

Understanding the functions of the bones and the importance of their interconnect...

[Health & Medicine](#)



**ASSIGN
BUSTER**

State the division of the skeleton The skeleton is divided into axial and appendicular parts Describe The Structure of a long bone

Provides strength with a minimum of additional mass Draw a diagram of the human elbow including cartilage, synovial fluid, tendons, ligaments, named bones and named antagonistic muscles Outline the functions of the components of the elbow joint There are two such pairs within the elbow joint—the humeroradial and humero-ulnar. The radius moves on one of the two subdivisions of the lower humeral articular cartilage, the ulna moves on the other subdivision. There are, then, two pairs of conarticular surfaces within the elbow joint even though there are only three bones in it. Synovial Membrane Protects the bones from rubbing against each other Cartilage Stops bone rubbing Ligament Attaches the bones together. These are elastic because of the pressure that they have to take from the bones. Tendons Both Attaches muscle to bone Antagonistic muscle Inelastic so muscles can work Bicep Can only Pull the arm up Tricep Can only pull the arm down

Ulna Structural Humerus Structural

Describe the movements of the hip and knee joint

Hip Joint §

Ball and socket A joint in which the rounded surface of a bone moves within a depression on another bone, allowing greater freedom of movement than any other kind of joint.

The hip joint is a ball-and-socket joint; the round head of the femur rests in a cavity (the acetabulum) that allows free rotation of the limb.

<https://assignbuster.com/understanding-the-functions-of-the-bones-and-the-importance-of-their-interconnectivity-with-other-systems/>

Hinge joints

Formed by the meeting of the thigh bone (femur) and the larger bone (tibia) of the lower leg.

Rounded ends of the femur and tibia that meet at the knee are massive. The rounded ends of the tibia move forward and backward on the corresponding ends of the femur; the kneecap, or patella, rests upon the ends of the femur and serves to prevent the tibia from moving too far forward when the leg is bent. The articulating (meeting) surfaces of the femur and tibia condyles are very smooth and are separated by a slight gap. The femur and the tibia are held together at the joint by a complex system of ligaments that run from the condyles of one bone to the condyles of the other. The two bones' possible contact with each other is cushioned by a synovial membrane and by layers of cartilage on the surface of each condyle. The entire knee joint, including the kneecap, is enveloped in a capsular apparatus that is large enough to allow for the movement of the tibia and also allows the kneecap to swing up and down freely on the front surface of the femur.

The quadriceps muscle of the thigh causes knee extension (straightening of the leg), while a number of other upper leg muscles cause the complementary motion, flexion, or bending, of the leg. Outline the principle of Levers, including fulcrum, effort, load with reference to the elbow joint. A hinge joint formed by the meeting of the humerus (bone of the upper arm) and the radius and ulna (bones of the forearm). The elbow allows the bending and extension of the forearm, and it also allows the rotational movements of the radius and ulna that enable the palm of the hand to be turned upward or downward. The elbow forms from the expansion of the <https://assignbuster.com/understanding-the-functions-of-the-bones-and-the-importance-of-their-interconnectivity-with-other-systems/>

lower end of the humerus into two thick knobs, or condyles: the humerus' dome-shaped lateral condyle articulates with a shallow depression on the end of the radius, and the humerus' spool-shaped trochlea fits into a notch in the ulna. In addition, the edge of the radius' head fits into a shallow groove on the side of the ulna. The bending and extension of the elbow joint are achieved, respectively, by contractions of the biceps and triceps muscles. These movements chiefly involve only the humerus and ulna; rotation of the forearm involves the smaller radius bone as well. The elbow is especially susceptible to stress injuries, although its surrounding capsule contains cushioning synovial membranes and is reinforced by ligaments. Thick lateral ligaments support the hinge action of the humerus-ulna junction, and a strong annular ligament around the upper part of the radius helps to hold that bone in place. These ligaments prevent the forward displacement of the forearm bones, but acute stresses can produce rearward dislocations of them. Outline the structure of skeletal muscle in terms of muscle fibres, myofibrils, actin and myosin filaments

Consists of bundles of muscle fibres held together by connective tissue (myofibril) Each fibre is a single multinucleate cell 10 to 100 micrometers in diameter and often several centimetres long.

The unit of muscles is called a sarcomere. They are about 2 or 3 micrometers in length. Each sarcomere is composed of two types of filaments running parallel to one another. The thicker filaments in the central portion of the sarcomere are composed of the protein myosin; the thinner filaments are

primarily actin. Explain the contraction of skeletal muscle Essentially, it uses a sliding action of actin and myosin filaments, with ATP as an energy source.

Skeletal muscles contract by the sliding of actin and myosin filaments, with ATP as an energy source. A myosin molecule consists of two long protein chains, each with a globular “ head” at one end. These heads

Are the binding sites at which force is exerted on the thin filaments during contraction They also act as enzymes that split ATP to ADP, thus providing the energy for muscle contraction.

When a muscle fibre is stimulated, the heads of the myosin molecules move away from the thick myosin filament toward the thin filament, to which they attach themselves. The heads move with a swivelling, oar like motion, pulling the thick filament, pushing the thin one. Thus, a repeated cycle of attachment, breaking away, and reattachment moves the two filaments past one another. The contractions of the sarcomeres is dependent on ATP in two ways: hydrolysis of ATP by the myosin molecule provides the energy for the cycle, and combination of a new ATP molecule with the myosin molecule release the myosin head from the binding site on the actin molecule.

Compare the activity of fast (twitch) and slow (tonic) muscle fibres in terms of speed and stamina Slow (tonic) Good blood supply

- Much myoglobin
- High rates of aerobic activity o Fast (twitch)
- Greater oxygen needs
- Little myoglobin

- Maximum work rate over shorter period Coordination of muscle activity
- Outline the general organisation of the human CNS HNS = CNS (Brain and Spinal Cord) + PNS (Nerves) Draw a Diagram of sensory and motor neurone Outline the process of Synaptic Transmission

Arrival of electric impulse

Release

Diffusion

Destruction of neuro-transmitter substance Propagation of another impulse

Explain the contraction of muscle and the controlling mechanism Controlled by

- Motor areas of cerebral cortex
- Motor Neurons
- Synapses
- Muscle Fibres
- Feedback to brain via proprioceptors and sensory neurones

Some proprioceptors (internal receptors) for mechanical stimuli provide information about posture and movements of parts of the body relative to each other; others contribute to an undisturbed course of coordinated muscular actions (e. g., in locomotion). Best known from studies of vertebrates and arthropods, some are tonic proprioceptors (serving to maintain muscle tone in posture); others are of the phasic type (serving movement); still others have a mixed phasic-tonic character. In principle, proprioceptors can be stimulated adequately by pressure or stretching

<https://assignbuster.com/understanding-the-functions-of-the-bones-and-the-importance-of-their-interconnectivity-with-other-systems/>

during active movements of the animal (reafferent stimulation) as well as through passive external pushing and pulling (exafferent stimulation). One passive factor, particularly in land-inhabiting animals, is gravity as it acts on bodily tissues or organs. Proprioceptors thus not only serve reflex adjustments in posture and relatively automatic movements of parts of the body with respect to each other (as in driving an automobile) but they also provide gravitational information about the position of limbs or of the whole body in space. To the extent that they are gravity detectors, these sensory structures are properly called external receptors (exteroceptors instead of proprioceptors). For receptors that are diffusely located within the body, a clean distinction between proprioceptive and possible exteroceptive function (gravity reception) is experimentally practicable only under conditions of weightlessness, as in space travel. Explain the Role of inhibitory neurons in coordinating the activity of antagonistic muscles in joint Inhibitory neurons make some neurons less sensitive to being stimulated by affecting synapses