

Anatomy Unit 3 Skeletal System Packet Answers

Anatomy Unit 3 Skeletal System Packet Answers Anatomy Unit 3 Skeletal System Packet Answers The skeletal system the intricate framework of our bodies serves a multitude of vital functions From providing structural support and enabling movement to safeguarding our internal organs and producing blood cells the skeletal system is a masterpiece of biological engineering This packet delves into the fascinating world of bones exploring their structure composition classification and the various processes that govern their growth and development

Answer Key

Section 1 Bone Structure and Composition

1 Label the components of a long bone

Diaphysis The shaft of the bone composed primarily of compact bone

Epiphysis The expanded ends of the bone composed of spongy bone

Epiphyseal Plate A layer of hyaline cartilage responsible for longitudinal bone growth

Articular Cartilage A thin layer of hyaline cartilage covering the epiphysis reducing friction and absorbing shock during joint movement

Periosteum A tough fibrous membrane covering the bone containing blood vessels nerves and osteoblasts

Medullary Cavity The hollow space within the diaphysis filled with yellow bone marrow in adults

Endosteum A thin membrane lining the medullary cavity containing osteoblasts and osteoclasts

2 Compare and contrast compact and spongy bone

Compact Bone Dense solid bone tissue found in the diaphysis of long bones and the outer layer of other bones Its structure provides strength and support

Spongy Bone Light and porous bone tissue found in the epiphyses of long bones and the interior of other bones Its structure provides flexibility and houses red bone marrow

3 Identify the organic and inorganic components of bone matrix

Organic Components

2 **Osteoblasts** Boneforming cells

Osteocytes Mature bone cells

Osteoclasts Boneresorbing cells

Collagen Fibers Provide tensile strength and flexibility

Ground Substance A gellike matrix containing proteins and polysaccharides

Inorganic Components

Hydroxyapatite A mineral compound composed of calcium phosphate giving bones their hardness and rigidity

4 Explain the role of osteoblasts osteocytes and osteoclasts in bone remodeling

Osteoblasts Responsible for bone formation They synthesize and secrete the organic components of bone matrix initiating the process of calcification

Osteocytes Mature bone cells trapped within the bone matrix They maintain bone tissue regulate mineral exchange and sense mechanical stress

Osteoclasts Responsible for bone resorption They break down bone tissue releasing calcium and other minerals into the bloodstream

5 Describe the process of bone formation ossification

Intramembranous Ossification Bone formation directly from mesenchymal tissue This process forms flat bones like the skull and clavicle

Endochondral Ossification Bone formation from a hyaline cartilage model This process forms most of the bones in the body including long bones

Section 2 Bone Classification and Structure

1 Classify bones based on their shape

Long Bones Longer than they are wide with a shaft and two expanded ends eg femur humerus

Short Bones Roughly cubeshaped provide support and stability eg carpals tarsals

Flat Bones Thin flattened and curved provide protection and attachment points for muscles eg skull bones ribs sternum

Irregular Bones Complex shapes dont fit into other categories eg vertebrae facial bones

Sesamoid Bones Small round bones embedded within tendons reduce friction and provide mechanical advantage eg patella

2 Identify key bone markings and their functions

3 **Processes** Projections

Condyle

Rounded articular surface eg femoral condyles Epicondyle A projection above a condyle eg humeral epicondyles Tuberosity A large roughened projection eg tibial tuberosity Trochanter A large blunt process eg greater trochanter of the femur Spine A sharp pointed process eg vertebral spine Depressions Indentations Fossa A shallow depression eg glenoid fossa Sulcus A groove or furrow eg intertubercular sulcus Foramen A hole or opening eg foramen magnum Meatus A canal or passage eg external auditory meatus 3 Describe the different types of joints and their range of motion Fibrous Joints Joined by fibrous connective tissue allowing minimal movement eg sutures of the skull Cartilaginous Joints Joined by cartilage allowing limited movement eg intervertebral discs Synovial Joints Most common type characterized by a joint capsule synovial fluid and hyaline cartilage allowing a wide range of motion eg knee shoulder hip Types of Synovial Joints BallandSocket Allows movement in all directions eg shoulder hip Hinge Allows movement in one plane eg elbow knee Pivot Allows rotation around a central axis eg radius and ulna Condylloid Allows movement in two planes eg wrist Saddle Allows movement in two planes eg thumb Gliding Allows sliding movement eg carpal bones Section 3 The Axial Skeleton 1 Identify the bones of the skull and their functions Cranium Frontal Bone Forms the forehead and roof of the orbits Parietal Bones 2 Form the sides and roof of the cranium Temporal Bones 2 Form the sides and base of the cranium housing the ears Occipital Bone Forms the posterior and inferior parts of the skull containing the foramen magnum Sphenoid Bone Forms the base of the skull forming part of the orbits and nasal cavity 4 Ethmoid Bone Forms part of the roof of the nasal cavity and the medial walls of the orbits Facial Bones Nasal Bones 2 Form the bridge of the nose Maxillary Bones 2 Form the upper jaw containing the teeth sockets Zygomatic Bones 2 Form the cheekbones Lacrimal Bones 2 Form the medial walls of the orbits housing the tear ducts Palatine Bones 2 Form the posterior part of the hard palate Vomer Bone Forms the inferior portion of the nasal septum Inferior Nasal Conchae 2 Curved bones in the nasal cavity increasing surface area Mandible The lower jawbone containing teeth sockets and allowing chewing 2 Describe the vertebral column and its functions Cervical Vertebrae 7 Smallest vertebrae support the head and allow for head movement Thoracic Vertebrae 12 Larger than cervical vertebrae articulate with ribs providing support and stability for the rib cage Lumbar Vertebrae 5 Largest and strongest vertebrae support the weight of the upper body and allow for bending and twisting Sacrum Five fused vertebrae forms the posterior wall of the pelvis Coccyx Four fused vertebrae the tailbone 3 Identify the bones of the rib cage and their functions Ribs 12 pairs Provide protection for the heart and lungs aid in breathing Sternum The breastbone connects to the ribs and provides attachment for muscles True Ribs 7 pairs Connect directly to the sternum via their own costal cartilages False Ribs 3 pairs Connect indirectly to the sternum via shared costal cartilages Floating Ribs 2 pairs Do not connect to the sternum Section 4 The Appendicular Skeleton 1 Identify the bones of the shoulder girdle upper limb and pelvic girdle Shoulder Girdle Clavicle The collarbone provides support and stability Scapula The shoulder blade provides attachment for muscles Upper Limb Humerus The upper arm bone Radius The lateral bone of the forearm involved in forearm rotation 5 Ulna The medial bone of the forearm articulates with the humerus at the elbow Carpals 8 Bones of the wrist Metacarpals 5 Bones of the hand Phalanges 14 Bones of the fingers Pelvic Girdle Ilium The largest and superior portion of the hip bone Ischium The inferior and posterior portion of the hip bone Pubis The anterior portion of the hip bone 2 Identify the bones of the lower limb Femur The thigh bone the longest and strongest bone in the body Patella The kneecap Tibia The shinbone bears the most weight Fibula The lateral bone of the lower leg provides support Tarsals 7 Bones of the ankle Metatarsals 5 Bones of the foot Phalanges 14 Bones of the toes Section 5 Bone Growth and Development 1 Describe the process of longitudinal bone growth Epiphyseal Plate A layer of hyaline cartilage located between the diaphysis and epiphysis responsible for bone elongation

Chondrocytes Cartilage cells within the epiphyseal plate undergo mitosis and produce new cartilage Osteoblasts Replace the calcified cartilage with bone tissue increasing bone length 2 Explain the factors affecting bone growth Hormones Growth Hormone Stimulates growth of cartilage and bone Thyroid Hormones Regulate growth hormone production and overall metabolism Sex Hormones Promote growth spurts during puberty and eventually stop bone growth Nutrition Calcium Essential for bone formation and mineralization Vitamin D Promotes calcium absorption Vitamin C Necessary for collagen synthesis 6 Exercise Weightbearing exercise stimulates bone growth and density 3 Discuss the process of bone remodeling Bone Resorption Osteoclasts break down bone tissue releasing calcium and other minerals Bone Formation Osteoblasts build new bone tissue replacing resorbed bone Balance Bone remodeling maintains bone strength repairs damage and regulates blood calcium levels 4 Explain the process of bone repair Hematoma Formation Blood clots at the fracture site Soft Callus Formation Fibrocartilage forms bridging the gap between bone fragments Hard Callus Formation Bony tissue replaces the soft callus Remodeling The hard callus is remodeled restoring bone shape and strength Conclusion The skeletal system is a complex and dynamic structure that plays a vital role in maintaining our health and wellbeing Understanding the structure composition and processes governing bone development and repair is essential for comprehending how our bodies function and adapting to changes in our environment This packet has provided a comprehensive overview of these fundamental concepts laying the foundation for a deeper exploration of skeletal biology As you delve further into this fascinating field remember that the skeletal system is a testament to the incredible adaptability and resilience of the human body

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