**11.2 Movement notes - the bottom line**

**The learning Statements**

The *can you* statements tell you what you notes should enable you to do. They are guidance to a minimum expectation. The deeper your understanding the easier you will find it to respond to questions and communicate your understanding.

11.2.U1 Bones and exoskeletons provide anchorage for muscles and act as levers.

*Can you outline the roles of bones, joints, muscles, tendons, ligaments, nerves in the musculoskeletal system?*

11.2.A1 Antagonistic pairs of muscles in an insect leg.

*Can you state the names and roles of the two muscles groups in the leg?*

*Can you explain why the muscles are regarded as being antagonistic?*

11.2.U3 Movement of the body requires muscles to work in antagonistic pairs.

*Can you give an example of antagonistic muscles in humans?*

*Can suggest the benefits of having a pair of antagonistic muscles rather than a single muscle?*

11.2.S1 Annotation of a diagram of the human elbow.

*Can you label and annotate the functions of the different structures in the human elbow?*

11.2.U2 Synovial joints allow certain movements but not others.

*Can you distinguish between the range of movement allowed by ‘hinge’ and ‘ball and socket’ joints?*

11.2.U4 Skeletal muscle fibres are multinucleate and contain specialized endoplasmic reticulum. AND 11.2.U5 Muscle fibres contain many myofibrils.

*Can you outline the function of the specialised structures (myofibrils, sarcoplasmic reticulum, mitochondria, sarcolemma) within muscle fibre cells?*

11.2.U6 Each myofibril is made up of contractile sarcomeres. AND 11.2.S2 Drawing labelled diagrams of the structure of a sarcomere.

*Can you draw, label and annotate a diagram of a sarcomere?*

11.2.U7 The contraction of the skeletal muscle is achieved by the sliding of actin and myosin filaments.

*Can you draw and label diagrams of sarcomeres to show myofibrils in state of contraction and relaxation?*

11.2.U8 ATP hydrolysis and cross bridge formation are necessary for the filaments to slide. AND 11.2.U9 *Calcium ions and the proteins tropomyosin and troponin control muscle contractions.*

*Can you explain in detail how the sliding of sliding of actin and myosin filaments is achieved, referring to cross-bridges, ATP, tropomyosin, troponin in your explanation?*

11.2.S3 Analysis of electron micrographs to find the state of contraction of muscle fibres.

*Can you identify and label electron micrographs with the same information in your diagram from 11.2.U6?*

*Can you relate the micrograph to one of the diagrams from 11.2.U7?*

Nature of science: Developments in scientific research follow improvements in apparatus - fluorescent calcium ions have been used to study the cyclic interactions in muscle contraction. (1.8)

*Can you state the name and origin of the protein to which calcium ions binds causing it to fluoresce?*

*Can you state the property of the protein makes it suitable for studying muscle contraction?*

*Can you outline the findings of the experiment and how they helped to identify the role of calcium ions in muscle contraction?*

**Recommended resources**

<http://bioknowledgy.weebly.com/73-translation.html>

Allott, Andrew. *Biology: Course Companion.* S.l.: Oxford UP, 2014. Print.