Solutions

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

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

2.1

cervical **7**, thoracic **12**, lumbar **5**

sacral **5** (fused), coccygeal about **4**

2.2

thumb: **C6**

nipple: **T4**

umbilicus: **T10**

2.3

L3/L4 or **L4/L5**

the line joining the tops of the iliac crests crosses the L4 spinous process

the cord ends at L1–L2, so the needle meets only floating roots, which move aside

2.4

supraspinous ligament, interspinous ligament, ligamentum flavum

epidural space, dura, arachnoid, then CSF

3.1

(a) the **L5** root; L4 leaves through its hole above the disc, so the bulge meets L5 on its way down

(b) weak lifting of the big toe and foot; numbness on the top of the foot and big toe; knee and ankle reflexes normal

(c) lifting the straight leg stretches the sciatic nerve and its roots, L4–S3, pulling the pressed root against the disc

3.2

(a) **cauda equina syndrome**; a large central disc or mass presses the roots below the cord, including S2–S5

(b) these roots control the bladder, bowel and sexual function; if they are pressed for long they may not recover, so surgery is needed within hours

(c) an urgent **MRI** of the lumbar spine

3.3

(a) about **L1**, because the spine grows longer than the cord, so lower cord segments sit higher than their vertebrae

(b) the end of the cord (conus) is damaged, giving upper motor neurone signs; the cauda equina roots passing it are damaged, giving lower motor neurone signs

(c) the cord ends lower at birth, at about L3

(d) **T4**; handling the uterus and peritoneum sends pain through higher segments than the skin cut

(e) the sympathetic nerves (T1–L2) are blocked, so blood vessels widen

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