



QUESTION WORKBOOK

Sliding filaments: shortening a muscle without shortening anything

Nervous coordination, receptors, muscles and behaviour · Unit B14

AQA 3.6.3 · OCR A 5.1.5 · Edexcel A Topic 7.13–7.16 · CAIE 15.2

6 questions · 24 marks

NAVY SCREEN EDITION

SECTION B · Standard, 3 to 5 marks

B1 Describe how the release of calcium ions from the sarcoplasmic reticulum causes the thin filaments of a sarcomere to slide inwards. [5]

B2 Explain the three ways ATP is used by a contracting and relaxing muscle fibre, and explain why the muscles of a body stiffen after death. [4]

B3 Compare slow twitch muscle fibres with fast twitch muscle fibres, linking each structural difference to the way the fibre works. [4]

- B4** A relaxed muscle fibre is 3.0 cm long and its myofibrils are made of sarcomeres each 2.4 micrometres long, joined end to end. Calculate the number of sarcomeres in one myofibril of this fibre, and calculate the length of the fibre in centimetres when every sarcomere has shortened to 2.0 micrometres. [4]

- B5** A sprinter's leg muscles fail after about 40 seconds of maximal effort. A student says this is because the muscles have used up all their ATP. Suggest why that explanation is wrong, and suggest what does limit the muscles over that time. [4]

- B6** State what happens to the width of the A band, the width of the I band and the width of the H zone when a sarcomere contracts. [3]