



Muscles and movement: practice questions

6 questions · 21 marks · mark scheme at the back

For Pearson Edexcel International AS Biology XBI11 and International A Level Biology YBI11. **A Level only** is IA2 content (Units 4 to 6), not needed for the International AS.

Name

Total / 21

1 UNIT 5 STYLE [3 marks]

Explain how the biceps and triceps muscles act as an antagonistic pair to move the forearm.

2 UNIT 5 STYLE [1 mark]

Which statement correctly describes tendons and ligaments?

- A. ☐ Tendons join bone to bone; ligaments join muscle to bone.
- B. ☐ Tendons join muscle to bone; ligaments join bone to bone.
- C. ☐ Tendons join muscle to muscle; ligaments join bone to bone.
- D. ☐ Tendons join muscle to bone; ligaments join muscle to muscle.

3 UNIT 5 STYLE [4 marks]

Describe the structure of a mammalian skeletal muscle fibre.

[4 marks]

Features of two muscle samples		
Feature	Muscle sample X	Muscle sample Y
Mitochondria	Many	Few
Myoglobin content	High	Low
Glycogen content	Low	High
Capillary density	High	Low

[illegible]

[6 marks]

[illegible]

[3 marks]

[illegible]

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [3]

- muscles can only pull / contract; cannot push
- biceps (flexor) contracts to bend the elbow while the triceps (extensor) relaxes
- triceps contracts to straighten the elbow while biceps relaxes
- bones act as levers, with the elbow as the pivot
- Max 3

2. [1]

B B: tendons join muscle to bone; ligaments join bone to bone.

3. [4]

- multinucleate / long cell surrounded by a sarcolemma
- contains many myofibrils / bundles of filaments running along the length
- myofibrils divided into sarcomeres (Z line to Z line) with thick myosin and thin actin filaments
- sarcoplasmic reticulum stores calcium ions
- T-tubules (folds of sarcolemma) pass into the fibre
- many mitochondria between myofibrils
- Max 4

4. [4]

- X is slow twitch (and Y fast twitch), because X has more mitochondria / myoglobin / capillaries
- slow twitch: many mitochondria for aerobic respiration, so ATP is made for a long time
- slow twitch: much myoglobin (stores oxygen) and dense capillaries supply oxygen, so the fibres resist fatigue / suit endurance or posture
- fast twitch: more glycogen for anaerobic glycolysis, so ATP is made rapidly
- fast twitch: contract faster / more forcefully, suited to sprinting, but lactate builds up so they fatigue quickly
- Max 4

5. [6]

- action potential causes sarcoplasmic reticulum to release Ca^{2+}
- Ca^{2+} binds to troponin, which changes shape
- this moves tropomyosin away from the myosin-binding sites on actin
- myosin heads bind to actin forming cross-bridges
- myosin head changes shape / power stroke, pulling actin past myosin
- ATP binds to myosin head, causing detachment from actin
- myosin ATPase hydrolyses ATP, releasing energy to re-set the myosin head
- ATP also used to pump Ca^{2+} back into the sarcoplasmic reticulum
- Max 6

6. [3]

- A band stays the same length because the myosin filaments do not change length
- I band gets shorter because the actin filaments slide inwards over the myosin
- H zone gets shorter / disappears because the actin filaments move closer together towards the centre