

GRADE 10

LIFE SCIENCES

SUPPORT SYSTEMS IN ANIMALS

MEMORANDUM

QUESTION 1

1. A skeleton is a framework that supports the body, provides shape, protects organs, enables movement, and in some cases, produces blood cells.
2.
 - **Hydrostatic:** fluid-filled cavity (e.g. earthworm)
 - **Exoskeleton:** hard outer shell (e.g. insect)
 - **Endoskeleton:** internal bone/cartilage (e.g. human)
3.
 - **Exoskeleton:** external, protects well, must be shed
 - **Endoskeleton:** internal, grows with body, flexible joints, less external protection
4. Advantages: flexible, lightweight, good in water.
Disadvantages: low protection, limited strength, needs moist environment.
5. Diagrams show:
 - Hydrostatic: worm shape with cavity
 - Exoskeleton: beetle outline
 - Endoskeleton: human frame (basic bones)
6. Worm contracts muscles to push fluid, extending parts of the body forward while anchoring other parts.
7.
 - Axial: skull, vertebral column, rib cage
 - Appendicular: limbs and girdles (pelvic, pectoral)
8. Muscles working in pairs (one contracts, the other relaxes).
E.g. biceps (flex) and triceps (extend) the arm.
9.
 - Fixed: no movement (e.g. skull sutures)
 - Slight: limited movement (e.g. vertebrae)
 - Freely: wide movement (e.g. elbow)
- 10.

- **Ligaments:** connect bone to bone
- **Tendons:** connect muscle to bone
- **Cartilage:** reduces friction, absorbs shock
- **Synovial fluid:** lubricates joint

QUESTION 2

1.
 - **Diaphysis:** shaft, contains compact bone
 - **Epiphysis:** ends, spongy bone
 - **Marrow:** inside cavity; red = blood cells, yellow = fat
 - **Periosteum:** outer membrane
 - **Cartilage:** protects joints
2. Diagram shows:
 - Outer compact bone
 - Inner marrow cavity
 - Epiphysis with spongy bone
 - Labelled periosteum, cartilage
3.
 - Compact: dense, outer layer, strength
 - Spongy: porous, ends of bone, lightweight, contains red marrow
4.
 - Skeletal: striated, voluntary, movement (arms/legs)
 - Cardiac: striated, involuntary, heart
 - Smooth: no striations, involuntary, digestive tract
5. Long cylindrical fibres, striations for contraction, many mitochondria for energy, nerves for control.
6.
 - Voluntary: controlled (e.g. walking)
 - Involuntary: automatic (e.g. heartbeat)
7. Myosin heads pull actin filaments inward using ATP, shortening sarcomere → muscle contracts.
8. Calcium triggers actin-myosin interaction; ATP provides energy for contraction and relaxation.

9. Nerve sends signal → muscle contracts → tendon pulls bone → limb moves.
10. Lactic acid builds up, energy stores depleted → tiredness, reduced contraction strength.