Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

A **skeletal**

B **cardiac**

C **smooth**

2.2

A band: stays the same length

I band: shortens

H zone: shortens or disappears

2.3

10 cm = 100 000 µm; 100 000 ÷ 2.5

= **40 000** sarcomeres

2.4

CNS: **oligodendrocyte**; PNS: **Schwann cell**

an oligodendrocyte wraps many axons; a Schwann cell wraps one stretch of one axon

3.1

(a) $2.5 - 1.6 = \mathbf{0.9}$ µm

(b) $2.5 - 2 \times 1.0 = \mathbf{0.5}$ µm

(c) I band $2.0 - 1.6 = \mathbf{0.4}$ µm; H zone $2.0 - 2.0 = \mathbf{0}$

(d) $2 \times 1.0 + 1.6 = 3.6$, so thin and thick filaments no longer overlap, and no cross-bridges can form

3.2

(a) patient 1: multiple sclerosis, oligodendrocytes; patient 2: Guillain–Barré syndrome, Schwann cells

(b) without myelin the signal cannot jump between nodes; current leaks out, so it moves slowly or stops

(c) Schwann cells divide and remyelinate easily; oligodendrocytes do this poorly

3.3

(a) $6 \times 12 = \mathbf{72}$ m/s

(b) $1 \div 72 \approx 0.014$ s = **14** ms

(c) $1 \div 1 = \mathbf{1}$ s

(d) the sharp pain arrives first through fast myelinated fibres; the dull ache arrives later through slow unmyelinated C fibres

(e) gap junctions pass the signal from cell to cell, so the heart contracts together; desmosomes hold the cells together under force

exercises.lol exercises.com.cn