

Solutions

2.1 A During shortening, overlap increases. The A-band length stays approximately constant while I bands and the H zone become smaller. Movement at a joint also depends on tendon insertion, lever geometry and opposing muscle activity.

2.2 shortening= $(3.0-2.4)/3.0 \times 100=20\%$.

2.3 False. ATP is required for myosin detachment as well as the continuing cycle. A muscle pulling harder does not mean all its fibres become shorter under every load.

2.4 sarcomere. sarcomere means The repeating contractile unit between two Z lines.

3.1 25% shortening. Sliding-filament reasoning changes overlap and sarcomere length, not filament length. The numerical observation alone does not measure force or diagnose function.