Skeletal System

Course
Medical Terminology

Unit
Skeletal System

Essential Question
What medical terms are associated with the skeletal system?

TEKS
130.203 (c)
1 A-F
2A-C
3A-C
4A-B

Prior Student Learning
Basic understanding of roots, prefixes, and suffixes

Estimated time
4-7 hours

Rationale
Healthcare professionals must have a comprehensive medical vocabulary in order to communicate effectively with other health professionals. They should be able to use terminology of the skeletal system to discuss common conditions and diseases.

Objectives
Upon completion of this lesson, the student will be able to:

- Define and decipher common terms associated with the skeletal system
- Identify the basic anatomy of the skeletal system
- Analyze unfamiliar terms using the knowledge of word roots, suffixes and prefixes gained in the course
- Research diseases which involve the skeletal system

Engage
A 78-year-old, female patient is admitted to the ortho floor with a broken hip; her physician said that her hip broke while she was walking and caused her to fall. The family members are asking you if that is really possible or if they should be looking for another doctor.

Key Points

I. Skeletal Terms to Know
   A. Acro – extremities
   B. Ankyl/o – crooked, bent, fused together
   C. Arthro – joint
   D. Brachi – arm
   E. Burs/o, bursa – a leather sac
   F. Carp – wrist
   G. Cerv/ic – neck
   H. Chir/o – hand
   I. Chrondr/o – cartilage
   J. Cost/o – rib
   K. Crani/o – skull, head
   L. Kyph/o – hump kyphosis
   M. Lord/o – bending lordosis
   N. Lumb/o – lumbar region, loin
   O. Myel/o – spinal cord; bone marrow
   P. Orthr/o – straight
   Q. Osteo/o – bone
   R. Pod, ped, ped/i – foot

S. Rachi/o – spine
T. Sacr/o – sacral region
U. Scoli/o – crooked scoliosis
V. Spondyl/o – vertebra
W. Synovi/o – the lubricating fluid of joints
X. Tars/o – ankle

II. Introduction
- A. The bony framework of the body (see the Major Skeletal Bones diagram)
- B. There are 206 bones in an adult
- C. Functions
  1. Support of the body structure and shape
  2. Protection of the vital organs
  3. Movement and Anchorage of the muscles (levers for muscular action)
     - a. Tendons – attach muscle to bone
     - b. Ligaments – attach bone to bone
  4. Mineral storage – calcium and phosphorus
  5. Blood cell formation – hematopoiesis

III. Bone Composition
- A. Collagen – a chief organic constituent (protein)
- B. Inorganic calcium salts (Vitamin D is essential for the absorption of minerals, i.e. calcium)
- C. Cells
  1. Osteoblasts – bone-building, bone-repairing cells in the periosteum
  2. Osteocytes – mature bone cells within the bone matrix
  3. Osteoclast – causes the reabsorption of bone
- D. Periosteum
  1. A dense, fibrous membrane covering bone
  2. Contains blood vessels
  3. Essential for bone cell survival and bone formation

IV. Types of Bones Based on Composition
- A. Compact bone
  1. Very dense, stress bearing
  2. Haversian systems
     - a. Lamellae – a concentric cylinder-shaped calcified structure
     - b. Lacunae – small spaces containing tissue fluid
     - c. Osteocytes – facilitate the exchange of calcium between blood and bone
     - d. Canaliculi – canals connecting the lacunae to each other and to the haversian canal which

carries nutrients and wastes to and from the osteocytes

B. Cancellous bone
   1. Light and spongy
   2. Low stress areas where the weight of bone would be a problem
   3. Found at the ends of the long bones, ribs, sternum, hips, vertebrae, and cranium
   4. No haversian systems
   5. Web-like arrangement

V. Classification of Bones According to Shape
   A. Long bones (extremities) – levers (see the Long Bone Structure Diagram)
      1. Epiphysis – at the ends, covered with hyaline cartilage for articulating bones; cancellous bone
      2. Diaphysis – shaft, covered with periosteum; medullary canal with yellow and red marrow (lined with endosteum); covered with periosteum for bone growth, repair, and nutrition; compact bone
      3. Femur, tibia, fibula, humerus, ulna, radius, and clavicle
   B. Short – cube-shaped; allows flexible movement (see the Bone Shape Diagram)
      1. Cancellous bone covered by compact bone
      2. Carpals, tarsals, metacarpals, metatarsals, and phalanges
   C. Flat – flat plates; protect the vital organs and provide a broad surface area for muscle attachment
      1. Cranial bones, facial bones, scapula, and sternum
   D. Irregular – peculiarly shaped to provide support and protection, yet allow flexibility
      1. Vertebrae, ribs, ear, hip, and hyoid
   E. Sesamoid bones
      1. Extra bones found in certain tendons, i.e., the patella

VI. Bone Formation
   A. Initially collagen fibers secreted by fibroblasts
   B. Cartilage deposited between the fibers
   C. The skeleton is fully formed by the second month of fetal development (all cartilage)
   D. After the eighth week of fetal development, ossification begins (the mineral matter deposited replaces the cartilage)
   E. Childhood and adolescence – ossification exceeds bone loss
   F. Early adulthood thru middle age – ossification equals bone loss
   G. After age 35 – bone loss exceed ossification
   H. The skull

1. Begins as a fibrous membrane
2. The ossification center is in the middle of the membrane – begins in the middle and radiates outward
3. Ossification is not complete at birth – the fontanels (soft spots) on an infant's head allow molding of the skull during birth and, with the open joints, allows for growth of the brain

I. Other bones
1. Begin as hyaline cartilage
2. Short bones – there is one ossification center in middle that proceeds toward the periphery
3. Long bones – there are three ossification centers (one at each end and one in the center of the shaft); ossification goes from the center toward each end and from each end toward the center

VII. Bone Growth
A. Grow in length at the epiphyseal line
B. Grow in width by the addition of bone to the surface
C. Controlled by the anterior pituitary (growth hormone)
1. Dwarfism – hypofunction
2. Giantism – hyperfunction
3. Acromegaly – hyperfunction after puberty; enlarges bones of the hands, feet, and face

VIII. Bone Markings (see the Bone Landmark Diagrams)
A. Purpose
1. Join one bone to another
2. Provide a surface for the attachment of muscles
3. Create an opening for the passage of blood vessels and nerves
4. Used as landmarks
B. Examples
1. Process – a bony prominence or projection
2. Condyle – a rounded, knuckle-like prominence usually at a point of articulation
3. Epicondyle – a small projection
4. Head – a rounded, articulating process at the end of a bone
5. Spine – a sharp, slender projection
6. Tubercle – a small, rounded process
7. Tuberosity – a large, rounded process
8. Trochanter – a large process for muscle attachment
9. Fossa – a depression or hollow
10. Foramen – a hole
11. Crest – a sharp ridge

12. Line – a ridge of bone that is less prominent than a crest
13. Meatus – a tube-like passage
14. Sinus/antrum – a cavity within a bone
15. Depression – a hollow region or opening
16. Fissure – a narrow, slit-like opening
17. Sulcus – a groove
18. Facet – a small area on a bone

IX. Bone Marrow
- A. Yellow marrow
  1. Medullary cavity of long bones
  2. Fat storage
- B. Red marrow – hematopoietic tissue
  1. In children – in all cancellous bone
  2. In adults – in the cancellous bone of the vertebrae, hips, sternum, ribs, cranial bones, proximal ends of femur, and humerus
  3. Forms red blood cells (RBCs), platelets, some white blood cells (WBCs), and destroys old RBCs and some foreign materials

X. Axial Skeleton (see the Lateral Skull Diagram)
- A. Skull – 22 bones
- B. Cranium – houses and protects the brain with eight bones
  1. Frontal – forms the forehead and the orbits of eyes; supraorbital margins (a ridge that protects the eyes)
  2. Ethmoid – forms the roof of the nasal cavity; a very light bone with a horizontal plate, a perpendicular plate, and two lateral masses
  3. Parietal, Right, and Left – form the sides and roof of the skull; the internal surface is rough to accommodate the brain
  4. Temporal, Right, and Left – forms the temple, cheek, and ear openings
     a. Squamous portion – forms the temple
     b. Zygomatic process – forms the cheek
     c. Petrous portion – forms the auditory canal
     d. Mastoid portion – behind the ear
     e. Tympanic portion – walls of the acoustic meatus
  5. Occipital – the back of the skull; the inferior portion has a foramen magnum where the spinal cord passes through; the sides of the foramen have two projections (condyles) that articulate with the first cervical vertebra (atlas)
  6. Sphenoid – fills the space between the orbital plates; contains the sphenoidal sinuses; the upper surface has

a depression called the sella turcica, where the pituitary gland rests

7. Wormian Bones – extra bones formed by irregular connections of cranial sutures
8. Cranial Sutures – unite the bones of the cranium; as a child grows, irregular bands of connective tissue ossify and turn into hard bone
    a. Coronal suture – between the frontal and parietal bones
    b. Sagittal suture – between the right and left parietal bones
    c. Lambdoidal suture – between the parietal and occipital bones
    d. Squamous suture – between the temporal and parietal bones
    e. Abnormalities
        I. Microcephalus – premature fusion
        II. Hydrocephalus – delayed fusion (increases intracranial pressure)
9. Fontanels – fusion of the cranial bones is not complete at birth, so a space between the bones remains
    a. Anterior (Bregmatic) – the “soft spot”; closes at 18 months
    b. Posterior (Occipital) – triangular; closes at 2-3 months
    c. Anteriolateral (Sphenoidal) – at both temples; close at 2-3 months
    d. Posterolateral (Mastoidal) – behind each ear; close at 1 year

C. Facial Bones – guard and support the eyes, ears, nose, and mouth; 14 bones
1. Nasal bones (2) – form the bridge of the nose
2. Vomer – forms the central nasal septum
3. Maxillary (2) – the upper jaw bones; fusion occurs before birth (if not, a cleft palate occurs); forms the roof of the mouth, walls of the nose, and floors of the orbitals; the body has maxillary sinuses, alveolar process; upper teeth, palatine process; anterior palate; the largest bone of the upper face
4. Mandible – the lower jawbone; the largest bone of face; two perpendicular portions called rami (have two processes: condylar process; posterior forms the temporal-mandibular joint; coronoid process; anterior for muscle attachment)
5. Zygoma (2) – the cheek bones
6. Lacrimal (2) – the small bones the form the medial wall

of the eye socket; the tear duct passes through; smallest; fragile
7. Palatine (2) – forms the back roof of the mouth and floor of the nose; L-shaped
8. Inferior turbinate (2) – forms the curved ledge inside the side wall of the nose

D. Ear Bones – tiny bones in the middle ear cavity in the temporal bone
1. Malleus (2) – the hammer
2. Incus (2) – the anvil
3. Stapes (2) – the stirrups

E. Hyoid Bone – a U-shaped bone in the neck at the base of the tongue; the only bone that does not touch another bone

F. Cranial Sinuses – cavities within the cranium; function as resonance chambers in the production of the voice; the decrease weight of the skull; lined with mucous membranes
1. Frontal sinuses (2) – above the eyebrows; open into the nasal cavity
2. Ethmoid sinuses (2) – between the eyes
3. Sphenoidal sinus (1) – posterior to the ethmoidal sinuses; opens into the nasopharynx
4. Maxillary sinuses (2) – on either side of the nose; opens on the lateral wall of the nasal cavity

G. Vertebral column
1. Functions
   a. Supports the trunk and neck
   b. Protects the spinal cord
   c. Multiple joint spaces allow for bending and twisting
2. Curves – (lateral view) allow for resilience and spring for walking
   a. Thoracic – present at birth
   b. Sacral – bow back
   c. Cervical – begins at 3 months when the infant first begins to lift his or her head
   d. Lumbar – begins when the child first walks
3. Vertebrae – 26 bones separated by intervertebral disks to cushion the joints for movement
   a. Cervical (7) – smallest, oblong bodies; wide transverse processes
      I. Atlas – the first cervical vertebra; supports the head by articulating with the condyles of the occipital bone; a bony ring with no body; has a short wing-like transverse process; allows for forward and backward motion

II. Axis – the second vertebra; a small body with a projection called the odontoid process that acts as the axis of rotation for the skull
III. The 3rd, 4th, 5th, and 6th vertebrae are forked to cradle the strong ligaments of head
IV. The 7th vertebra has a very prominent spinous process, called the vertebral prominence, that can be felt at the base of the neck

b. Thoracic (12) – progressively increase in size from the neck down; have a long spinous process (pointed downward) and six articular facets for rib attachment
c. Lumbar (5) – the largest and strongest; have short projections for muscle attachment
d. Sacral – five fused bones; triangular; form the dorsal part of the pelvis; join the ileum bone at the iliosacral joint
e. Coccyx – 3-4 fused bones; articulates with the tip of the sacrum; slightly movable (to assist in childbirth)

4. Injuries and Diseases (see the Abnormal Curvature Diagram)
a. Kyphosis – hunchback; the posterior thoracic is exaggerated
b. Lordosis – swayback; an exaggerated anterior curve of the lumbar region
c. Scoliosis – a lateral curvature of the spine
d. Fractures and dislocations – most often a fracture of the lamina; can cause spinal cord damage and paralysis
e. Intervertebral disk herniation – causes pressure on the spinal nerve and pain
f. Tuberculosis of the spine – by tubercle bacillus; destroys body of vertebrae

H. Thorax – 25 bones and cartilage; walls covered by skin and muscles; the floor is formed by the diaphragm
1. Functions
a. Protect and support the heart and lungs
b. Support the bones of the pectoral girdle
c. Plays a leading role in respiration
d. The ribs and sternum aid in RBC formation
2. Sternum – the breast bone; sword and handle shape
a. Manubrium – the handle; notched for the first 7

costal cartilages; articulates with the acromium end of the clavicle and the first rib
        b. Body – the blade; notched for first 7 costal cartilages
        c. Xiphoid process – the tip; attachment site for the diaphragm
    3. Costal cartilages – hyaline cartilage connecting the ribs to the sternum in 1-7 and to the anterior ribs in 8-10
    4. Ribs (12 pairs) – attached posteriorly to the vertebrae and anteriorly to the costal cartilage
        a. True ribs – the first 7 pairs
        b. False ribs – pairs 8-12 (11 and 12 are the floating ribs)

XI. Appendicular Skeleton (126 bones)
- A. Shoulder girdle
    1. Clavicles (2) – the collarbones
    2. Scapulas (2) – the shoulder blades
- B. Upper Extremities
    1. Humerus – upper arm
    2. Radius – thumb side of the forearm
    3. Ulna – little finger side of the forearm
    4. Carpals (8) – wrist bones
    5. Metacarpals (5) – hand bones
    6. Phalanges (14) – finger bones
- C. Pelvic Girdle
    1. Os coxae (2) – contains the acetabulum (hip socket)
        a. Ilium
        b. Ischium
        c. Pubis
    2. Sacrum
- D. Lower extremities
    1. Femur – thigh bone
    2. Patella – kneecap
    3. Tibia – shin bone
    4. Fibula – lateral bone of the lower leg
    5. Tarsals (7) – ankle bones
        a. Talus
        b. Calcaneus
    6. Metatarsals (5) – foot bones
    7. Phalanges (14) – toe bones

XII. Articulations
- A. Synarthrotic – immovable
- B. Amphiarthrotic – limited movement, i.e. the pubic symphysis, vertebral joints, and sacroiliac joint

C. Diarthrotic – freely movable (see the Synovial Joints Diagram)
   1. Gliding – wrist
   2. Pivot – between the radius and ulna
   3. Ball and socket – hip
   4. Hinge – elbow

XIII. Diseases/Disorders
- A. Arthritis – an inflammation of the bones at the joints, usually with pain and changes in bone structure
- B. Bunion – an abnormal lateral displacement of the big toe, causing inflammation and thickening of the bursae
- C. Bursitis – an inflammation of the bursa, which is a sac or cavity filled with synovial fluid
- D. Dislocation – the displacement of a bone from a joint, tearing ligaments, tendons, and capsules
- E. Fracture – a break in a bone
  1. Simple
  2. Compound
  3. Spiral
  4. Comminuted
  5. Greenstick
- F. Osteitis – an inflammation or infection of the bone
- G. Osteomyelitis – a bone infection that involves the bone marrow
- H. Osteoporosis – a condition in which the bones become softer and more brittle, and thus more liable to fracture due to the loss of mineral content; associated with aging
- I. Rickets – a condition in which the bones fail to calcify and growth is hampered, usually due to a deficiency of vitamin D and phosphorus in the diet
- J. Spina bifida – a congenital defect in which the vertebrae fail to unite at the midline
- K. Sprain – the wrenching of a joint with injury to the ligaments

Activity

I. Make flash cards of skeletal terms and practice putting the terms together with prefixes and suffixes to make new terms.
II. Complete the Skeletal System Worksheet.
III. Complete the Skeletal System Medical Terminology Worksheet.
IV. Review media terms with the students using review games such as the “Fly Swatter Game” or the “Flash Card Drill” (see the Medical Terminology Activity Lesson Plan - http://texashste.com/documents/curriculum/principles/medical_terminology_activities.pdf)
V. Research and report on diseases and disorders from the Urinary system

Assessment
Successful completion of activities

Materials
Skeletal System Worksheet
Skeletal System Medical Terminology

Accommodations for Learning Differences
For reinforcement, the students will practice terms for the skeletal system using flash cards.

For enrichment, the students will choose a disease related to the skeletal system and research the disease using the internet. Students will share their findings with the class.

National and State Education Standards
National Healthcare Foundation Standards and Accountability Criteria
Health care workers will know the various methods of giving and obtaining information. They will communicate effectively, both orally and in writing.

TEKS
130.203 (c)(1)(A) identify abbreviations, acronyms, and symbols;
130.203 (c)(1)(B) identify the basic structure of medical words;
130.203 (c)(1)(C) practice word-building skills;
130.203 (c)(1)(D) research the origins of eponyms;
130.203 (c)(1)(E) recall directional terms and anatomical planes related to body structure;
130.203 (c)(1)(F) define and accurately spell occupationally specific terms such as those relating to the body systems, surgical and diagnostic procedures, diseases, and treatments.
130.203 (c)(2)(A) demonstrate appropriate verbal and written strategies such as correct pronunciation of medical terms and spelling in a variety of health science scenarios;
130.203 (c)(2)(B) employ increasingly precise language to communicate;
130.203 (c)(2)(C) translate technical material related to the health science industry.
130.203 (c)(3)(A) examine medical and dental dictionaries and multimedia resources;
130.203 (c)(3)(B) integrate resources to interpret technical materials;
130.203 (c)(3)(C) investigate electronic media such as the Internet with appropriate supervision.
130.203 (c)(4)(A) distinguish medical abbreviations used throughout the health science industry; and
130.203 (c)(4)(B) translate medical abbreviations in simulated technical material such as physician progress notes, radiological reports, and

laboratory reports.

College and Career Readiness Standards
English/language art
B.1 Identify new words and concepts acquired through study of their relationships to other words and concepts.
B2. Apply knowledge of roots and affixes to infer the meanings of new words.
B3. Use reference guides to confirm the meanings of new words or concepts.
Cross- Disciplinary standards-Foundational Skills
A2. Use a variety of strategies to understand the meanings of new words

Skeletal System Medical Terminology

Prefixes, Suffixes, Root Words

-al	
alges/i	
-algia	
ambi	
ankyl/o	
ante	
-ar	
arthr/o	
-blast	
brachi/o	
burs/o	
calcane/o	
carp/o	
-centesis	
cervic/o	
chondr/o	
-clasis	
-clysis	
-clast	
clavic/o	
cost/o	
crani/o	
crista	
-cyte	
-desis	
dextr/o	
disk	
-ectomy	
femor/o	
fibul/o	
-gen	
-graphy	
hemat/o	
humer/o	
hy/o	
-ic	
ili/o	
inter	
ischi/o	

-itis	
kyph/o	
lamin/o	
ligament/o	
lordosis	
-malacia	
mandibul/o	
maxill/o	
menisc/o	
meta	
myel/o	
-oma	
orth/o	
-osis	
osse/o	
oste/o	
patell/o	
ped	
peri	
phalang/o	
-physis	
-poiesis	
-porosis	
pub/o	
scapul/o	
scoli/o	
-scope	
-scopy	
spondyl/o	
stern/o	
supra	
syn	
synovi/o	
tars/o	
tibi/o	
-um	
uln/o	
vertebr/o	

Medical Terms

ambidextrous	
ankylosis	
arthralgia	
arthritis	
arthrocentesis	
arthrodesis	
arthrography	
arthroplasty	
arthroscope	
arthroscopy	
brachial	
bursitis	
calcaneal	
carpals	
cervical	
chondrectomy	
chondromalcia	
collagen	
craniotomy	
cranium	
cribriform	
femoral	
hematopoiesis	
hyoid	
ilium	
infraorbital	
intercostal	
interosseus	
kyphosis	
laminectomy	
ligament	
lordosis	
mental foramen	
metacarpal	
metatarsal	
orthopedic	
osteoarthritis	
osteoblast	
osteoclast	
osteocyte	

osteoma	
osteomalacia	
osteomyelitis	
osteoporosis	
patellar	
periosteum	
polydactylism	
scoliosis	
spondylosis	
sternum	
styloid	
synovial	
vertebral	

Medical Abbreviations:

amb	
CXR	
Fx	
Tx	

Key: Skeletal System Medical Terminology

Prefixes, Suffixes, Root Words

-al	pertaining to or expressing relationship
alges/i	oversensitivity to pain
-algia	pain
ambi	both
ankyl/o	stiff, crooked, bent
ante	before
-ar	pertaining to
arthr/o	joint
-blast	precursor, developing cell
brachi/o	arm
burs/o	bursa (serous sac)
calcane/o	calcaneous
carp/o	carpals (wrist bone)
-centesis	surgical puncture to remove or aspirate fluid
cervic/o	cervical (neck)
chondr/o	cartilage
-clasis	to break down
-clysis	to wash
-clast	cell to break down
clavic/o	clavicle (collarbone)
cost/o	rib
crani/o	cranium, helmet, skull
crista	ridge
-cyte	cell
-desis	surgical union
dextr/o	right
disk	intervertebral disk
-ectomy	removal of
femor/o	femur
fibul/o	fibula
-gen	producing
-graphy	the process of making a picture
hemat/o	blood
humer/o	humerus
hy/o	u-shaped
-ic	pertaining to
ili/o	ilium (hipbone)
inter	between
ischi/o	ischium

-itis	inflammation of
kyph/o	hump
lamin/o	lamina (layer)
ligament/o	ligament (liga = bind)
lordosis	curvature of the lumbar spine
-malacia	softening
mandibul/o	mandible
maxill/o	maxilla (maxillary)
menisc/o	meniscus
meta	beyond, change
myel/o	bone marrow
-oma	tumor
orth/o	straight
-osis	condition of
osse/o	bone
oste/o	bone
patell/o	patellar (knee cap)
ped	foot
peri	around
phalang/o	phalanges (fingers and toes)
-physis	growth
-poiesis	making or production of
-porosis	porous condtion
pub/o	pubis
scapul/o	scapula (shoulder blade)
scoli/o	crooked, curve
-scope	instrument to view or examine
-scopy	to visualize or view
spondyl/o	vertebra or vertebral column
stern/o	sternum (breast bone)
supra	above
syn	with, together
synovi/o	synovial
tars/o	tarsals (ankle bones)
tibi/o	tibial
-um	pertaining to
uln/o	ulna
vertebr/o	vertebral

Medical Terms

ambidextrous	able to use both hands
ankylosis	condition of being crooked, bent, or stiff
arthralgia	joint pain
arthritis	inflammation of the joints
arthrocentesis	surgical puncture to remove fluid from the joint
arthrodesis	surgical union of the joint
arthrography	the process of recording pictures of the joints
arthroplasty	repair of the joints
arthroscope	instrument to view a joint
arthroscopy	procedure to view a joint
brachial	pertaining to the arms
bursitis	inflammation of the bursa
calcaneal	pertaining to the calcaneous (heel bone)
carpals	wrist bones
cervical	pertaining to the neck
chondrectomy	removal of cartilage
chondromalcia	softening of the cartilage
collagen	glue forming (literal translation; refers to a protein found in the matrix of connective tissue)
craniotomy	incision into the cranium
cranium	pertaining to the skull
cribriform	sieve-like plate
femoral	pertaining to the femur
hematopoiesis	pertaining to the production of blood
hyoid	pertaining to something U-shaped
ilium	pertaining to the ilium (hipbone)
infraorbital	pertaining to below the eye
intercostal	pertaining to between the ribs.
interosseus	between the bones
kyphosis	condition of having a hump (humpback or hunchback)
laminectomy	removal of the lamina or vertebrae layers
ligament	ligament (to bind)
lordosis	condition of being bent forward
mental foramen	chin openings or holes
metacarpal	beyond the wrist
metatarsal	beyond the ankles
orthopedic	straightening the feet
osteoarthritis	inflammation of the bones and the joints
osteoblast	cell that develops the bone
osteoclast	cell that breaks down the bone

osteocyte	bone cell
osteoma	bone tumor
osteomalacia	softening of the bone
osteomyelitis	inflammation of the bone and bone marrow
osteoporosis	pertaining to the porous condition of bones
patellar	pertaining to the patella or kneecap
periosteum	pertaining to around the bone
polydactylism	many fingers or toes
scoliosis	condition of being bent
spondylosis	condition of the vertebral column
sternum	pertaining to the sternum (breastbone)
styloid	resembling a pole or stake
synovial	pertaining to the synovial membrane
vertebral	pertaining to the vertebral column

Medical Abbreviations:

amb	ambulate
CXR	chest x-ray
Fx	fractures
Tx	treatment or traction

Skeletal System Worksheet

1. List four functions of the skeletal system.
   a.

   b.

   c.

   d.

2. Define ossification and identify the roles of the osteoblasts, osteocytes, and osteoclasts in the growth of bones.

3. Describe the structural and functional features of a typical long bone.
   a. periosteum

   b. diaphysis

   c. epiphysis

   d. red marrow

   e. yellow marrow

   f. articular cartilage

   g. endosteum

4. Describe the following classes of bone and give an example of each:
   a. long

   b. short

   c. flat

   d. irregular

5. Describe the following bone markings:
    a. foramen

    b. meatus

    c. sinus

    d. fossa

    e. condyle

    f. tuberosity

    g. trochanter

    h. tubercle

    i. process

6. Describe the terms suture and fontanel.

7. Identify the major groups of bones which belong to the axial skeleton and to the appendicular skeleton.
    a. axial

    b. appendicular

8. Describe the location of the following skull bones:
    a. mandible:

    b. hyoid:

9. List the number of vertebrae and the nicknames of the cervical vertebrae:
    a. cervical:
    b. thoracic:
    c. lumbar:
    d. sacrum:
    e. coccyx:

10. Describe the structural classification of the following articulations:
    a. fibrous:
    b. synovial:
    c. cartilaginous:

11. Describe a ligament and its role in a synovial joint.

12. Describe the diseases and disorders of the skeletal system:
    a. Arthritis:
    b. Bursitis:
    c. Osteoporosis:
    d. Scoliosis:
    e. Spina Bifida:

Skeletal System Worksheet – **KEY**

1. 1. List four functions of the skeletal system.
    a. Support
    b. Protection
    c. Movement Facilitation
    d. Mineral Storage

2. Define ossification and identify the roles of the osteoblasts, osteocytes, and osteoclasts in the growth of bones.
    a. Ossification – the process by which bones form in the body by replacing pre-existing connective tissue with bone. The process occurs during bone growth
    b. Osteoblasts – the cells responsible for bone formation
    c. Osteocytes – mature bone cells
    d. Osteoclasts – cells that break down bone tissue

3. Describe the structural and functional features of a typical long bone.
    a. periosteum – a dense, white fibrous covering around the surface of bone. Essential for bone growth, repair, and nutrition. Serves as a point of attachment for the ligaments and tendons
    b. diaphysis – the shaft or long, main portion of a long bone
    c. epiphysis – the expanded ends of the long bone
    d. red marrow – blood cell forming tissue located within the spaces or the spongy bone of the long bones. Forms all blood cells types including erythrocytes, leukocytes, and thrombocytes
    e. yellow marrow – fat-storing tissues found within the medullary cavities of the long bones
    f. articular cartilage – a thin layer of hyaline cartilage covering the epiphysis in order to reduce friction during the movement of the joint
    g. endosteum – a thin layer of squamous cells lining the medullary cavity

4. Describe the following classes of bone and give an example of each.
    a. long – longer than they are wide (humerus, ulna, radius, metacarpals, phalanges, femur, tibia, fibula, metatarsals)
    b. short – cube-shaped, nearly equal in length and width (tarsals and carpals)
    c. flat – generally thin and flat; composed of two layers of compact bone on the outside with a layer of spongy bone on the inside. Provide protection and surface area for muscle attachment (cranial bones, sternum, ribs, and scapulae)
    d. irregular – variously shaped bones (cannot be classified into any other groups or classifications). Vary in the amount of spongy and compact bone (facial bones, vertebrae)

5. Describe the following bone markings:
    a. foramen – an opening or hole through a bone serving as a passageway for nerves or blood vessels
    b. meatus – a tube-like passageway within a bone
    c. sinus – a space within a bone, lined with a mucus membrane to reduce the weight of the bone
    d. fossa – a fairly deep pit or depression
    e. condyle – a large, rounded prominence which articulates with another bone
    f. tuberosity – an elevated, rounded, (knob-like) usually roughened area on a bone; generally bigger than a tubercle and is used for muscle attachment
    g. trochanter – a very large, blunt process used for muscle attachment
    h. tubercle – a small, rounded process used for muscle attachment
    i. process – any projection from the surface of a bone used in muscle attachment

6. Describe the terms suture and fontanel.
    a. Suture – an immovable joint found only between skull bones
    b. Fontanel – membrane-filled spaces between cranial bones (soft spots of a baby's skull)

7. Identify the major groups of bone which belong to the axial skeleton and to the appendicular skeleton.
    a. axial – consists of bones that lie along the axis of the body
    Skull, Vertebral column, Ribs, Sternum, Hyoid bone
    b. appendicular – contains the bones of the free appendages
    Clavicle, Scapula, Humerus, Ulna, Radius, Carpals, Metacarpals, Phalanges, Femur, Tibia, Fibula, Patella, Tarsals, Metatarsals, Phalanges

8. Describe the location of the following skull bones:
    a. mandible – jawbone
    b. hyoid – located in the neck, between the mandible and the larynx

9. List the number of vertebrae and the nicknames of the cervical vertebrae:
    a. cervical – 7 bones
    C1 – atlas
    C2 – axis
    b. thoracic – 12 bones
    c. lumbar – 5 bones
    d. sacrum – 5 fused bones
    e. coccyx – 2-4 fused bones

10. Describe the structural classification of the following articulations:
    a. fibrous – articulating bones are held very closely together by fibrous connective tissue
    b. synovial – joints which contain a synovial cavity between the articulating bones
    c. cartilaginous – articulating bones are held together tightly by cartilage

11. Describe a ligament and its role in a synovial joint.
    A band or cord of dense, fibrous connective tissue extending from one bone to another to provide a joint with structural stability

12. Describe the diseases and disorders of the skeletal system.
    a. Arthritis – an inflammation of the bones at the joints, usually with pain and changes in bone structure
    b. Bursitis – an inflammation of the bursa, which is a sac or cavity filled with synovial fluid
    c. Osteoporosis – a loss of bone mass and bone density which leads to porous bones, making them more susceptible to fracture
    d. Scoliosis – abnormal lateral curvature of the spine (vertebral column) resulting in an S-shaped appearance
    e. Spina Bifida – occurs when the posterior part of the vertebrae fails to form properly and does not enclose the spinal cord