

## CHAPTER SIX

### Answers to WHAT DID YOU LEARN?

1. Cartilage supports soft tissues, provides a gliding surface at articulations, and serves as a model for most bones.
2. The three types of cartilage are hyaline cartilage, fibrocartilage, and elastic cartilage. Hyaline cartilage attaches the ribs to the sternum, forms the apex of the nasal septum, and supports the air passageways in the respiratory system. Fibrocartilage is located in areas of high stress, such as the pubic symphysis and within the intervertebral discs. Elastic cartilage is a component of the external ear, where it can return to normal shape after deformation.
3. Interstitial growth occurs from within the cartilage itself, whereas appositional growth occurs around the periphery of the cartilage. Appositional growth predominates in older cartilage.
4. Bone functions include support and protection, movement, hemopoiesis, and storage of minerals and energy.
5. The four types of bones are long bones, short bones, flat bones, and irregular bones. The scapula is a flat bone.
6. The diaphysis is the shaft of the bone, and contains the medullary cavity (filled with yellow bone marrow). Epiphyses are the ends of the long bone, and sometimes contain red bone marrow.
7. The metaphysis is the region in a mature bone sandwiched between the diaphysis and the epiphysis.
8. Osteoblasts secrete osteoid.
9. Organic bone components include bone cells, collagen fibers, and ground substance. Inorganic components include calcium phosphate and calcium hydroxide, which together form hydroxyapatite.
10. When deposition of bone matrix is greater than resorption of bone matrix, the mass of the bone increases.
11. The central canal is the cylindrical space in the center of the osteon that houses blood vessels and nerves. The canaliculi are small channels within bone tissue that house osteocyte cytoplasmic projections through which nutrients, minerals, gases, and wastes are exchanged between osteocytes within lacunae. Lacunae are the spaces within the bone that house osteocytes.
12. Intramembranous ossification is the formation of bone within a thickened mesenchyme. Bones produced by this process include flat bones of the skull, some facial bones (zygomatic bone, maxilla), the mandible, and the central part of the clavicle.
13. The primary ossification center is in the center of the diaphysis of a hyaline cartilage model of bone; the secondary ossification center forms within each epiphysis.
14. The epiphyseal plate is a thin region of cartilage sandwiched between the diaphysis and the epiphysis.
15. A radiograph should show either an epiphyseal plate (growth not complete) or an epiphyseal line (growth complete).

16. Growth hormone stimulates the production of somatomedin in the liver. Somatomedin acts on the cartilage at the epiphyseal plate to increase bone growth and, subsequently, bone mass. Parathyroid hormone activates osteoclasts to cause bone resorption, resulting in reductions in bone growth and bone mass.
17. Vitamins A, C, and D help regulate bone growth.
18. Mechanical stress increases the strength of bone by promoting deposition of mineral salts and synthesis of collagen fibers.
19. The four steps in fracture repair are: (1) formation of a fracture hematoma; (2) formation of a fibrocartilaginous callus; (3) formation of a hard bony callus; and (4) remodeling of bone.