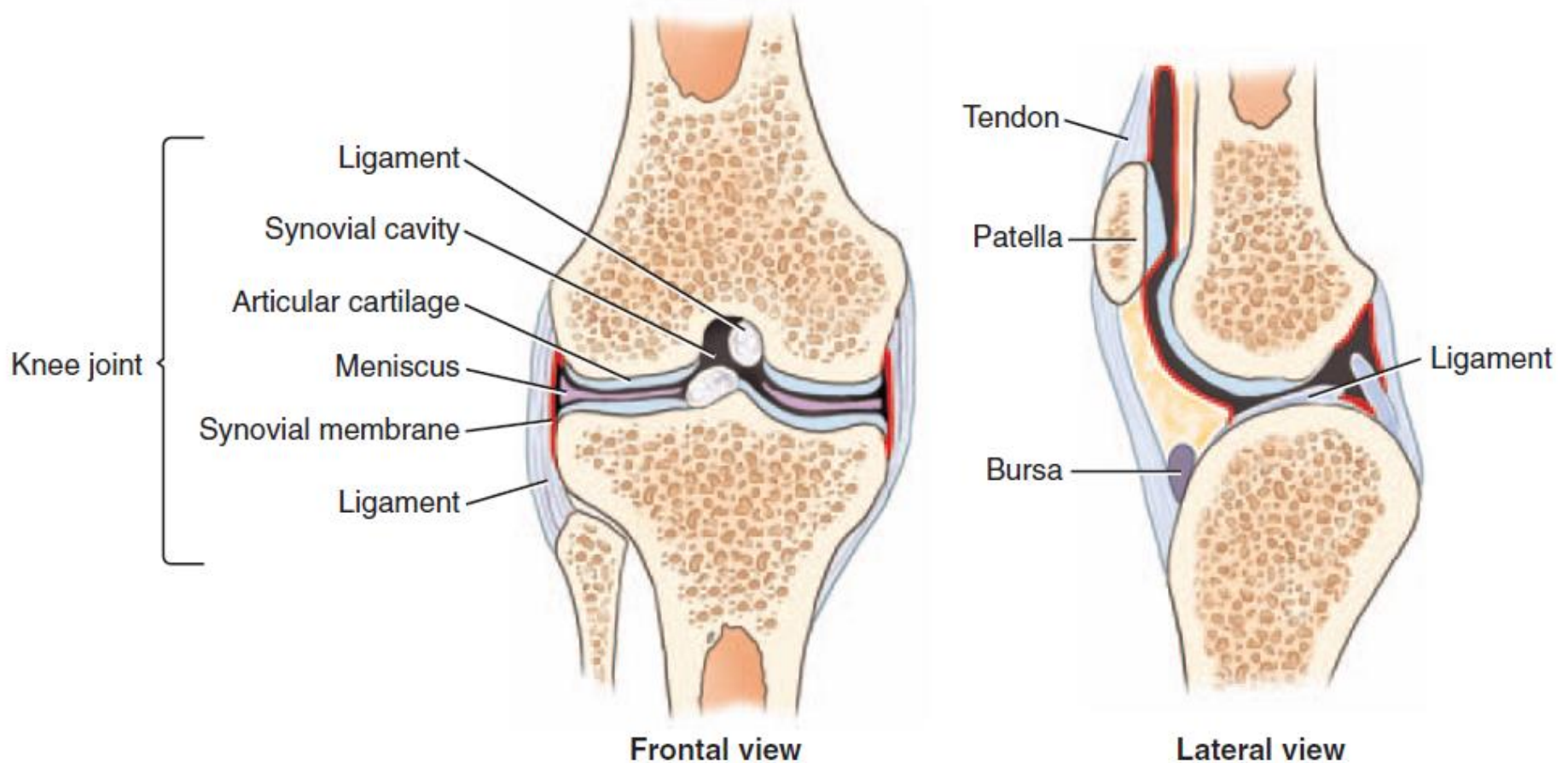
Joints (Articulations)

- **joint:** holds bones together and makes movement possible
- **articular cartilage:** smooth layer of firm fibrous tissue covering the contacting surface of joints
- **meniscus:** crescent-shaped cartilage found in the knee
- **intervertebral disk:** cartilaginous pad found between the vertebrae in the spine
- **pubic symphysis:** cartilaginous joint at which two pubic bones come together

Joints (*cont'd*)

- **synovia:** fluid secreted by the synovial membrane and found in joint cavities
- **bursa:** fluid-filled sac that allows for easy movement of one part of a joint over another
- **ligament:** flexible, tough band of fibrous connective tissue that attaches one bone to another at a joint
- **tendon:** band of fibrous connective tissue that attaches muscle to bone
- **aponeurosis:** strong sheet of tissue that acts as a tendon to attach muscles to bone

Knee Joint



Muscles

- **skeletal muscles (striated):** attached to bones by tendons and make body movement possible. Skeletal muscles produce action by pulling and by working in pairs. Also known as voluntary muscles because we have control over these muscles.

Muscles (*cont'd*)

- **smooth muscles (unstriated):** located in internal organs, such as the walls of blood vessels and the digestive tract. They are also called **involuntary muscles** because they respond to impulses from the autonomic nerves and are not controlled voluntarily.
- **cardiac muscle:** forms most of the wall of the heart. Its involuntary contraction produces the heartbeat.

Chapter 14

Objective 2: Identify and define types of body movement.

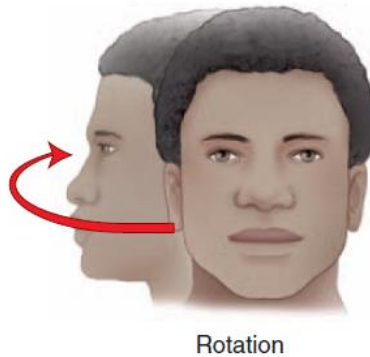
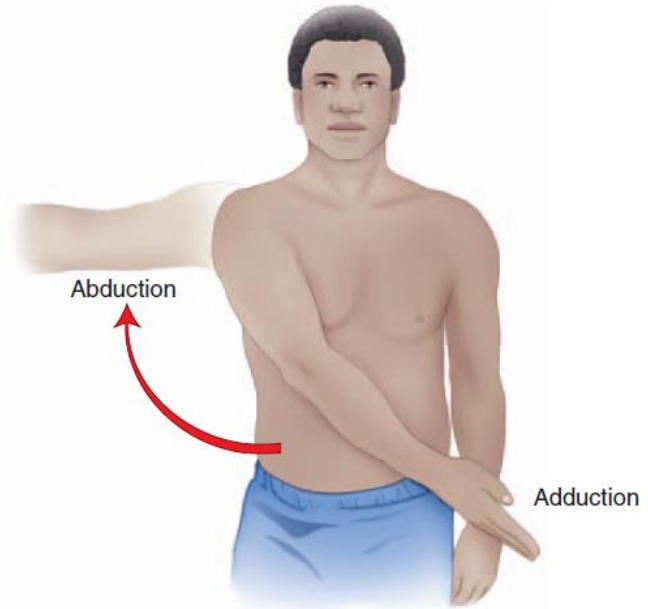
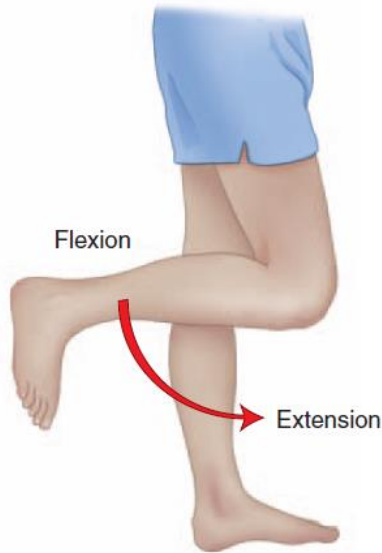
Types of Body Movement

Bones and muscles work together to produce various movements. Some are listed here:

- abduction
- adduction
- inversion
- eversion
- extension
- flexion
- pronation
- supination
- rotation

Types of Body Movement (*cont'd*)

(animation on Student Evolve site)



Chapter 14

Objective 3: Define and spell word parts related to the musculoskeletal system

Combining Forms of the Musculoskeletal System

- carp/o
- clavic/o,
clavicul/o
- cost/o
- crani/o
- femor/o
- fibul/o
- humer/o
- ili/o
- ischi/o
- lumb/o
- mandibul/o
- maxill/o

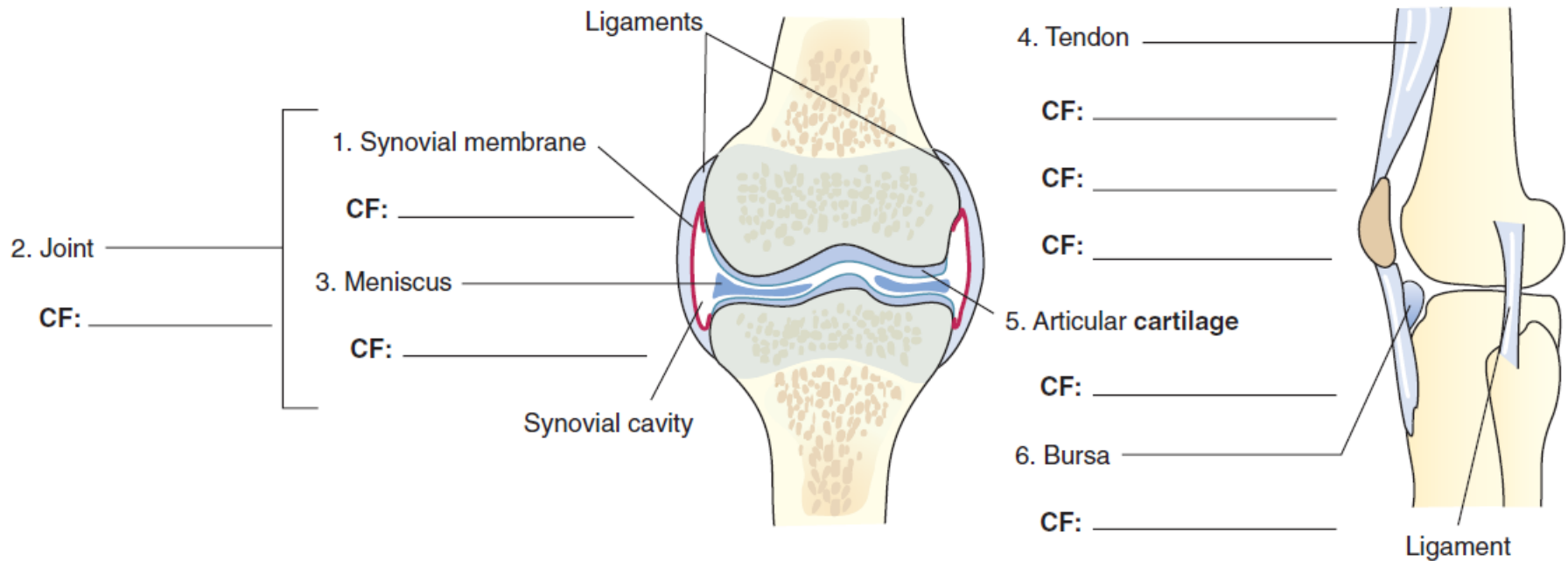
Combining Forms of the Musculoskeletal System (*cont'd*)

- patell/o
- pelv/i, pelv/o
- phalang/o
- pub/o
- rachi/o, spondyl/o, verebr/o
- radi/o
- sacr/o
- scapul/o
- stern/o
- tars/o
- tibi/o
- uln/o

Combining Forms of Joints

- aponeur/o
- arthr/o
- burs/o
- chondr/o
- disk/o
- menisc/o
- synovi/o
- ten/o, tend/o, tendin/o

Review Question



Combining Forms Commonly Used with Musculoskeletal System Terms

- ankylo
- kinesi/o
- kyph/o
- lamin/o
- lord/o
- my/o, myos/o
- myel/o
- oste/o
- petr/o
- scoli/o

Prefixes

- inter-
- supra-
- sym-, syn-

Suffixes

- -asthenia
- -clasia, -clasis, -clast
- -desis
- -physis
- -schisis

Review Question

In the medical term *sym/physis*, the prefix means:

- a) together, joined
- b) surgical fixation, fusion
- c) between
- d) growth

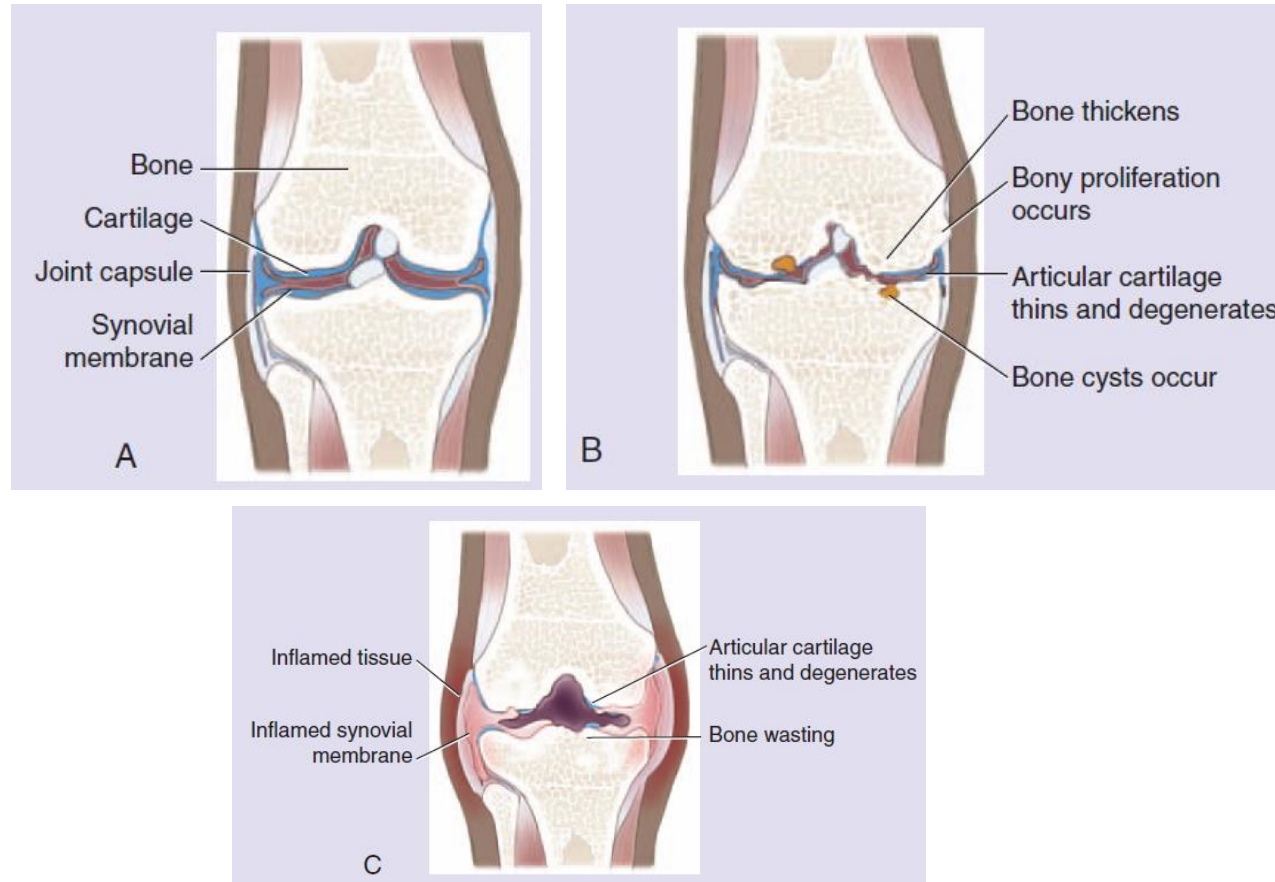
Chapter 14

Objective 4: Define, pronounce, and spell disease and disorder terms related to the musculoskeletal system.

Disease and Disorder Terms Built from Word Parts

- ankylosis
- arthritis
- bursitis
- chondromalacia
- cranioschisis
- diskitis
- fibromyalgia
- kyphosis
- lordosis
- maxillitis
- meniscitis
- myasthenia
- myeloma
- osteitis
- osteoarthritis (OA)

Knee Joint



A, normal; B, osteoarthritis; C, rheumatoid arthritis

Disease and Disorder Terms Built from Word Parts (*cont'd*)

- osteochondritis
- osteofibroma
- osteomalacia
- osteomyelitis
(animation on Student Evolve site)
- osteopenia
- osteopetrosis
- osteosarcoma
- polymyositis
- rachischisis
- rhabdomyolysis
- sarcopenia
- scoliosis (animation on Student Evolve site)
- spondylarthritis
- spondylosis
- synoviosarcoma
- tendinitis
- tenosynovitis

Review Question

The medical term that means softening of bones is:

- a) osteopetrosis
- b) osteoporosis
- c) osteomalacia

Disease and Disorder Terms Not Built from Word Parts

- ankylosing spondylitis
- bunion
- carpal tunnel syndrome (CTS)
- Colles fracture
- exostosis
- fracture (fx)
- gout
- herniated disk

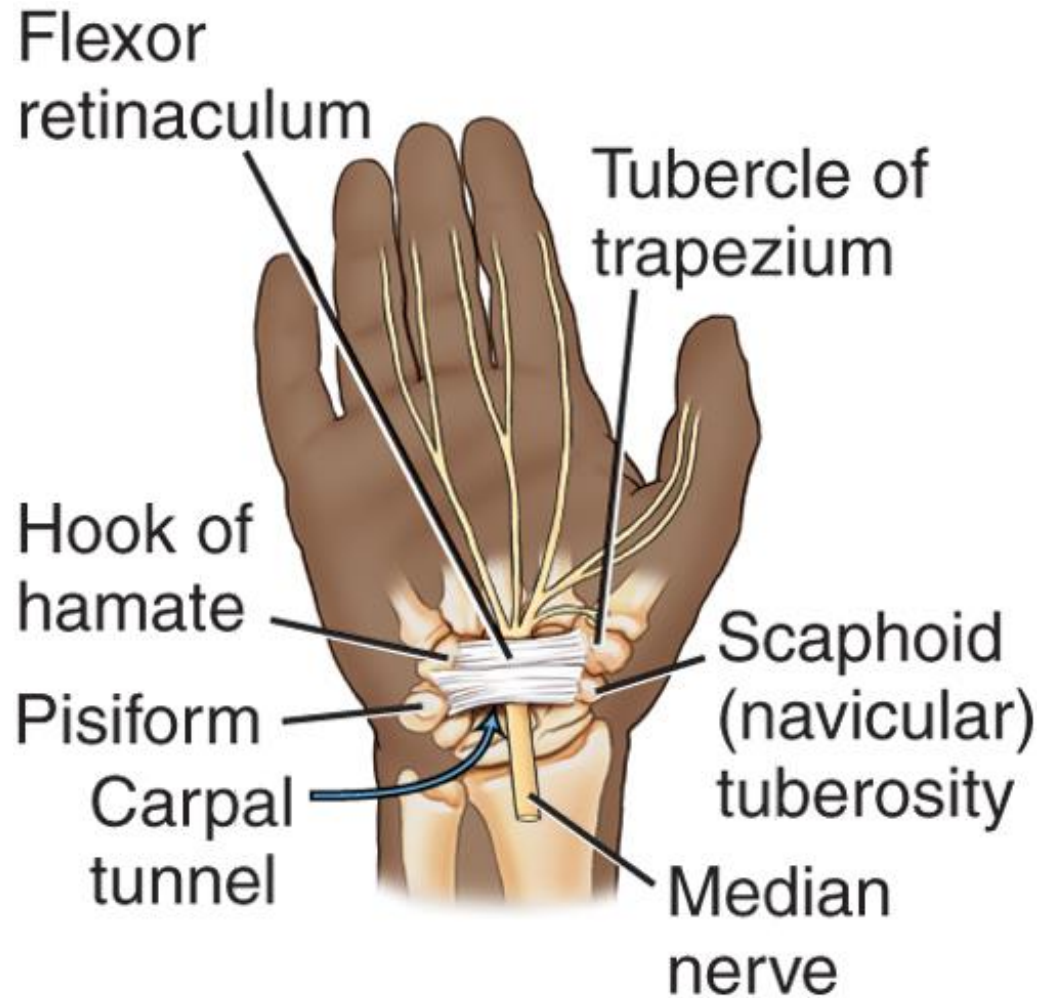
Disease and Disorder Terms Not Built from Word Parts (*cont'd*)

- Lyme disease
- muscular dystrophy (MD)
- myasthenia gravis (MG)
- osteoporosis
- plantar fasciitis
- rheumatoid arthritis (RA) (animation on Student Evolve site)
- spinal stenosis
- spondylolisthesis

Terms Known by Other Names

Term	Also called. . .
kyphosis.....	hunchback, humpback
lordosis.....	swayback
rachischisis.....	spina bifida
bunion.....	hallux valgus
exostosis.....	spur
herniated disk.....	slipped disk, ruptured disk, herniated intervertebral disk, herniated nucleus pulposus

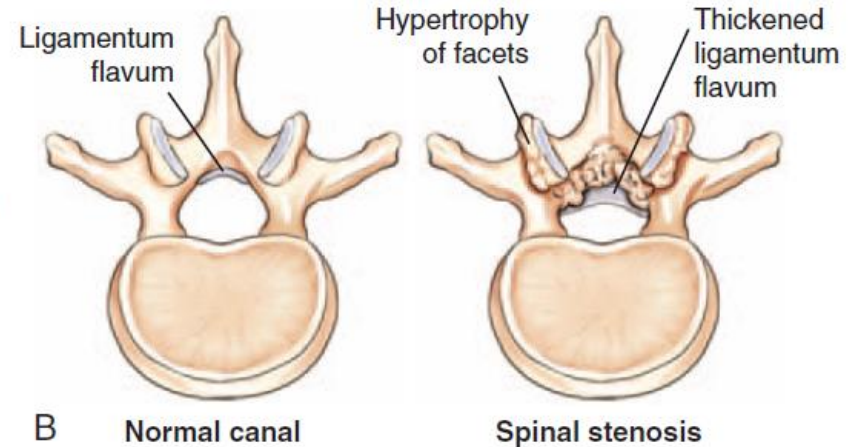
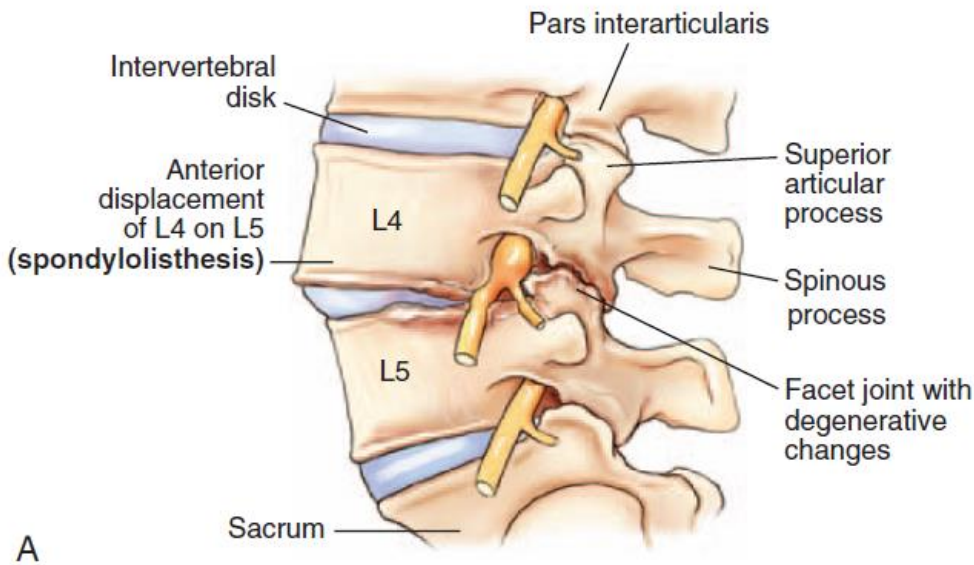
Carpal Tunnel



Colles Fracture



Spondylolisthesis and Spinal Stenosis



Chapter 14

Objective 5: Define, pronounce, and spell surgical terms related to the musculoskeletal system.

Surgical Terms Built from Word Parts

- aponeurorrhaphy
- arthrocentesis
- arthroclasia
- arthrodesis
- arthroplasty
- bursectomy
- carpectomy
- chondrectomy
- chondroplasty
- costectomy
- cranioplasty
- craniotomy
- diskectomy
- laminectomy
- maxillectomy
- meniscectomy

Review Question

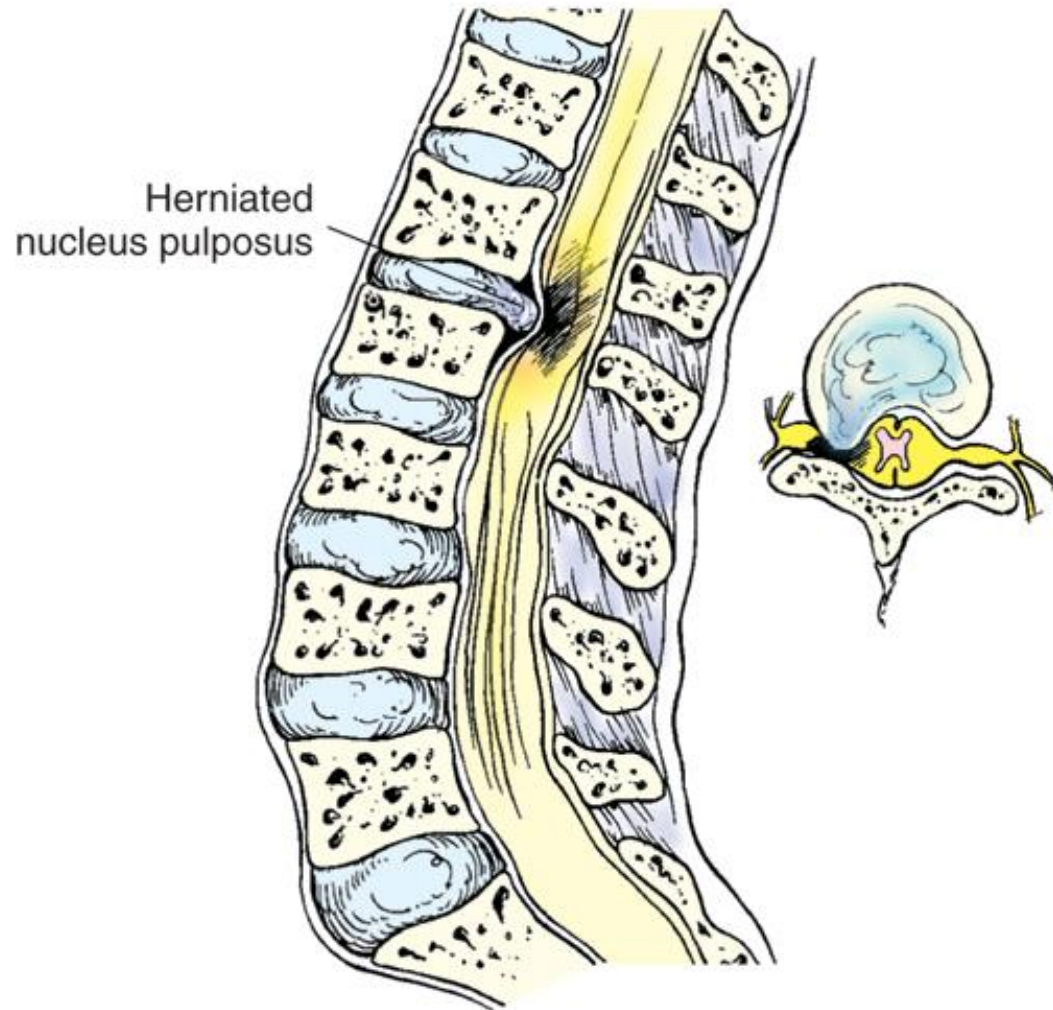
The correct spelling of the term meaning surgical puncture to aspirate fluid from a joint is

- a) athrocentesis
- b) arthocentesis
- c) arthrocentesis

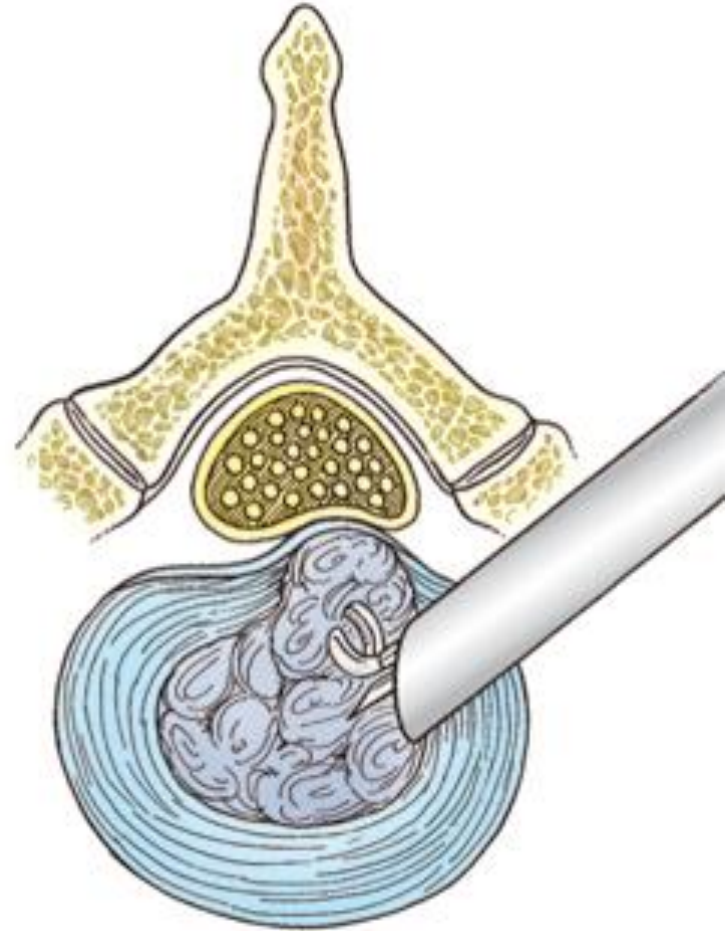
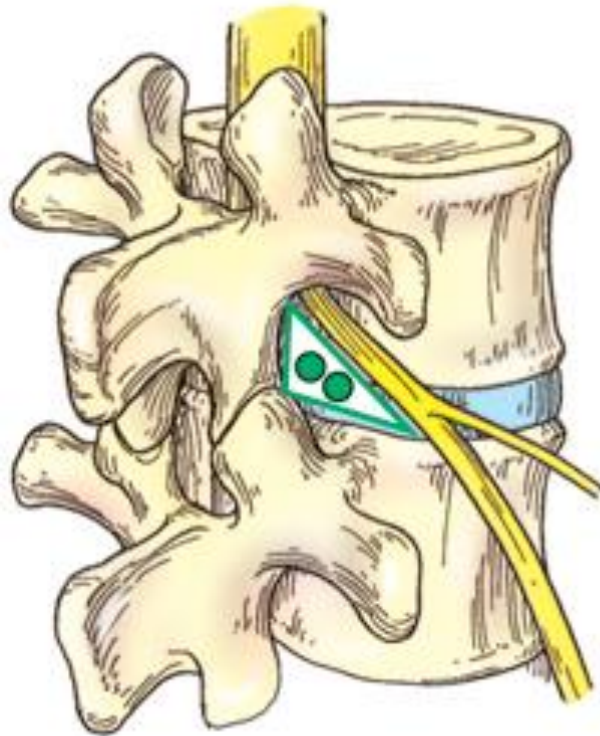
Surgical Terms Built from Word Parts (*cont'd*)

- myorrhaphy
- ostectomy
- osteoclasia
- patellectomy
- phalangectomy
- rachiotomy
- spondylosyndesis
- synovectomy
- tarsectomy
- tenomyoplasty
- tenorrhaphy
- vertebroplasty

Herniated Disk



Diskectomy



Chapter 14

Objective 6: Define, pronounce, and spell diagnostic terms related to the musculoskeletal system.

Diagnostic Terms Built from Word Parts

- **Diagnostic Imaging**
 - arthrography
- **Endoscopy**
 - arthroscopy
- **Other**
 - electromyogram (EMG)

Review Question

The procedure shown is a (an):

- a) arthrocentesis
- b) arthroscopy
- c) arthroscope



joint/cv/visual examination

Chapter 14

Objective 7: Define, pronounce, and spell complementary terms related to the musculoskeletal system.

Complementary Terms Built from Word Parts

- arthralgia
- atrophy
- bradykinesia
- carpal
- clavicular
- costochondral
- cranial
- dyskinesia
- dystrophy
- femoral
- humeral
- hyperkinesia
- hypertrophy
- iliofemoral
- intercostal
- intervertebral
- intracranial
- ischiofibular
- ischiopubic

Review Question

The term *dystrophy* means

- a) abnormal development
- b) difficult movement
- c) excessive development

Complementary Terms Built from Word Parts (*cont'd*)

- lumbar
- lumbocostal
- lumbosacral
- myalgia
- osteoblast
- osteocyte
- osteonecrosis
- pelvic
- pelvisacral
- pubic
- pubofemoral
- radial
- sacral
- sternoclavicular
- sternoid
- subcostal
- submandibular
- submaxillary

Complementary Terms Built from Word Parts (*cont'd*)

- subscapular
- substernal
- suprapatellar
- suprascapular
- symphysis
- tibial
- ulnoradial
- vertebrocostal

Complementary Terms Not Built from Word Parts

- chiropodist,
podiatrist
- chiropractic
- chiropractor
- crepitus
- orthopedics (ortho)
- orthopedist
- orthotics
- orthotist
- osteoclast
- osteopath (DO)
- osteopathy
- prosthesis (pl.
prostheses)
- rheumatologist
- rheumatology

Chapter 14

Objective 8: Interpret the meaning of abbreviations related to the musculoskeletal system.

Abbreviations

- C1-C7
- CTS
- DO
- EMG
- fx
- HNP
- L1-L5
- MD
- MG
- OA
- ortho
- RA
- T1-T12
- THA

Chapter 14

Objective 9: Interpret, read, and comprehend medical language in simulated medical statements, documents, and electronic health records.

Medical Terms in Use

- The **orthopedist** recommended Mr. Shah have an **arthrodesis** to reduce pain caused from an ankle **fracture** he sustained several years ago.
- Mrs. Diaz severed a tendon by accidentally walking through a glass patio door. A **tenorrhaphy** was performed to repair the tendon.
- An **electromyogram** can assist the physician in diagnosing **muscular dystrophy**. **Atrophy** frequently occurs in patients with this disease.

Medical Terms in Use (*cont'd*)

- Adjective forms of medical terms:
 - a. **cranial** laceration
 - b. **intercostal** muscles
 - c. pain in the **subcostal** region
 - d. herniation of an **intervertebral** disk
 - e. **intracranial** pressure
 - f. **femoral** artery
 - g. strain of the **ischiopubic** area
 - h. degenerative disease of the **sternoclavicular** joint