

Exam

Name \_\_\_\_\_

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

1) An open or \_\_\_\_\_ fracture projects through the skin. 1) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

2) The humerus is an example of a(n) \_\_\_\_\_ bone. 2) \_\_\_\_\_  
A) flat B) sesamoid C) long D) short E) irregular

3) Accelerated closure of the epiphyseal plates could be caused by 3) \_\_\_\_\_  
A) too little thyroxine.  
B) high levels of vitamin D.  
C) an excess of growth hormone.  
D) too much calcium in the diet.  
E) elevated levels of estrogen.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

4) The adult skeleton contains \_\_\_\_\_ major bones. 4) \_\_\_\_\_

5) A(n) \_\_\_\_\_ or closed fracture does not break the skin. 5) \_\_\_\_\_

6) The process of depositing calcium into a tissue is called \_\_\_\_\_. 6) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

7) Fat is stored within the 7) \_\_\_\_\_  
A) epiphysis.  
B) diaphysis.  
C) metaphysis.  
D) medullary cavity.  
E) spongy bone.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

8) During the process of \_\_\_\_\_, an existing tissue is replaced by bone. 8) \_\_\_\_\_

9) A(n) \_\_\_\_\_ is a rounded passageway for passage of blood vessels and/or nerves. 9) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

10) If osteoclasts are more active than osteoblasts, bones will become 10) \_\_\_\_\_  
A) denser.  
B) calcified.  
C) stronger.  
D) thicker.  
E) osteopenic.

11) A condition in which bone becomes riddled with holes is called

11) \_\_\_\_\_

- A) osteoporosis.
- B) osteomalacia.
- C) osteitis.
- D) osteomyelitis.
- E) osteopenia.

12) \_\_\_\_\_ bones develop inside tendons, commonly near the knees, hands, and feet.

12) \_\_\_\_\_

- A) Long
- B) Irregular
- C) Flat
- D) Sesamoid
- E) Short

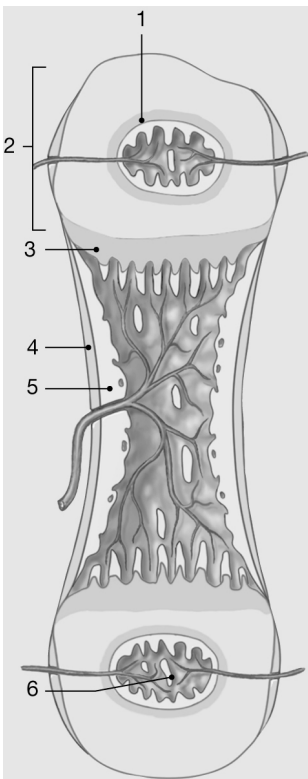


Figure 6-2 Endochondral Ossification

Use Figure 6-2 to answer the following question(s):

13) Where does growth in length occur?

13) \_\_\_\_\_

- A) 2
- B) 4
- C) 1
- D) 5
- E) 3

14) Excessive growth hormone prior to puberty could result in

14) \_\_\_\_\_

- A) osteoporosis.
- B) dwarfism.
- C) rickets.
- D) gigantism.
- E) osteopenia.

- 15) \_\_\_\_\_ cells are located in the inner cellular layer of the periosteum. 15) \_\_\_\_\_  
A) Osteoclast  
B) Osteoid  
C) Osteoprogenitor  
D) Osteocyte  
E) Chondroblast
- 16) Bones that develop within tendons are called \_\_\_\_\_ bones. 16) \_\_\_\_\_  
A) tendon                      B) sutural                      C) sesamoid                      D) Wormian                      E) irregular
- 17) Bone growth in length occurs by mitosis of 17) \_\_\_\_\_  
A) cartilage cells in the epiphyseal side of the metaphysis.  
B) concentric lamellae.  
C) growth of trabeculae.  
D) cartilage cells in the diaphyseal side of the metaphysis.  
E) osteoblasts in the endosteum.
- 18) During appositional growth 18) \_\_\_\_\_  
A) bone is replaced by cartilage.  
B) osteoblasts are overwhelmed by osteocytes.  
C) bones grow wider.  
D) bones grow longer.  
E) the epiphysis fuses with the diaphysis.
- 19) Which of the following bones is classified as "irregular" in shape? 19) \_\_\_\_\_  
A) metatarsal                      B) ulna                      C) patella                      D) vertebra                      E) frontal
- 20) The following are important steps in the process of endochondral ossification. 20) \_\_\_\_\_  
1. Enlarged chondrocytes die.  
2. Osteoblasts replace calcified cartilage with spongy bone.  
3. Chondrocytes enlarge and the surrounding matrix begins to calcify.  
4. Blood vessels invade the perichondrium.  
5. Perichondrial cells become osteoblasts and produce a thin shell of bone.
- The correct order for these events is  
A) 1, 5, 3, 4, 2  
B) 2, 3, 1, 5, 4  
C) 3, 1, 4, 5, 2  
D) 1, 3, 5, 4, 2  
E) 3, 1, 5, 4, 2
- 21) The narrow passageways that contain cytoplasmic extensions of osteocytes are called 21) \_\_\_\_\_  
A) central canals.  
B) foramina.  
C) medullary cavities.  
D) lacunae.  
E) canaliculi.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 22) The narrow region between the head and shaft of a long bone is called the \_\_\_\_\_. 22) \_\_\_\_\_

23) \_\_\_\_\_ hormones stimulate osteoblasts to produce bone matrix. (Note: Be sure to capitalize the first letter of your answer).

23) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

24) Where in the body does the production of precursors for the synthesis of calcitriol occur?

24) \_\_\_\_\_

- A) bone
- B) kidneys
- C) liver
- D) skin
- E) small intestine

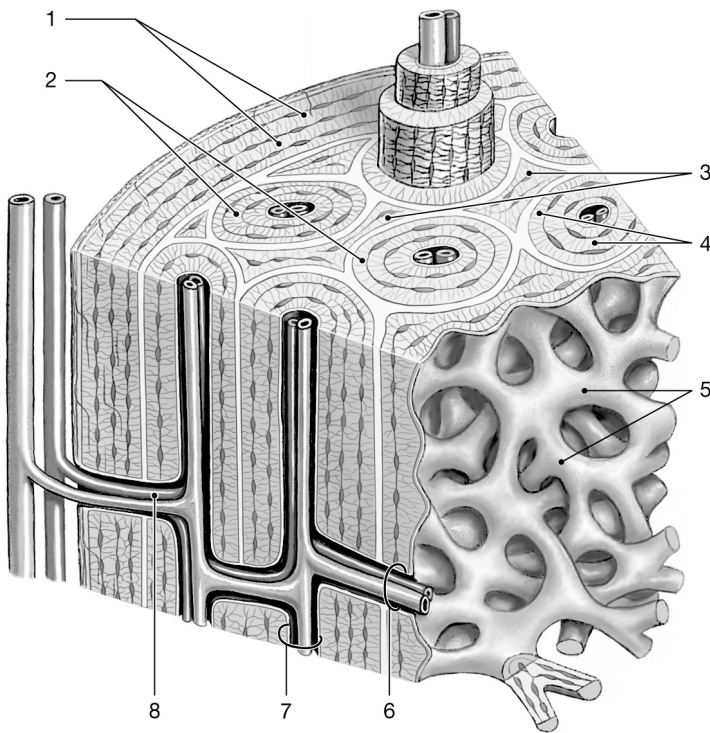


Figure 6-1 Bone Tissue

Use Figure 6-1 to answer the following questions:

25) Which structure is termed an osteon?

25) \_\_\_\_\_

- A) 2
- B) 3
- C) 4
- D) 5
- E) 1

26) The articular cartilage of a typical long bone is composed of what type of cartilage?

26) \_\_\_\_\_

- A) elastic cartilage
- B) osseous cartilage
- C) fibrocartilage
- D) synovial cartilage
- E) hyaline cartilage

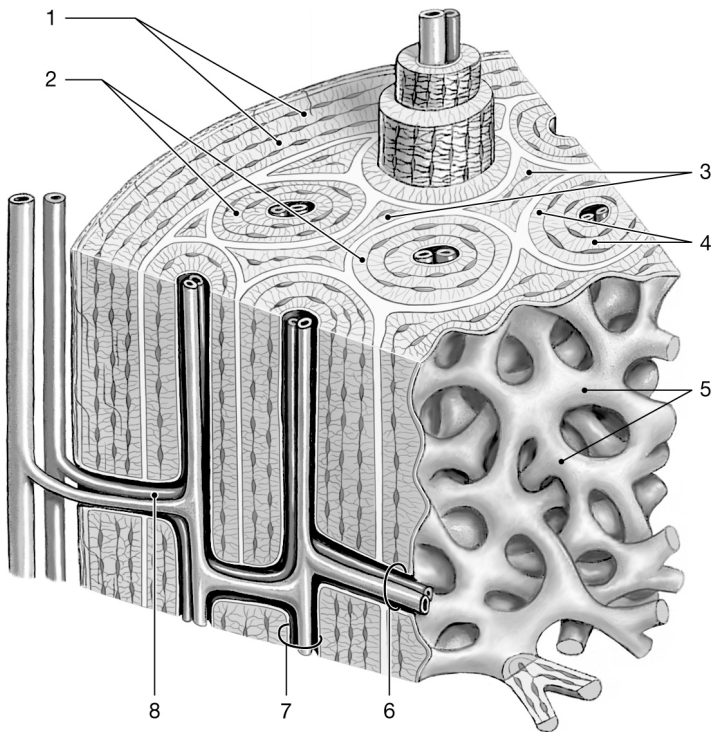


Figure 6-1 Bone Tissue

Use Figure 6-1 to answer the following questions:

27) Which structure is characteristic of spongy bone?

A) 5

B) 2

C) 4

D) 1

E) 3

27) \_\_\_\_\_

28) The lacunae of osseous tissue contain

A) bone marrow.

B) blood cells.

C) capillaries.

D) osteocytes.

E) chondroblasts.

28) \_\_\_\_\_

29) The region of a long bone between the end and the shaft is known as the \_\_\_\_\_.

A) osseophysis

B) diaphysis

C) medullary cavity

D) epiphysis

E) metaphysis

29) \_\_\_\_\_

30) Secondary ossification centers occur

A) in the metaphyses.

B) in the diaphysis.

C) in dermal bones.

D) at the periosteum.

E) in the epiphyses.

30) \_\_\_\_\_

- 31) Factors that are necessary for proper bone formation include all of the following, except 31) \_\_\_\_\_
- A) the hormone thyroxine.
  - B) vitamin E.
  - C) vitamin D.
  - D) vitamin A.
  - E) vitamin C.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 32) The fracture of vertebrae subjected to extreme vertical stress is called a(n) \_\_\_\_\_ 32) \_\_\_\_\_  
fracture.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 33) The smooth, rounded articular process of a bone is termed a 33) \_\_\_\_\_
- A) head.
  - B) trochlea.
  - C) ridge.
  - D) crest.
  - E) condyle.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 34) In a(n) \_\_\_\_\_ fracture one side of the shaft is split and the other side is bent. 34) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 35) A fracture at the ankle involving both lower leg bones is often called a \_\_\_\_\_ fracture. 35) \_\_\_\_\_
- A) Pott
  - B) greenstick
  - C) Colles
  - D) compression
  - E) displaced

- 36) Why does osteoporosis affect more women than men? 36) \_\_\_\_\_
- A) Women typically do not get enough calcium in their diet.
  - B) Men do not remodel the skeleton as fast as women.
  - C) Men exercise more than women and therefore have less osteoporosis.
  - D) Women have a decrease in sex hormones after menopause whereas men continue to produce male sex hormones throughout adulthood.
  - E) Pregnancy causes deossification of bones in women and will lead to osteoporosis.

- 37) The \_\_\_\_\_ interactions allow bone to be strong, somewhat flexible, and highly resistant to shattering. 37) \_\_\_\_\_
- A) mineral-crystal
  - B) hydroxyapatite-crystal
  - C) protein-crystal
  - D) protein-protein
  - E) collagen-fiber

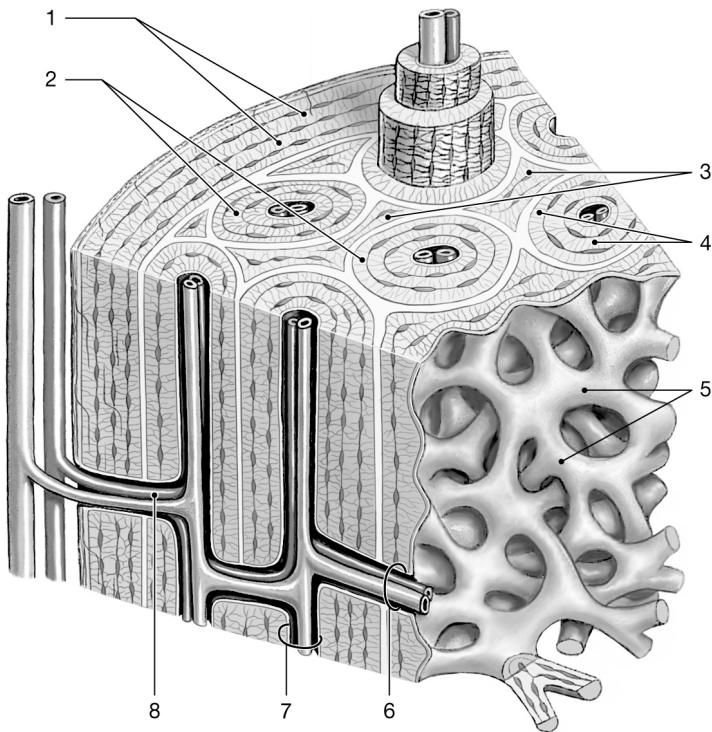


Figure 6-1 Bone Tissue

Use Figure 6-1 to answer the following questions:

38) The structure labeled "3" is the result of which process?

38) \_\_\_\_\_

- A) surface growth of bone
- B) bone cells adding matrix between existing osteons
- C) remodeling of compact bone
- D) remodeling of spongy bone
- E) osteoporosis

39) The condition known as osteopenia

39) \_\_\_\_\_

- A) causes a gradual reduction in bone mass.
- B) affects mostly women.
- C) only affects the femur.
- D) is rarely seen as people age.
- E) is caused by too much vitamin D in the diet.

40) Aging has what effect on the skeletal system?

40) \_\_\_\_\_

- A) progressive loss of processes and tuberosities
- B) loss of calcium and collagen fibers from matrix
- C) fusion of joints, especially syndesmoses
- D) increase in adipose tissue in epiphyses
- E) increase in the number of cranial foramina

- 41) The trabeculae of spongy bone 41) \_\_\_\_\_  
A) are organized parallel to the long axis of the bone.  
B) will collapse under stress.  
C) are organized along stress lines.  
D) are concentrated in the cortex of the diaphysis.  
E) are composed mostly of cartilage.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 42) A boot-top fracture that involves both lower leg bones is called a(n) \_\_\_\_\_ fracture. 42) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 43) While on a school skiing trip in Colorado, Heidi falls and breaks her tibia and fibula in a Pott fracture. What would you expect as a prominent part of her clinical assessment several hours after the fall? 43) \_\_\_\_\_  
A) erythema  
B) hematoma  
C) cyanosis  
D) hypertension  
E) tachycardia

- 44) \_\_\_\_\_ marrow is found between the trabeculae of spongy bone. 44) \_\_\_\_\_  
A) Red B) Blue C) White D) Gray E) Yellow

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 45) Blood is distributed from the surface of a bone to deeper central canals through channels known as \_\_\_\_\_. 45) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 46) Through the action of osteoclasts, 46) \_\_\_\_\_  
A) an organic framework is formed.  
B) new bone is formed.  
C) bony matrix is dissolved.  
D) osteoid is calcified.  
E) fractured bones regenerate.

- 47) \_\_\_\_\_ account(s) for almost two-thirds of the weight of bone. 47) \_\_\_\_\_  
A) Calcium phosphate  
B) Calcium carbonate  
C) Collagen fibers  
D) Fluoride  
E) Water

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 48) A chamber within a bone normally filled with air is a \_\_\_\_\_. 48) \_\_\_\_\_



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 49) The large proximal projection on the femur is termed the \_\_\_\_\_  
A) condyle.  
B) ramus.  
C) tubercle.  
D) tuberosity.  
E) trochanter.
- 50) In relationship to the diaphysis of a long bone, the osteons are \_\_\_\_\_  
A) parallel.  
B) anterior.  
C) radial.  
D) diagonal.  
E) proximal.
- 51) The interconnecting tiny arches of bone tissue found in spongy bone are called \_\_\_\_\_  
A) interstitial lamellae.  
B) osteons.  
C) trabeculae.  
D) concentric lamellae.  
E) lacunae.
- 52) Suppose that epiphyseal lines appear in a 10-year-old's long bones. Which of the following statements is therefore true? \_\_\_\_\_  
A) More growth will occur during the teenage years as sex hormones stimulate rebuilding of growth plates.  
B) Administration of growth hormone will stimulate future bone growth in length.  
C) The epiphyseal plates have ossified and further growth in length is not possible.  
D) Osteoclasts will dissolve the metaphysis so length growth can continue until adulthood.  
E) Intramembranous ossification will enable further growth in length.
- 53) The type of bone that is adapted to withstand stresses that arrive from many directions is \_\_\_\_\_ bone. \_\_\_\_\_  
A) irregular                      B) spongy                      C) lamellar                      D) osteon                      E) compact
- 54) The deposition of calcium salts in bone tissues is referred to as \_\_\_\_\_  
A) remodeling.  
B) hardening.  
C) calcification.  
D) ossification.  
E) osteogenesis.
- 55) The carpal bones are examples of \_\_\_\_\_ bones. \_\_\_\_\_  
A) flat                      B) long                      C) irregular                      D) sesamoid                      E) short

56) The most abundant cell type in bone is 56) \_\_\_\_\_  
A) osteocytes.  
B) osteoprogenitor cells.  
C) osteoblasts.  
D) osteolytes.  
E) osteoclasts.

57) Which of the following statements about Marfan's syndrome is false? 57) \_\_\_\_\_  
A) affects epiphyseal cartilages  
B) results in short, stubby fingers  
C) results from a mutation  
D) affects connective tissue genes  
E) may also cause cardiovascular problems

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

58) A(n) \_\_\_\_\_ fracture produces shattered bone fragments. 58) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

59) Primary ossification centers develop in long bones in the 59) \_\_\_\_\_  
A) diaphysis.  
B) periosteum.  
C) proximal epiphysis.  
D) distal epiphysis.  
E) metaphysis.

60) How would removing hydroxyapatite from bone matrix affect the physical properties of a bone? 60) \_\_\_\_\_  
A) The bone would be stronger.  
B) The bone would be less compressible.  
C) The bone would be more brittle.  
D) The bone would be more flexible.  
E) The bone would be less flexible.

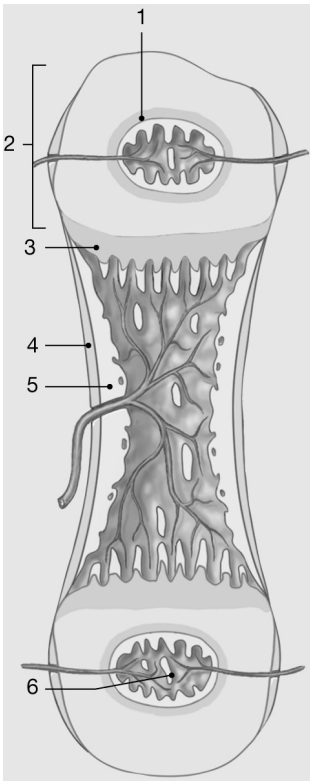


Figure 6-2 Endochondral Ossification

Use Figure 6-2 to answer the following question(s):

- 61) What process is shown at #6?  
 A) primary ossification  
 B) secondary ossification  
 C) fracture repair  
 D) length growth  
 E) width growth

61) \_\_\_\_\_

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 62) \_\_\_\_\_ prevents damaging bone-to-bone contact within movable joints. (Note: Be sure to capitalize the first letter of your answer).

62) \_\_\_\_\_

- 63) A fracture of the bone across its long axis is called a(n) \_\_\_\_\_ fracture.

63) \_\_\_\_\_

- 64) The shaft of long bones is called the \_\_\_\_\_.

64) \_\_\_\_\_

- 65) A transverse fracture of the wrist that may be comminuted is called a(n) \_\_\_\_\_ fracture.

65) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

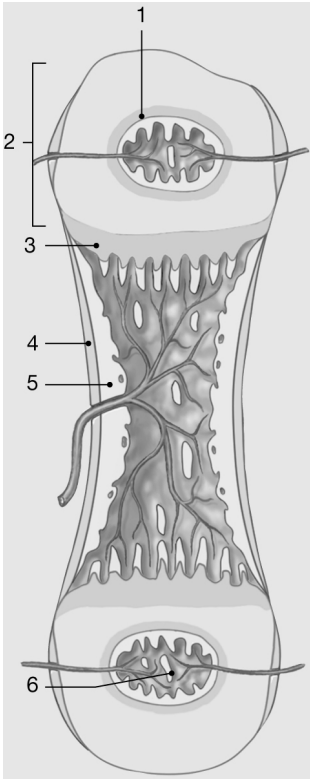


Figure 6-2 Endochondral Ossification

Use Figure 6-2 to answer the following question(s):

66) Identify the structure at #4.

- A) hyaline cartilage
- B) intramembranous bone
- C) mesenchyme
- D) periosteum
- E) spongy bone

66) \_\_\_\_\_

67) Elevated levels of calcium ion in the blood stimulate the secretion of the hormone

- A) calcitonin.
- B) testosterone.
- C) parathyroid hormone.
- D) growth hormone.
- E) thyroid hormone.

67) \_\_\_\_\_

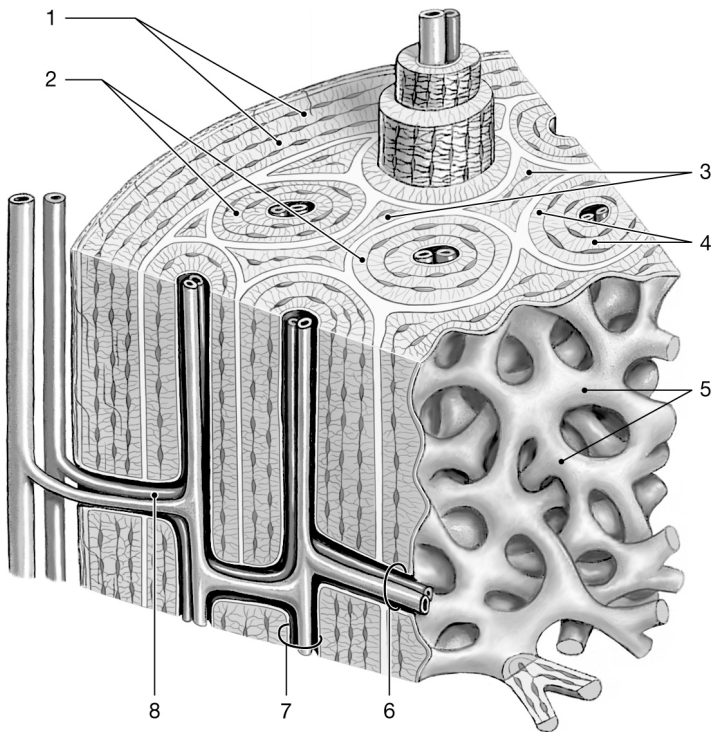


Figure 6-1 Bone Tissue

Use Figure 6-1 to answer the following questions:

68) Identify the structures labeled "4."

68) \_\_\_\_\_

- A) concentric lamellae
- B) periosteum
- C) circumferential lamellae
- D) interstitial lamellae
- E) trabeculae

69) The lining of the medullary cavity is called the

69) \_\_\_\_\_

- A) epimysium.
- B) perichondrium.
- C) perimysium.
- D) periosteum.
- E) endosteum.

70) Osteoclast-activating factor does all of the following, except that it

70) \_\_\_\_\_

- A) produces a severe osteoporosis.
- B) increases the number of osteoclasts.
- C) is released in large amounts early in life.
- D) is released by some cancer tumors.
- E) increases the activity of osteoclasts.

- 71) The disease osteomalacia causes calcium loss from the skeleton, which would result in bones that are \_\_\_\_\_ 71) \_\_\_\_\_
- A) stronger and heavier.
  - B) weaker and more flexible.
  - C) stronger and contain more spongy bone.
  - D) more resistant to compression.
  - E) weaker and more brittle.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 72) The organic component of the matrix in developing or repairing bone is called \_\_\_\_\_. 72) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 73) The tip of a long bone is called the \_\_\_\_\_ 73) \_\_\_\_\_
- A) epiphyseal plate.
  - B) metaphysis.
  - C) diaphysis.
  - D) lamella.
  - E) epiphysis.

- 74) Bone is composed of \_\_\_\_\_ percent cells. 74) \_\_\_\_\_
- A) 15                      B) 25                      C) 2                      D) 50                      E) 10

- 75) The space occupied by an osteocyte is called a \_\_\_\_\_ 75) \_\_\_\_\_
- A) Haversian canal.
  - B) trabecula.
  - C) lacuna.
  - D) Volkmann's canal.
  - E) Venetian canal.

- 76) Hundreds of years ago explorers often died of scurvy. How can this bone-related disease be prevented? 76) \_\_\_\_\_
- A) Increase levels of testosterone to stimulate bone repair.
  - B) Amputate fractured limbs to prevent the spread of scurvy.
  - C) Drink more water to promote bone remodeling and repair.
  - D) Supplement the diet with more calcium from meat.
  - E) Supplement the diet with fresh fruit rich in vitamin C.

- 77) When stress is applied to a bone, \_\_\_\_\_ 77) \_\_\_\_\_
- A) it usually breaks.
  - B) the minerals in the bone produce a weak electrical field that attracts osteoblasts.
  - C) osteoclast activity increases.
  - D) the bone compensates by becoming thinner in the region of stress.
  - E) the bone becomes thin and brittle.

78) The most abundant mineral in the human body is

78) \_\_\_\_\_

- A) calcium.
- B) potassium.
- C) hydrogen.
- D) sodium.
- E) phosphorus.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

79) Damage to a bone because of extreme load, sudden impact, or stresses applied from an unusual direction is called a(n) \_\_\_\_\_.

79) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

80) Intramembranous ossification

80) \_\_\_\_\_

- A) explains how a juvenile's bone can grow in length.
- B) occurs in all bones before birth.
- C) occurs in the diaphysis of a long bone.
- D) occurs inside a bag of cartilage.
- E) produces flat bones as in the bones of the roof of the skull.

81) A rib is an example of a \_\_\_\_\_ bone.

81) \_\_\_\_\_

- A) short
- B) flat
- C) long
- D) sesamoid
- E) sutural

82) In normal adult bones,

82) \_\_\_\_\_

- A) a portion of the protein and mineral content is replaced each year.
- B) exercise will have no effect on bone remodeling.
- C) osteoblast activity exceeds osteoclast activity, once bone has been formed.
- D) there is no turnover of minerals.
- E) osteoclasts continue to be active long after osteoblast activity ceases.

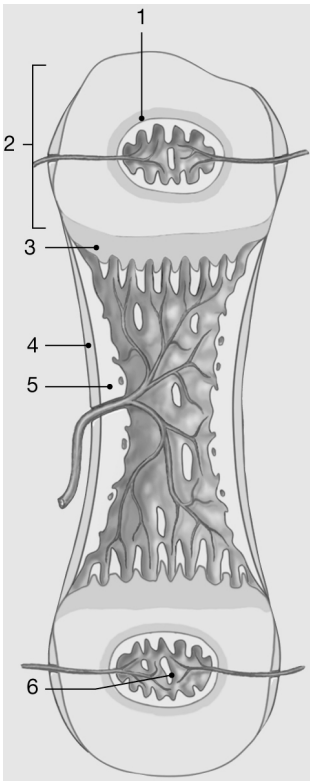


Figure 6-2 Endochondral Ossification

Use Figure 6-2 to answer the following question(s):

83) What type of tissue occurs at #1?

83) \_\_\_\_\_

- A) elastic tissue
- B) fibrocartilage
- C) marrow tissue
- D) hyaline cartilage
- E) bone

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

84) A calcified skeletal muscle is an example of \_\_\_\_\_.

84) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

85) Small, oddly shaped bones that fill gaps between bones of the skull are called \_\_\_\_\_ bones.

85) \_\_\_\_\_

- A) sutural
- B) sagittal
- C) sesamoid
- D) tendon
- E) irregular

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

86) What is the difference between ossification and calcification.?

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

87) A small rough bump on bone where a tendon attaches is called a \_\_\_\_\_.

87) \_\_\_\_\_

88) Cells that free calcium from bone to maintain blood calcium levels are called \_\_\_\_\_.

88) \_\_\_\_\_



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 89) Mary is 50 years old and has entered menopause. During a checkup, a bone scan reveals the beginnings of osteoporosis. Her physician suggests nutritional therapy. What might she recommend for her patient? 89) \_\_\_\_\_
- A) vitamin D
  - B) vitamin C
  - C) calcium supplements
  - D) dairy products
  - E) All of the answers are correct.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 90) What type of tissue is replaced in the embryo during endochondral ossification? 90) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 91) A child with rickets often has 91) \_\_\_\_\_
- A) long fingers.
  - B) oversized facial bones.
  - C) frequent bruises.
  - D) inadequate muscle development.
  - E) bowed legs.
- 92) The structural units of mature compact bone are called 92) \_\_\_\_\_
- A) osteocytes.
  - B) lacunae.
  - C) osteons.
  - D) lamellae.
  - E) canaliculi.
- 93) Put the following steps of bone repair in correct sequence: 93) \_\_\_\_\_
1. Cartilage in the external callus is replaced by bone.
  2. A hematoma occurs.
  3. An internal callus forms at the site of injury.
  4. Osteoclasts remodel the bone at the site of repair.
- A) 3, 1, 4, 2      B) 1, 2, 3, 4      C) 2, 3, 1, 4      D) 2, 1, 3, 4      E) 4, 2, 3, 1

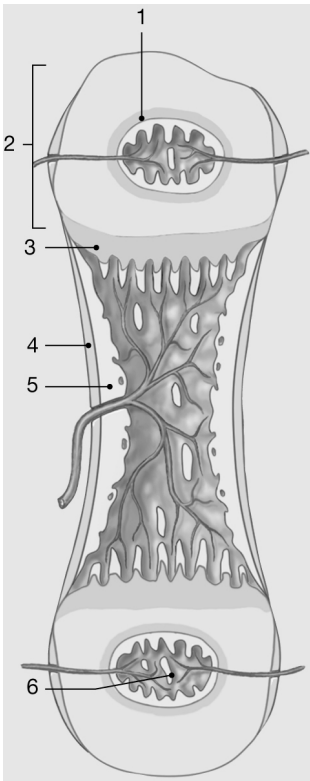


Figure 6-2 Endochondral Ossification

Use Figure 6-2 to answer the following question(s):

94) Identify the structure labeled "2."

94) \_\_\_\_\_

- A) diaphysis
- B) metaphysis
- C) trabeculae
- D) epiphysis
- E) marrow cavity

95) A hole through a bone is termed a

95) \_\_\_\_\_

- A) foramen.
- B) linea.
- C) tubercle.
- D) ramus.
- E) facet.

96) Which of the following is formed by intramembranous ossification?

96) \_\_\_\_\_

- A) femur
- B) the roof of the skull and the clavicle
- C) clavicle
- D) carpal bones
- E) roof of the skull

97) A lack of exercise could

97) \_\_\_\_\_

- A) cause bones to store more calcium.
- B) result in porous and weak bones.
- C) cause bones to lose their medullary cavity.
- D) cause bones to become longer.
- E) cause bones to become thicker.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 98) \_\_\_\_\_ fibers are stronger than steel when stretched. (Note: Be sure to capitalize the first letter of your answer). 98) \_\_\_\_\_
- 99) The expanded articular end of an epiphysis that is separated from the shaft by a narrower neck is termed a(n) \_\_\_\_\_. 99) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 100) Bone plays a central role in the regulation of blood levels of \_\_\_\_\_  
A) sodium.  
B) potassium.  
C) sulfate.  
D) calcium.  
E) iron. 100) \_\_\_\_\_
- 101) \_\_\_\_\_ bone reduces the weight of the skeleton and reduces the load on muscles.  
A) Long B) Spongy C) Compact D) Irregular E) Short 101) \_\_\_\_\_
- 102) Endochondral ossification begins with the formation of a(n) \_\_\_\_\_  
A) fibrous connective-tissue model.  
B) calcified model.  
C) cartilage model.  
D) osteoblasts model.  
E) membranous model. 102) \_\_\_\_\_

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 103) Stem cells that can differentiate into osteoblasts are called \_\_\_\_\_ cells. 103) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 104) How is vitamin D (vitamin D<sub>3</sub>) related to calcium homeostasis in bone?  
A) Vitamin D replaces calcium in the skeleton.  
B) Vitamin D provides a framework for calcium in the matrix.  
C) Vitamin D is regulated by osteoclast activity.  
D) Vitamin D is produced by osteoblasts during endochondral ossification.  
E) Vitamin D is involved in calcium absorption by the digestive tract so calcium is available for ossification and remodeling. 104) \_\_\_\_\_
- 105) A shallow depression on a bone is termed a \_\_\_\_\_  
A) fissure. B) facet. C) sulcus. D) line. E) fossa. 105) \_\_\_\_\_

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 106) The superficial membrane of a bone is called the \_\_\_\_\_. 106) \_\_\_\_\_

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

- 107) Would you expect to see changes in blood levels of the hormones calcitonin and PTH as a result of vitamin D<sub>3</sub> deficiency? Explain.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 108) Which statement is true regarding calcium in bone matrix? 108) \_\_\_\_\_  
A) Once deposited, calcium cannot be removed from bone.  
B) Calcium is secreted by osteoblasts into the matrix.  
C) Calcium is the organic part of the matrix.  
D) Calcium provides flexibility to the bone matrix.  
E) Calcium is found in crystals called hydroxyapatite.
- 109) The layers of bone tissue immediately deep to the periosteum are 109) \_\_\_\_\_  
A) epiphseal ridges.  
B) osteoid plates.  
C) concentric lamellae.  
D) circumferential lamellae.  
E) trabeculae.
- 110) Parathyroid hormone functions in all of the following ways, except that it 110) \_\_\_\_\_  
A) increases the rate of calcium absorption.  
B) decreases the rate of calcium excretion.  
C) raises the level of calcium ion in the blood.  
D) stimulates osteoclast activity.  
E) inhibits calcitonin secretion.
- 111) Bone tissue formation begins when osteoblasts secrete 111) \_\_\_\_\_  
A) collagen fibers.  
B) silica.  
C) mesenchyme.  
D) calcium.  
E) hydroxyapatite.
- 112) Intramembranous ossification begins with differentiation of \_\_\_\_\_ cells. 112) \_\_\_\_\_  
A) osteocyte  
B) osteoclast  
C) mesenchymal  
D) osteoblast  
E) osteoprogenitor

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

- 113) An elderly patient has a broken femur that is healing very slowly. A young resident suggests using a device that will create an electrical field in the area of the fracture to help speed the healing process. Why might this possibly help?

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 114) Which of the following is a characteristic of bone? 114) \_\_\_\_\_
- A) The bone matrix is very dense and contains deposits of calcium salts.
  - B) The matrix of the bone contains osteoclasts.
  - C) Narrow channels pass through the matrix to allow for muscle attachment.
  - D) For strength, compact bone is organized into a meshwork of matrix called trabeculae.
  - E) The matrix of bone is mostly collagen with very little calcium.

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

- 115) During the growth of a long bone, how is the epiphysis forced farther from the shaft?

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 116) Cells that are found in small depressions on the endosteal surfaces are the \_\_\_\_\_. 116) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 117) The following are major steps in the process of intramembranous ossification: 117) \_\_\_\_\_
1. Clusters of osteoblasts form osteoid that becomes mineralized.
  2. Osteoblasts differentiate within mesenchymal connective tissue.
  3. Spicules of bone radiate out from the ossification centers.
  4. Mesenchymal cells aggregate.

The correct order for these events is:

- A) 2, 1, 3, 4                      B) 4, 2, 1, 3                      C) 2, 3, 1, 4                      D) 4, 1, 2, 3

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

- 118) What is osteopenia? Name and define two forms of osteopenia.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 119) A \_\_\_\_\_ is a smooth, grooved bone process shaped like a pulley. 119) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 120) After a fracture of the diaphysis has healed, the thickened region that results is called the 120) \_\_\_\_\_
- A) condyle.
  - B) fracture facet.
  - C) dense tuberosity.
  - D) epiphyseal plate.
  - E) external callus.

- 121) When the epiphyseal plate is replaced by bone, 121) \_\_\_\_\_
- A) the bone becomes more brittle.
  - B) appositional bone growth begins.
  - C) puberty begins.
  - D) interstitial bone growth begins.
  - E) long bones have reached their adult length.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

122) A(n) \_\_\_\_\_ fracture is produced by twisting stresses applied to the bone. 122) \_\_\_\_\_

123) A(n) \_\_\_\_\_ fracture shatters the bone. 123) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

124) Which of the following chemicals is not present in bone? 124) \_\_\_\_\_

- A) hydroxyapatite
- B) calcium carbonate
- C) calcium phosphate
- D) collagen fibers
- E) chondroitin sulfate

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

125) Todd is 13 and lives in an urban apartment. He spends most of his time watching TV and eating "junk" food. One afternoon, during recess, he falls on the playground and breaks his leg. Although he appears to be healthy, his leg takes longer to heal than expected. What might be the cause of the longer healing time?

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

126) Which of the following labels best matches *osteocyte*? 126) \_\_\_\_\_

- A) mature bone cell
- B) secretes organic matrix
- C) stem cell
- D) dissolves matrix

127) \_\_\_\_\_ are squamous stem cells that develop into osteoblasts. 127) \_\_\_\_\_

- A) Osteomedullary cells
- B) Osteoclasts
- C) Osteocytes
- D) Squamous osteons
- E) Osteoprogenitor cells

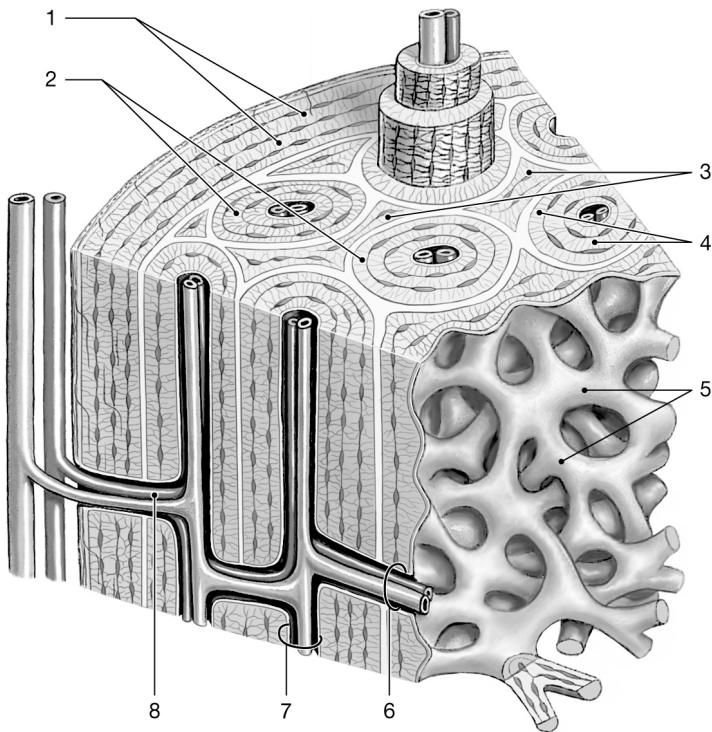


Figure 6-1 Bone Tissue

Use Figure 6-1 to answer the following questions:

- 128) Where would osteoclasts be most active? 128) \_\_\_\_\_  
 A) 2 B) 3 C) 1 D) 5 E) 4
- 129) When production of sex hormones increases at puberty, epiphyseal plates 129) \_\_\_\_\_  
 A) accelerate rapidly, but mostly in thickness.  
 B) get wider.  
 C) are hardly affected.  
 D) become narrower.  
 E) increase slowly.
- 130) The hormone calcitonin functions to 130) \_\_\_\_\_  
 A) decrease the rate of calcium excretion.  
 B) decrease the rate of calcium absorption.  
 C) stimulate osteoclast activity.  
 D) decrease the level of calcium ion in the blood.  
 E) stimulate osteoblasts and inhibit osteoclasts.
- 131) Mary is 50 years old and has entered menopause. During a checkup, a bone scan reveals the beginnings of osteoporosis. Her physician suggests hormone therapy. What hormone might she prescribe for her patient? 131) \_\_\_\_\_  
 A) calcitonin  
 B) growth hormone  
 C) thyroid hormone  
 D) parathyroid hormone  
 E) estrogen

- 132) Which of the following are not components of the skeletal system? 132) \_\_\_\_\_
- A) other tissues that connect bones
  - B) bones
  - C) tendons
  - D) ligaments
  - E) cartilage

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 133) The natural age-related loss of bone mass is called \_\_\_\_\_. 133) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 134) If a tumor secretes high levels of osteoclast-activating factor, which of the following would you expect to occur as a result of this condition? 134) \_\_\_\_\_
- A) increased osteoclast activity
  - B) bone fragility
  - C) increases in blood levels of calcium
  - D) decreased bone density
  - E) All of the answers are correct.

- 135) The central canal of an osteon contains 135) \_\_\_\_\_
- A) lacunae.
  - B) blood vessels.
  - C) osteocytes.
  - D) bone marrow.
  - E) concentric lamellae.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 136) The matrix in spongy bone forms struts and arches called \_\_\_\_\_. 136) \_\_\_\_\_

- 137) Cells that secrete collagen fibers are called \_\_\_\_\_. 137) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 138) When cartilage is produced at the epiphyseal side of the metaphysis at the same rate as bone is deposited on the opposite side, bones 138) \_\_\_\_\_
- A) grow longer.
  - B) grow wider.
  - C) become more porous and weaker.
  - D) become thicker.
  - E) become shorter.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 139) In bone, the calcium phosphate forms crystals of \_\_\_\_\_. 139) \_\_\_\_\_



MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 140) Which of following is a function of the skeletal system? 140) \_\_\_\_\_
- A) protection of internal organs
  - B) body support
  - C) calcium homeostasis
  - D) blood cell production
  - E) All of the answers are correct.

- 141) The femur can withstand \_\_\_\_\_ times the body weight without breaking. 141) \_\_\_\_\_
- A) 10 to 15      B) 5 to 10      C) 3      D) 8      E) 30

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 142) The ongoing process of tearing down and rebuilding bone matrix is called \_\_\_\_\_. 142) \_\_\_\_\_

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 143) Cells that secrete the organic components of the bone matrix are called 143) \_\_\_\_\_
- A) osteoprogenitor cells.
  - B) osteoclasts.
  - C) osteoblasts.
  - D) chondrocytes.
  - E) osteocytes.