

These review questions are for the Skeletal system lecture topic. The questions were adapted from several sources, including 1700+ Review Questions for Anatomy and Physiology II (3rd edition) by R. Michael Anson, Ph.D. Questions marked with an asterisk (*) are questions from the laboratory, not the lecture, portion of the class.

You are required to know and understand all the material on the skeletal system that is covered in the lecture and the laboratory. To aid in your review of skeletal system anatomy, a list of bones and bone features is given below. For each of the bones or bone features listed below, be able to (a) find its location on a skeleton, (b) state if it is part of the axial or appendicular skeleton, (c) state what bones it articulates with, and (d) describe its function.

Acetabulum	Medial malleolus
Acromion	Metacarpal
Body (of sternum)	Metatarsal
Carpal	Nasal
Cervical vertebrae	Nasal cavity
Clavicle	Obturator foramen
Coccyx	Occipital
Costal cartilage	Palatine
Hip	Paranasal sinuses
Ethmoid	Parietal
External auditory meatus	Patella
Eye orbit	Pelvic girdle
False pelvis	Pelvis
False rib	Phalanges
Femur	Pubis
Fibula	Radius
Floating rib	Sacrum
Fontanel	Scapula
Foramen magnum	Shoulder girdle
Frontal	Sphenoid
Glenoid cavity	Spine (of scapula)
Humerus	Sternum
Ilium	Sutures
Inferior nasal concha	Tarsal
Ischeum	Temporal
Lacrimal	Thoracic cage
Lateral malleolus	Thoracic vertebrae
Lumbar vertebrae	Tibia
Mandible	True pelvis
Manubrium	True rib
Mastoid process	Ulna
Maxillary	Vomer
Xiphoid process	Zygomatic
	Zygomatic Process

Multiple choice questions:

- 1) Which is **not** a function of bones?
 - a) Protect organs
 - b) Cause movement
 - c) Anchor organs
 - d) Support the weight

- 2) Which is **not** part of bone tissue?
 - a) Keratin protein
 - b) Calcium phosphate
 - c) Bone cells
 - d) Collagen

- 3) The hollow space in the center of a bone is called the
 - a) Osseous space
 - b) Medullary cavity
 - c) Bone gaps
 - d) Skeletal canaliculi

- 4) During fetal development, the skeleton is made of _____ tissue, not bone tissue
 - a) Epithelial
 - b) Dense connective
 - c) Muscle
 - d) Cartilage

- 5) The bone cells that convert cartilage tissue to bone tissue are called
 - a) Osteoblasts
 - b) Osteoclasts
 - c) Osteocytes
 - d) Skelacytes

- 6) The tissue that fills the medullary cavity of adult bones is called
 - a) Cartilage
 - b) Marrow
 - c) Compact bone
 - d) Spongy bone

- 7) Marrow comes in two types:
 - a) Red and Yellow
 - b) Cartilage and Bone
 - c) Liquid and solid
 - d) Humerus and radius

8) The long shaft of a long bone is called its

- a) Epiphysis
- b) Head
- c) Diaphysis
- d) Foremen

9) The round knob-like ends of a long bone are called its

- a) Epiphysis
- b) Medulla
- c) Diaphysis
- d) Foremen

10) The growth centers of bone are a zone of cartilage tissue between the epiphysis and the diaphysis, called the

- a) Cartilagenous accretion zone
- b) Osseogenous region
- c) Epiphyseal growth plate
- d) Mitotic cavity

11) A(n) _____ is where bones meet (two answers)

- a) Epiphysis
- b) Joint
- c) Articulation
- d) Cartilage bridge
- e) Osseous connection
- f) Bone bar

12) The protective tissue at the ends of bones in joints is (two answers)

- a) Hyaline cartilage
- b) Fibrocartilage
- c) Synovial cartilage
- d) Articular cartilage
- e) Cartilage discs
- f) Epiphyseal plate

13) The microscopic circular structures of bone tissue are called (two answers)

- a) Bone processes
- b) Foremen
- c) Osseous canals
- d) Bone rings
- e) Osteons
- f) Haversian systems

- 14) The medical term for a broken bone is a
- a) Rupture
 - b) Splint
 - c) Fracture
 - d) Dislocation
- 15) A disease of thin or fragile bones often seen in senior citizens
- a) Rickets
 - b) Osteoporosis
 - c) Compound decay
 - d) Arthritis
- 16) A disease of soft and flexible bones seen in children with calcium deficiency
- a) Rickets
 - b) Osteoporosis
 - c) Compound decay
 - d) Arthritis
- 17) Any part of a bone that projects outward from the main body of the bone
- a) Process
 - b) Foremen
 - c) Head
 - d) Papillus
- 18) How many bones are there in the human skeleton?
- a) 206
 - b) 124
 - c) 105
 - d) 103
- 19) The _____ skeleton are the bones of the head, spine, and thorax
- a) Central
 - b) Appendicular
 - c) Axial
 - d) Medullary
- 20) The bones of the limbs are bones of the _____ skeleton
- a) Distal
 - b) Appendicular
 - c) Axial
 - d) Lateral

- 21) The cranial bone under the forehead is the _____ bone
- a) Mental
 - b) Orbital
 - c) Superior
 - d) Frontal
- 22) The cranial bone at the back (posterior) of the skull is the _____ bone
- a) Occipital
 - b) Postoid
 - c) Trailing
 - d) Metacarpal
- 23) The zig-zag lines on the cranium are the joints between cranial bones, called _____.
- a) Sutures
 - b) Fibrocytes
 - c) Articular cranium
 - d) Osocephalic joints
- 24) Facial bone of the **upper** jaw:
- a) Mandible
 - b) Zygomatic
 - c) Maxillary
 - d) Mastoid
- 25) Facial bone of the front of the cheeks:
- a) Cheechous
 - b) Zygomatic
 - c) Mastoid
 - d) Temporal
- 26) The _____ of each vertebra is a solid disc of bone to support the body weight
- a) Base
 - b) Body
 - c) Process
 - d) Foremen
- 27) The _____ of each vertebra is a ring-shaped area where the spinal cord passes through
- a) Vertebral arch
 - b) Spinous process
 - c) Neuroforemen
 - d) Osteon (Haversean system)

- 28) How many vertebrae are there in the cervical, thoracic, and lumbar regions of the spine?
- a) 12, 18, and 17
 - b) 8, 8, and 10
 - c) 7, 12, and 5
 - d) 5, 5, and 14
- 29) Inferior to the lumbar vertebrae is a bone made of 5 fused vertebrae called the _____
- a) Coccyx
 - b) Sacrum
 - c) Hip
 - d) Pelvis
- 30) The most inferior bone of the spine is the _____. It is made of 4 fused vertebrae.
- a) Coccyx
 - b) Sacrum
 - c) Lumbar vertebrae
 - d) L5
- 31) The breastbone
- a) Sternum
 - b) Thoracic plate
 - c) Cardial plate
 - d) Cardial process
- 32) There are _____ pairs of ribs (including true and false ribs).
- a) 7
 - b) 12
 - c) 18
 - d) 18 plus two floating ribs
- 33) The two bones of the shoulder girdle: (two answers)
- a) Deltoid
 - b) Humerus
 - c) Trapezius
 - d) Clavicle
 - e) Cervical
 - f) Scapula
- 34) The bone of the arm (remember that the arm is from the shoulder to the elbow)
- a) Humerus
 - b) Femur
 - c) Radius
 - d) Clavicle

35) The two bones of the forearm (two answers)

- a) Ulna
- b) Radius
- c) Tibia
- d) Carpal
- e) Tarsal
- f) Metacarpal

36) Wrist bones

- a) Acromions
- b) Radii
- c) Carpals
- d) Phalanges

37) Palm bones

- a) Metacarpals
- b) Metatarsals
- c) Osteons
- d) Manus bones

38) Finger bones

- a) Digital bones
- b) Distal bones
- c) Phalanges
- d) Manipules

39) The two hip bones are part of the

- a) Pelvis
- b) Spine
- c) Femur
- d) Gluteus muscle

40) Which is not a region of the hip bones?

- a) Magnum
- b) Ileum
- c) Ischeum
- d) Pubis

41) The thigh bone

- a) Femur
- b) Humerus
- c) Lumbar
- d) Brachial

- 42) The knee cap bone
- a) Orthogonal
 - b) Orthostatic
 - c) Patella
 - d) Rodilla
- 43) The two bones of the leg (remember the leg is from the knee to the ankle) (two answers)
- a) Fibula
 - b) Tarsals
 - c) Humerus
 - d) Tibia
 - e) Xiphoid
 - f) Maxillary
- 44) The ankle bones
- a) Anchula
 - b) Carpals
 - c) Achilles
 - d) Tarsals
- 45) The bones of the sole of the foot
- a) Achilles
 - b) Metatarsals
 - c) Plantar
 - d) Soleus
- 46) The bones of the toes
- a) Dedoes
 - b) Tibial bones
 - c) Phalanges
 - d) Pedallar bones
- 47) Which is **not** a type of joint?
- a) Rotary
 - b) Cartilaginous
 - c) Fibrous
 - d) Synovial
- 48) When a bone is out of its normal position in a joint
- a) Strain
 - b) Fracture
 - c) Dislocation
 - d) Discontinual articulation

- 49) When the ligaments of a joint are torn
 a) Rupture
 b) Splints
 c) Sprain
 d) Arthritis
- 50) Painful and inflamed joints is known as...
 a) Synovitis
 b) Arthritis
 c) Paralysis
 d) Chondrosis
- 51) Which type of arthritis is an autoimmune disease?
 a) Rheumatoid arthritis
 b) Osteoarthritis
 c) Gout
 d) Cartilolytic arthritis

Answers to multiple choice questions:

- | | | |
|--------------|--------------|--------------|
| 1 = B | 18 = A | 35 = A and B |
| 2 = A | 19 = C | 36 = C |
| 3 = B | 20 = B | 37 = A |
| 4 = D | 21 = D | 38 = C |
| 5 = A | 22 = A | 39 = A |
| 6 = B | 23 = A | 40 = A |
| 7 = A | 24 = C | 41 = A |
| 8 = C | 25 = B | 42 = C |
| 9 = A | 26 = B | 43 = A and D |
| 10 = C | 27 = A | 44 = D |
| 11 = B and C | 28 = C | 45 = B |
| 12 = A and D | 29 = B | 46 = C |
| 13 = E and F | 30 = A | 47 = A |
| 14 = C | 31 = A | 48 = C |
| 15 = B | 32 = B | 49 = C |
| 16 = A | 33 = D and F | 50 = B |
| 17 = A | 34 = A | 51 = A |

Fill-in-the-blank questions:

- 1) Two major functions of the skeleton are _____ and _____.
- 2) Bone tissue is one of the connective tissues. Like most connective tissues, the cells of bone tissue are embedded in an extracellular matrix. The major mineral (rock like substance) of bone matrix is _____.
- 3) Calcium phosphate is made of two ions, calcium and phosphate. Write the correct molecular formulas for these two ions, including their correct ionic charges: _____ & _____
- 4) In addition to calcium phosphate, the bone extracellular matrix contains large amounts of _____, a protein that serves several purposes: it reinforces the calcium phosphate ground substance. It also increases bone flexibility.
- 5) Fill in the blanks with the appropriate bone terms:
The process where cartilage is converted to bone: _____
The cells that convert cartilage to bone: _____
Bone tissue with many small holes: _____
- 6) During the fetal stage, the skeleton is not made of bone tissue. It is instead made of _____ tissue.
- 7) The term _____ means when cartilage is converted to bone. It occurs during fetal development.
- 8) Cells that build bone by ossifying cartilage are called _____ cells.
- 9) The _____ is a hollow space inside a bone where the cartilage bone of the fetus existed before being covered with bone tissue.
- 10) By the time a person is born, the medullary cavities of their bones are filled with a substance called _____.
- 11) _____ is the marrow that fills most medullary cavities in an adult's bones, and is composed of adipose tissue.
- 12) _____ is the marrow that fills the medullary cavities of children's bones (it also is found in a few bones in adults). It is the type of marrow where blood cells are made.
- 13) List at least three bones in adults that contain red marrow: _____, _____, and _____.
- 14) Bones with a long tubular shape (such as the bones of the arms and legs) are called _____ bones.

15) The tubular shaft that forms the long axis of a long bone is called the _____. It is composed mostly of _____ (a type of bone tissue).

16) The wide knob-like ends of long bones is called the _____. They are composed mostly of _____ (a type of bone tissue).

17) The outside of the diaphysis is covered with a dense connective tissue membrane called the _____.

18) In children, the zone between the epiphysis and the diaphysis is a cartilage area where bone growth occurs. This growth center is called the _____ of the bone.

19) As children grow and reach their adult size, the epiphyseal plate cartilage is replaced by bone tissue. This process leaves a mark in the bone called the _____ where the epiphyseal plate used to be.

20) In joints, the tips of bones are covered with a protective layer of _____ (a tissue type. Be as specific as possible).

21) The hyaline cartilage in joints is also called _____ cartilage.

22) Bone tissue consists of microscopic circular structures called _____ or _____.

23) At the center of each osteon is a hollow space called the _____. This space is where _____ pass through the bone.

24) The _____ are tiny canals in the osteon that bring blood and nutrients from the central canal to the bone cells of the osteon.

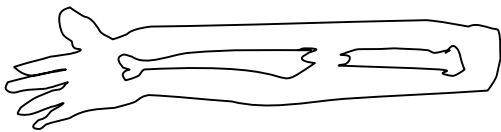
25) The rings of bone tissue that surround the central canal of an osteon are called _____.

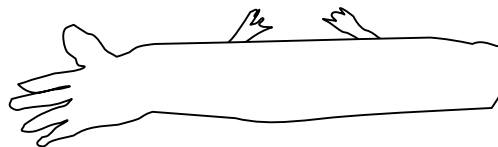
26) The bone cells in osteons are called _____. They live in tiny hollow spaces in the bone tissue called _____.

27) Cells that dissolve bone are called _____.

28) The proper medical term for a broken bone is a(n) _____.

29) Using the terms we learned in lecture, name these two bone fracture types:





30) In _____ (a bone disease), calcium removal from the bone occurs faster than calcium deposition to the bone. It leads to extremely thin brittle bones and is very common in advanced old age.

31) Osteoporosis occurs more often in women/men (circle one).

32) Osteoporosis can be caused by lack of _____ or _____ in the diet, or by lack of _____ in a person's lifestyle.

33) _____ is a childhood bone disease of soft, weak bones. It is usually due to lack of _____ or _____ in the diet.

34) What is unusual about the legs of children with rickets? _____

35) On a bone, a(n) _____ is a part of the bone that protrudes from the main body of the bone. These protrusions are often attachment sites for _____.

36) On a bone, a(n) _____ is a large, rounded end of the bone. This is usually where the bone fits into a socket in another bone.

37) On a bone, a(n) _____ is a tunnel through the bone. This is usually to allow space for _____, _____, or _____ to pass through the bone.

38) There are _____ (a number) of bones in the human body.

39) The bones of the body are divided by location into two main groups: The _____ skeleton are the bones of the central part of the skeleton, whereas the bones of the limbs are bones of the _____ skeleton.

40) The axial skeleton includes bones from three major areas of the skeleton: The _____, the _____, and the _____.

41) The bones of the skull are divided into two groups: The skull bones that form a round protective covering for the brain are called the _____ bones. The skull bones that form the flat front of the skull (where the eyes, nose, and mouth are located) are called the _____ bones.

42) There are _____ (a number) of cranial bones. List all their names. For the cranial bones that come in left-right pairs, just write their name once but write (pair) after the name.

_____, _____, _____, _____, _____, _____

43*) The _____ bone forms the forehead.

44*) The posterior end of the frontal bone articulates with the _____ bones.

45*) The pair of bones that form much of the superior lateral portions of the cranium are the _____ bones.

46*) The posterior of the cranium and much of the bottom of the cranium are formed by the _____ bone.

47) The foramen magnum is the hole in the _____ bone. It allows the _____ to pass through the skull to connect to the brain.

48*) The pair of bones that form the inferior lateral region of skull (the region where the ears are located) are the _____ bones.

49) The “cheekbone” is not itself a bone. It is made up of parts of several bones. The posterior section of the “cheekbone” is the _____ of the _____ bone. Its function is an attachment site for chewing muscles.

50) The _____ is the hole in the _____ bone where sounds enter for hearing.

51) The _____ process of the _____ bone is a thin pencil-like structure where muscles of the tongue and throat attach.

52*) The _____ is a large cranial bone that (along with the occipital bone) forms the floor of the cranium. This bone is anterior to the occipital bone.

53*) The _____ bone is the smallest cranial bone. Although small, it spans from the medial orbit of one eye to the medial orbit of the other eye. In between, it forms the superior portion of the roof of the nasal cavity and the top part of the nasal septum.

54*) The crista galli is a small crest on the _____ bone.

55*) The cribriform plate is a surface on the _____ bone filled with many small foramina (holes). Its purpose is to allow nasal nerves for the sense of smell to reach the brain.

56*) The “soft spots” on an infant’s skull are unossified cartilage areas called _____. They allow for _____ during birth and, afterwards, they allow for _____ during early development.

57) _____ are zig-zag lines on the cranium formed by the joints between cranial bones.

58*) There are _____ (a number) of facial bones. List all their names. For the facial bones that come in left-right pairs, just write their name once but write (pair) after the name.

_____, _____, _____, _____, _____, _____, _____

59*) The pair of bones that form the bridge (top) of the nasal cavity are the _____ bones.

60*) Within each eye orbit, there is a small facial bone called the _____ bone, which contains a groove to allow tear drainage. The name of this bone means “tears.”

61*) The “cheekbone” is not itself a bone. It is made up of parts of several bones. The anterior section of each “cheekbone” is formed by part of the _____ (a facial bone) and also by part of the _____ (another facial bone).

62*) The nasal septum is the bony region that divides the nasal cavity into left and right halves. The flat thin bone that forms the lower part of the nasal septum is the _____ bone.

63*) The pair of bones that form the posterior of the hard pallet (the roof of the mouth) are the _____ bones.

64*) The _____ bone forms the superior region of each orbit (eye socket).

65*) Each end of the _____ (lower jaw bone) articulates with a _____ (a cranial bone).

66*) The _____ are a pair of tiny shell-shaped bones in the nasal cavity. They increase the ability of the nose to trap dust, preventing it from reaching the lungs.

67*) The _____ bones are a pair of bones that form the upper jaw, the front part of the "cheekbone," and the lateral sides of the nasal cavity.

68*) The roof of the mouth (which is also called the hard pallet) is formed by several bones. The _____ pair of bones form the anterior part of the hard pallet. The _____ pair of bones form the posterior part of the hard pallet.

69) The _____ are hollow cavities inside certain skull bones that are near the nose. The function of these cavities is not clear, but they can easily become infected when we have a cold, causing a stuffy or pressurized feeling in the head.

70*) The bones of the skull that contain paranasal sinuses are the _____, _____, _____, and the _____.

71) The “backbone” (the medial bones of the back) is really a stack of individual bones called _____. The entire stack of these bones is called the _____ or the _____.

72) The spine has two main functions: _____ and _____.

73) The ring-shaped region of each vertebra is called the _____.

74) The spinal cord passes through the _____ of each vertebra, which is the hole in the middle of the vertebral arch.

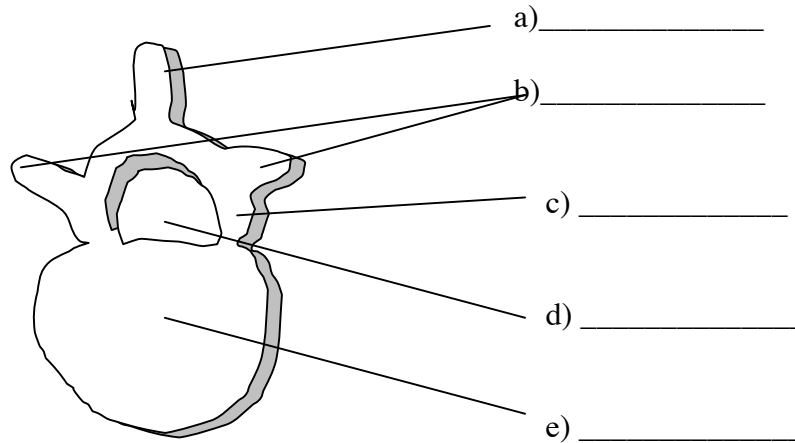
75) The tunnel made by all the vertebral foremen stacked on top of each other in the spine is called the _____.

76) The solid round region of each vertebra is called the _____ of the vertebra. Its purpose is to _____.

77) Between neighboring vertebrae are round discs of cartilage called _____ which cushion the vertebrae from the body weight.

78) There are bony projections called _____ that point outward from the vertebral arch. These serve as attachment sights for muscles.

79) The drawing below represents a vertebra. Name parts a, b, c, and d.



Which part (a, b, c d, or e)...

Has a cartilage disc on it for cushioning _____

Is where the spinal cord passes through _____

Is where the muscles that bend the back attach _____

Articulates with the sacrum _____

80*) The vertebral arch is posterior/anterior (circle one) to the body of the vertebra.

81*) The vertebral arch is more superficial /deep (circle one) than the body of the vertebra.

82) Name the five regions of the vertebral column in their correct order, from superior to inferior. After each answer state how many vertebrae are in that region (In the case of fused vertebrae, write how many vertebrae are fused together in that region, followed by the word fused).

<u>Name of spine region:</u>	<u>Number of vertebrae</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

83) There are _____ (a number) cervical vertebrae, _____ (a number) thoracic vertebrae, and _____ (a number) lumbar vertebrae.

84*) One distinguishing feature of the cervical vertebrae is small _____ in the processes of their vertebral arch. These provide a bony channel for blood vessels supplying the brain.

85*) Another distinguishing feature of the cervical vertebrae is _____ (hint: Something about the tips of their spinous process, which is the most posterior of the vertebral arch processes).

86*) The first cervical vertebra (C1) is called the _____; it articulates superiorly with the _____ bone of the skull.

87*) The second cervical vertebra (C2) is called _____.

88*) A distinguishing feature of the thoracic vertebrae is the shape of their spinous process. Its shape is _____.

89*) A distinguishing feature of the lumbar vertebrae is the shape of their spinous process. Its shape is _____.

90*) The body of cervical/thoracic/lumbar (circle one of the three) vertebrae are the largest and thickest of the spine.

91) Each thoracic vertebra articulates with one pair of _____.

92*) The _____ is the region of the spine directly below the lumbar vertebrae. It consists of _____ (a number) of fused vertebrae.

93*) The _____ is the inferior-most region of the spine. It is directly below the sacrum and articulates with it. It is made out of _____ (a number) of fused vertebrae.

94) The thoracic cage is formed from three bone groups: _____, _____ and _____.

95) The sternum is formed by the fusion of three bones: the _____, _____, and _____.

96) There are _____ (a number) pairs of ribs. The superior-most _____ (a number) are “true ribs” and the inferior-most _____ (a number) pairs are “false ribs”. The lowest _____ (a number) pairs of false ribs are called the “floating ribs”.

97) Anteriorly, ribs articulate with the _____ (a bone). Posteriorly, ribs articulate with _____ (a type of bone. Be as specific as possible).

98) The cartilage connection between a rib and the sternum are called its _____ cartilage.

99) The appendicular skeleton includes the bones of the limbs, and also the bones of the _____, which are the bony junctions between limb bones and axial bones.

100) The bones of the upper limbs are attached to the axial skeleton by the _____ girdle. The bones of the lower limbs are attached to the axial skeleton by the _____ girdle.

101) Each shoulder girdle consists of one _____ bone and one _____ bone.

102) The lateral end of the clavicle articulates with the _____ (a process) of the _____ bone.

103) The medial end of the clavicle articulates with the _____ bone.

104) "Shoulder blade" is the common term for the _____ bone.

105) Each scapula articulates distally with the _____ bone and proximally with the _____ bone.

106) The _____ cavity of the scapula articulates with the humerus.

107) The back of the scapula has a ridge-shaped process called the _____ of the scapula. Its function is _____.

108) The upper limb consists of three regions. From shoulder to elbow is the _____. From elbow to wrist is the _____. Distally from the wrist is the _____.

109) The arm (recall, the arm is the region from shoulder to elbow) has only one bone, the _____.

110) The humerus articulates proximally with the _____ and distally with the _____ and _____.

111) The proximal end of the humerus is shaped like a large round knob. This rounded end is called the _____ of the humerus. It articulates with the _____ (a cavity) of the _____ bone.

112) The forearm has two bones: The _____ and the _____.

113*) The radius is the medial/lateral (circle one) bone of the forearm. The ulna is the medial/lateral (circle one) bone of the forearm.

114) The hand (which includes the wrist) contains three types of bones: the _____ of the wrist, the _____ of the palm, and the _____ of the fingers.

115) On each hand, there are _____ (a number) of carpals, _____ (a number) of metacarpals, and (a number) of phalanges.

116) Each finger has _____ (a number) of phalanges, except the thumb which has only _____ (a number).

117) The pelvis is formed from the two _____ bones and also the spine's _____ and _____ bones.

118) The hip bones are part of the _____. Each hip bone is formed by fusion of three bones: the _____, _____ and _____.

119*) The superior portion of each hip bone is the _____. You can feel this region as the upward ridge at the side of your pelvis.

120*) The posterior and inferior region of each hip bone is the _____. When you sit down, this is the region of each hip bone that touches the chair.

121*) The anterior and inferior region of each hip bone is the _____.

122) The _____ is a shallow depression in each hip bone. It articulates with the femur.

123) Each hip bone has hole in it called the _____, which serves as a passage to allow nerves and blood vessels to connect to the thigh.

124) Together, the bones of the pelvis form a structure shaped like a bowl with a hole at the bottom. The diameter (size) of the top of the pelvis is called the _____ pelvis. The size (diameter) of the opening at the bottom of the pelvis is called the _____ pelvis.

125) In women, the true pelvis is wider/narrower (circle one) than in males.

126) The lower limb consists of three regions. From hip to knee is the _____. From knee to ankle is the _____. Distally from the ankle is the _____.

127) The thigh has only one bone, the _____.

128) The femur articulates proximally with the _____ and distally with the _____, and _____.

129) The proximal end of the femur is shaped like a large round knob. This rounded end is called the _____ of the femur. It articulates with the _____ (a cavity) of the _____ bone.

130) The _____ bone is the knee cap.

131) Three bones are part of the knee joint: The _____, the _____, and the _____.

132) The leg has two bones: The _____ and the _____.

133) The tibia is the medial/lateral (circle one) bone of the leg. The fibula is the medial/lateral (circle one) bone of the leg.

134*) The fibula is larger/smaller (circle one) than the tibia.

135) The fibula is/isn't (circle one) part of the knee joint.

136) The proximal end of the fibula articulates with the _____.

137) If you feel the bones near the top of your ankle, you will feel a knob of bone on the medial side and a knob of bone on the lateral side. The knob on the medial side is called the _____. It is part of the _____ bone. The knob on the lateral side is the _____. It is part of the _____ bone.

138) The foot (which includes the ankle) contains three types of bones: The _____ of the ankle, the _____ of the sole, and the _____ of the toes.

139) The heel of the foot is the _____ (the name of a specific tarsal).

140*) The distal ends of the tibia and fibula articulate with _____ (the name of a specific tarsal).

141) The talus is superior/inferior (circle one) to the calcaneus.

142) The bones of the sole of the foot are called the _____ bones.

143) The bones of the toes, like the bones of the fingers, are called _____.

144) Each toe has _____ (a number) of phalanges, except the big toes which has only _____ (a number).

145) On each foot, there are _____ (a number) of tarsals, _____ (a number) of metatarsals, and (a number) of phalanges.

146) The largest single bone of the skeleton is the _____.

147) A(n) _____ is any site where two bones meet. This is also called a _____.

148) The dense connective tissue structures that surround the outside of a joint and hold the bones together are called _____.

149) Based on the type of tissue between the bones, the three types of joints are _____, _____, and _____.

150) For _____ joints, the bones are joined by fibrous connective tissue and their function is to prevent separation (in other words, to hold the bones solidly together with no movement).

151) An example of a fibrous joint in the body is _____.

152) For _____ joints, there is a cartilage disc between the bones, which functions to cushion the joint. This type of joint is found in parts of the skeleton that carry the body weight.

153) An example of a cartilaginous joint in the body is _____.

154) In _____ joints, between the bones there is a joint cavity filled with a slippery lubricating fluid. The fluid is called _____ fluid and it is made by the _____ membrane that encloses the joint cavity.

155) An example of a synovial joint in the body is _____.

156) Because synovial joints do not have any tissue directly between the bones to hold them together, they are reinforced by connective tissues outside the joint cavity. List the two types of connective tissue structures found on the outside of synovial joints: _____ and _____.

157) List the three joint types from the one with the most mobility to the one with the least mobility:
_____, _____, and _____.

158) A sprain is due to damaged or torn _____.

159) When two bones that normally articulate are separated forcibly and stay apart, the injury is called a _____.

160) When a joint itself becomes painful and its mobility is reduced, the condition is called _____.

161) Name the three types of arthritis we discussed in lecture. Circle the one that is most common in seniors. Put a box around the one that is an autoimmune disease.

162) The cause of osteoarthritis is when the _____ of a joint is worn out due to decades of use. This is why the people who get osteoarthritis are usually senior citizens.

163) The cause of rheumatoid arthritis is when the articular cartilage is destroyed by _____.

164) Rheumatoid arthritis is more common in males/females (circle one).

165) _____ is a painful form of arthritis that is caused by the buildup of _____ acid in the joints.

Answers to fill-in-the-blank review questions:

- 1) Support weight
Protect/Anchor organs
- 2) Calcium phosphate
- 3) Ca^{2+}
 PO_4^{3-}
- 4) Collagen
- 5) Ossification
Osteoblasts
Spongy bone
- 6) Cartilage
- 7) Ossification
- 8) Osteoblasts
- 9) Medullary cavity
- 10) Marrow
- 11) Yellow
- 12) Red
- 13) Skull
Ribs
Vertebrae
- 14) Long bones
- 15) Diaphysis
Compact
- 16) Epiphysis
Spongy
- 17) Periosteum
- 18) Epiphyseal plate
- 19) Epiphyseal line
- 20) Hyaline cartilage
- 21) Articular cartilage
- 22) Osteons
Haversian systems
- 23) Central canal
Blood vessels
- 24) Canaliculi
- 25) Lamella
- 26) Osteocytes
Lacuna
- 27) Osteoclasts
- 28) Fracture
- 29) Closed fracture (or simple fracture)
Open fracture (or compound fracture)
- 30) Osteoporosis
- 31) Women
- 32) Calcium
Vitamin D
Exercise
- 33) Rickets
Calcium
Vitamin D
- 34) The legs bow outward
- 35) Process
Muscles
- 36) Head
- 37) Foreman
Blood vessels
Nerves
Tendons
- 38) 206
- 39) Axial skeleton
Appendicular skeleton
- 40) Skull
Thoracic cage
Spine
- 41) Cranial bones
Facial
- 42) Eight
Frontal bone
Parietal bones (pair)
Occipital
Temporal (pair)
Sphenoid
Ethmoid
- 43) Frontal bone
- 44) Parietal bones
- 45) Parietal bones
- 46) Occipital bone
- 47) Occipital bone
Spinal cord
- 48) Temporal bones
- 49) Zygomatic process
Temporal bone
- 50) External auditory meatus
Temporal bone
- 51) Styloid process
Temporal bone
- 52) Sphenoid bone
- 53) Ethmoid bone

- 54) Ethmoid bone
- 55) Ethmoid bone
- 56) Fontanel
Flexing of the skull
Growth of the brain
- 57) Sutures
- 58) Fourteen
Mandible
Maxillary (pair)
Zygomatic (pair)
Nasal (pair)
Palantine (pair)
Inferior nasal concha (pair)
Lacrimal (pair)
Vomer
- 59) Nasal bones
- 60) Lacrimal bones
- 61) Zygomatic bones
Maxillary bones
- 62) Vomer
- 63) Palantine bones
- 64) Frontal bone
- 65) Mandible
Temporal bone
- 66) Inferior nasal concha
- 67) Maxillary
- 68) Maxillary
Palantine
- 69) Paranasal sinuses
- 70) Frontal
Maxillary
Ethmoid
Sphenoid
- 71) Vertebrae
Spine
Vertebral column
- 72) Support body weight
Protect the spinal cord
- 73) Vertebral arch
- 74) Vertebral foremen
- 75) Vertebral canal
- 76) Body
Carry body weight
- 77) Intervertebral discs
- 78) Processes
- 79) a = Spinous process
b = Transverse processes
c = Vertebral arch
d = Vertebral foremen
e = Body
e
d
a and b
e
- 80) Posterior
- 81) Superficial
- 82) Cervical 7
Thoracic 12
Lumbar 5
Sacrum 5 (fused)
Coccyx 4 (fused)
- 83) Seven
Twelve
Five
- 84) Foremen
- 85) Forked end of spinous process
- 86) Atlas
Occipital
- 87) Axis
- 88) Long and narrow (like a horse head)
- 89) Hatchet shaped
- 90) Lumbar
- 91) Ribs
- 92) Sacrum
Five
- 93) Coccyx
Four
- 94) Ribs
Sternum
Thoracic vertebrae
- 95) Manubrium
Body
Xiphoid process
- 96) Twelve
Seven
Five
Two
- 97) Sternum
Thoracic vertebrae
- 98) Costal cartilage

- 99) Girdles
- 100) Shoulder girdle
Pelvic girdle
- 101) Clavicle
Scapula
- 102) Acromion process
Scapula
- 103) Sternum
- 104) Scapula
- 105) Humerus
Clavicle
- 106) Glenoid cavity
- 107) Spine
Attachment site for shoulder muscles
- 108) Arm
Forearm
Hand
- 109) Humerus
- 110) Scapula
Radius
Ulna
- 111) Head
Glenoid cavity
Scapula
- 112) Radius
Ulna
- 113) Lateral
Medial
- 114) Carpals
Metacarpals
Phalanges
- 115) Eight
Five
Fourteen
- 116) Three
Two
- 117) Hip
Sacrum
Coccyx
- 118) Pelvis
Ileum
Ischeum
Pubis
- 119) Ileum
- 120) Ischeum
- 121) Pubis
- 122) Acetabulum
- 123) Obturator Foramen
- 124) False
True
- 125) Wider
- 126) Thigh
Leg
Foot
- 127) Femur
- 128) Hip bone
Tibia
Patella
- 129) Head
Acetabulum
Hip
- 130) Patella
- 131) Femur
Patella
Tibia
- 132) Tibia
Fibula
- 133) Medial
Lateral
- 134) Smaller
- 135) Isn't
- 136) Tibia
- 137) Medial malleolus
Tibia
Lateral malleolus
Fibula
- 138) Tarsals
Metatarsals
Phalanges
- 139) Calcaneous
- 140) Talus
- 141) Superior
- 142) Metatarsals
- 143) Phalanges
- 144) Three
Two
- 145) Seven
Five
Fourteen
- 146) Femur

- | | |
|-------------------------------------------------------------|---------------------------------------------------------------|
| 147) Articulation
Joint | 156) Ligaments
The fibrous capsule |
| 148) Ligaments | 157) Synovial
Cartilaginous |
| 149) Fibrous
Cartilaginous
Synovial | Fibrous |
| 150) Fibrous | 158) Ligaments |
| 151) The sutures of the skull | 159) Dislocation |
| 152) Cartilaginous | 160) Arthritis |
| 153) Knee joint (or vertebral joints) | 161) Osteoarthritis (circled)
Rheumatoid arthritis (boxed) |
| 154) Synovial joints
Synovial fluid
Synovial membrane | Gout |
| 155) Shoulder (or hip, knee, or elbow) | 162) Articular cartilage |
| | 163) The immune system |
| | 164) Females |
| | 165) Gout
Uric acid |

Short answer questions:

1) Cross out the term that does not belong with the others, and write a brief explanation why the term you crossed out does not belong with the others.

Diaphysis Compact bone Medullary cavity Spongy bone

2) Contrast red and yellow marrow: What is the function of each? In what way do they change as we age?

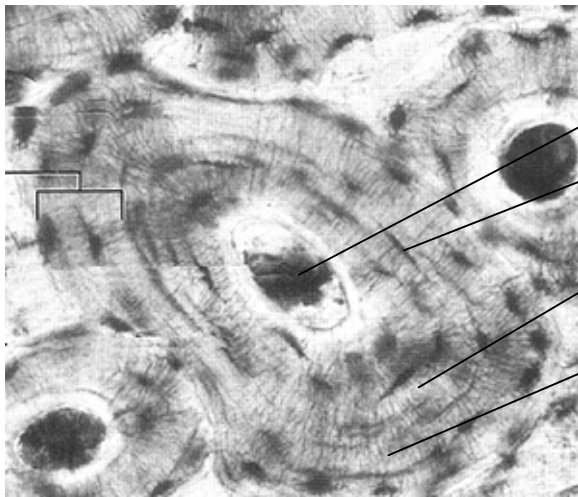
3) Answer the following questions about the epiphyseal plate (the growth centers of bones).

- a) Where in the bone are epiphyseal plates located?
- b) What type of tissue are they?
- c) What part of the bone do they lengthen?
- d) Briefly describe the process by which the epiphyseal plates make new bone tissue.
- e) In adults, the bones no longer have epiphyseal plates. What has happened to the epiphyseal plates and what are the remnants of them called?

4) In the lecture, three different bone cells were mentioned. Name each bone cell type and describe what it does.

- a) _____
- b) _____
- c) _____

5) The picture below shows a microscopic view of bone tissue. Notice that bone tissue is made of circular units. Identify the name of the circular units and for each of the unit's 5 parts, name the part and state its function. Circular unit name: _____



- _____
- _____
- _____
- (the rings of bone tissue)
- _____
- (the tiny dark lines)

6) Name some causes of osteoporosis and rickets. What physical deformity is associated with rickets but not osteoporosis.

7) What is the defining difference between true ribs and false ribs? Which of the 12 pairs of ribs are true ribs and which are false ribs?

8) What is a floating rib? Which of the 12 pairs of ribs are floating ribs?

9) When standing in anatomical position, the palms are facing forward. In this position, the radius is lateral to the ulna. When we rotate our palms inward, such that they face our thigh, what happens to the positions of the radius and ulna? Be as exact as possible and answer in terms of lateral, medial, proximal, and distal.

10) Using the proper anatomical terminology, describe the difference in pelvis diameter between males and females. Also, explain the purpose of this difference.

11) What is the correct anatomical term for the thigh bone? _____

Draw a thigh bone below. Label in your drawing the head, the epiphysis, the diaphysis, and the compact bone and spongy bone areas. Make lines on your drawing showing where growth of the bone occurs, and label these growth areas with their proper name.

12) Tendons and ligaments are both examples of dense connective tissue structures that connect to bones. What is the difference between a tendon and a ligament?

Answers to short answer questions:

1) Spongy bone (crossed out). All the terms except spongy bone are found in the center of longbones: Diaphysis is the name of the shaft-shaped center of a longbone, it is made of compact bone, and it contains the medullary cavity. Spongy bone, on the other hand, is found at the ends of a longbone (in the epiphysis).

2) Red marrow makes blood cells. Yellow marrow is adipose (fat) tissue. We are born with red marrow in all of our bones, but as we get older more and more of the red marrow is converted into yellow marrow.

3) a) The epiphyseal plates are located between the diaphysis and the epiphysis at each end of the longbone.

b) The epiphyseal plates are made of cartilage

c) They lengthen the diaphysis of the longbone.

d) During growth of the skeleton, the epiphyseal plates make more cartilage, but osteoblast cells convert the cartilage to bone tissue as fast as it is made.

e) The cartilage tissue of the epiphyseal plates is converted to bone tissue by the hormones of puberty. Therefore no more skeletal lengthening is possible. The bones of adults have a line called the epiphyseal line that marks the former location of the epiphyseal plate.

4)	Osteoblasts	Cause bone growth by converting cartilage into bone tissue.
	Osteocytes	Bone cells that maintain bone tissue. They live within the bone tissue (in lacuna of osteons)
	Osteoclasts	Dissolve bone to release calcium to the blood.

- 5) Circular unit name: Osteon (or Haversian system)
Central canal
Osteocyte (in a lacuna)
Lamella
Canaliculi

6) Osteoporosis and Rickets can both be caused by lack of calcium or lack of vitamin D in the diet. Rickets causes a bowing outward of the legs, but this deformity is not a symptom of osteoporosis.

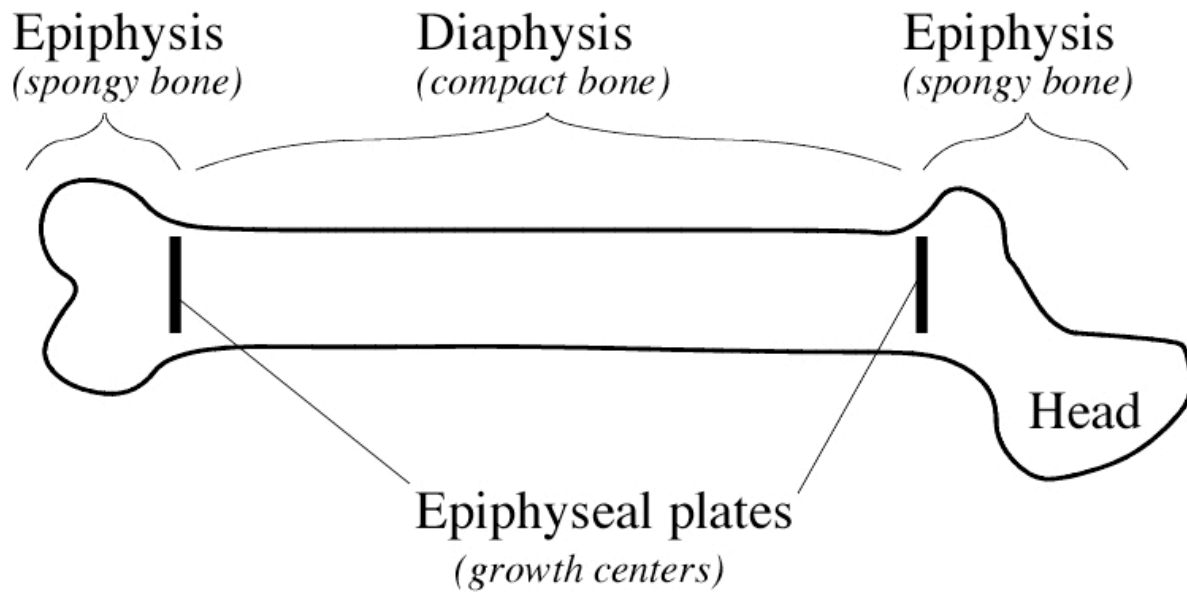
7) A true rib has a direct cartilage connection to the sternum. A false rib does not have a direct cartilage connection to the sternum. (Some false have cartilage connections to the cartilage of true ribs and some false ribs have no cartilage connections at all). The superior seven pairs of ribs are true ribs. The inferior five pairs of ribs are false ribs.

8) Floating ribs are the ribs that do not have any cartilage connections at all. The floating ribs are the two inferior-most pairs of the twelve pairs of ribs. In terms of the false ribs (see question 7, above) the floating ribs are the lowest two of the five pairs of false ribs. This means that all floating ribs are false ribs but not all false ribs are floating ribs.

9) Recall that in anatomical position the palms are facing forward and the radius is lateral to the ulna. When we turn our palms inward from anatomical position, the distal end of the radius crosses over the ulna. This means at the end of forearm near the wrist, the distal end of the radius is now medial and the ulna is now lateral. At the proximal end of the forearm, however, the bones do not cross over, so the radius is lateral and the ulna is medial.

10) Recall that the pelvis is shaped like a bowl with a hole in the bottom. The diameter of the “top of the bowl” is called the false pelvis. The diameter of the “hole at the bottom of the bowl” is called the true pelvis. The true pelvis is larger in females than in males. This is because babies must pass through the true pelvis during birth.

11) The femur is the correct anatomical term for the thigh bone.



12) A tendon connects muscle to bone. A ligament connects bone to bone.