Unit 14 · Animal Tissues

ANSWER KEY · FOR TEACHERS

Full marks 32

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. avascular
2. transitional
3. fibroblast
4. collagen
5. chondrin
6. sarcomere
7. nodes of Ranvier
8. Schwann cells

Each carries 0.5 mark. **K · 4**

2 Label the diagram

1. dendrites
2. cell body (cyton)
3. axon hillock
4. node of Ranvier
5. Nissl bodies
6. myelin sheath

Each carries 0.5 mark. **K · 3**

3 Multiple choice

i. **a.** tight junction **K · 1**

A **tight junction** seals the space between the cells near their free surface, so anything crossing the lining has to pass *through* the cells. A **gap junction** does the opposite: it opens channels between cells. Desmosomes hold cells together against pulling; hemidesmosomes fix them to the basement membrane.

ii. **c.** it must stretch a lot as the bladder fills, without tearing or leaking **U · 1**

Transitional epithelium can change from thick, with rounded top cells, to thin, with flattened ones, as the bladder fills, while its tight junctions keep urine from leaking back. That is what its other names, **plastic epithelium** and **urothelium**, refer to.

iii. **c.** elastic connective tissue **U · 1**

Elastic connective tissue, full of elastin fibers, stretches and recoils. Its recoil between beats keeps the blood flowing.

iv. **b.** an eosinophil; in a worm infection or an allergy **A · 1**

Eosinophils take up the red dye eosin and usually have a **two-lobed** nucleus. They rise in **parasitic worm infections** and **allergies**. Neutrophils have fine, pale granules and 3–5 lobes; basophils dark blue granules.

v. **b.** the A band **A · 1**

The **A band** is the length of the **myosin** filaments, which don't change. The actin filaments slide in over them, so the **I band** and **H zone** shorten and the **Z lines** come closer.

4 Short answers

a. **MARKING SCHEME** **K · 2**

- ✓ Epithelial and connective, with their jobs.
- ✓ Muscular and nervous, with their jobs.

b. **MARKING SCHEME** **U · 2**

- ✓ Thromboplastin → prothrombinase; prothrombin → thrombin (with Ca^{2+}).
- ✓ Thrombin changes fibrinogen into fibrin, which forms the clot.

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c. MARKING SCHEME A · 2

✓ Sprinter: white (fast) fibers, quick strong contraction without oxygen.
✓ Marathon runner: red (slow) fibers, many mitochondria and myoglobin, don't tire.

d. MARKING SCHEME U · 3

✓ Periosteum and outer circumferential lamellae.
✓ Haversian systems with interstitial lamellae.
✓ Inner circumferential lamellae, endosteum and marrow.

5 Long answers

a. ANSWER U · 4

Feature	Skeletal	Smooth	Cardiac
Fiber	long, cylindrical, unbranched	spindle-shaped	cylindrical, branched
Nuclei	many, at the edge	one, central	one or two, central
Stripes	clear	none	present, fainter; intercalated discs
Control	voluntary, tires quickly	involuntary, slow	involuntary, rhythmic, never tires
Where	attached to bones	gut, vessels, bladder	heart only

MARKING SCHEME

✓ Shape of fiber.
✓ Nuclei.
✓ Stripes (and intercalated discs).
✓ Control (or where found).

b. ANSWER U · 4

Neuroglia (glial cells) are the cells of nervous tissue that **don't carry impulses**; they hold, protect and feed the neurons.
CNS: **astrocytes** (star-shaped, hold neurons to capillaries and control what passes into the brain); **oligodendrocytes** (form the myelin sheath in the CNS); **microglia** (macrophages that engulf germs and dead neurons); **ependymal cells** (line the ventricles and central canal, move the CSF).
PNS: **satellite cells** (surround the cell bodies in ganglia); **Schwann cells** (form the myelin sheath, help a cut fiber regrow).

MARKING SCHEME

✓ Definition: non-conducting cells that support neurons.
✓ Astrocytes and oligodendrocytes, with their work.
✓ Microglia and ependymal cells, with their work.
✓ Satellite and Schwann cells, with their work.

6 Think

ANSWER HA · 3

Myelin **insulates** the axon, so the impulse can't be made under it; it is made only at the **nodes of Ranvier** and **jumps from node to node** (**saltatory conduction**) instead of passing along every bit of the membrane, so it is much **faster**. In an animal with long nerves (a leg's nerve is about a meter long), fast conduction lets a signal reach a muscle quickly, so it can react in time (pull a foot from a thorn, catch its balance).

MARKING SCHEME

✓ Myelin insulates; impulses are made only at the nodes of Ranvier.
✓ The impulse jumps from node to node (saltatory conduction), so it is faster.
✓ Long nerves need fast conduction for quick reactions.

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7 Activity: Muscles in motion

(not marked)

WHAT STUDENTS SHOULD FIND

Laughing uses face muscles (zygomaticus, orbicularis oculi) and the diaphragm; walking and jumping the gluteus maximus, quadriceps, hamstrings and calf muscles; cycling the quadriceps, gluteus maximus and hamstrings. All of these are **skeletal (voluntary)**. Meanwhile **cardiac** muscle beats faster, and **smooth** muscle in the arteries changes their width: these are **involuntary**.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	10	15	4	3	**32**

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