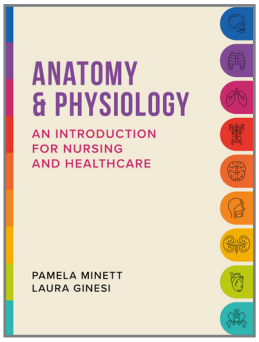
Lantern



Questions to accompany *Anatomy and Physiology*

CHAPTER 4 THE MUSCULOSKELETAL SYSTEM

Multiple Choice Questions (MCQs)

Each question consists of a stem statement or question, and 5 options. You must pick the one correct answer.

1. What is the shaft of a long bone known as?

A. periosteum
B. diaphysis
C. epiphysis
D. central cavity
E. cartilage

2. The function of red bone marrow is to:

A. produce the components of blood
B. store fat
C. make new skin cells
D. replace and renew bone
E. none of the above

3. The term periosteum refers to:

A. the small spaces within spongy bone
B. the ossification centre of a bone
C. the place where bone forms a synovial joint with another bone
D. the outer, more dense layer of bone
E. the tough, thin connective tissue that covers a bone

4. Osteoclasts are bone cells that:

A. secrete new bone tissue called osteoid
B. secrete enzymes and acid that resorbs bone tissue
C. have become embedded within bone tissue
D. produce blood components
E. produce synovial fluid for joints

5. In anatomical terms, what are fontanelles?

A. horseshoe-shaped bone that supports the tongue and larynx
B. 'soft spots' in a baby's head
C. joints that allow a baby's head to move backwards and forwards
D. flexible, membranous gaps between the cranial bones of a newborn baby
E. fused bones that will form the sacrum in an adult

6. How many thoracic vertebrae are there?

A. 7
B. 12
C. 5
D. 4
E. 33

7. The thoracic cage is formed by:

A. the clavicle, scapula and humerus
B. the sacrum, coccyx, ilium, ischium and pubis
C. the sternum, ribs and part of the spine
D. frontal, parietal, occipital and temporal bones
E. sutures that hold bones firmly together

8. The function of the quadriceps muscle is to:

A. lift the arm sideways
B. pull the shoulder down and back
C. straighten the hip
D. straighten the knee
E. bend the body forwards and sideways

9. Regarding tendons:

A. they are made of elastic, fibrous, connective tissue
B. they attach muscles to bone
C. they attach bones to bone
D. options A and B are both correct
E. options A and C are both correct

10. The function of ligaments is to:

A. allow a limited movement to take place
B. restrict the amount of movement
C. reduce friction during movement
D. separate two bones from each other
E. attach muscle to a bone

11. What are the thin filaments in skeletal muscle sarcomeres made of?

A. myosin
B. actin
C. collagen
D. keratin
E. melanin

12. Which of the following is NOT a function of skeletal muscle?

A. generation of force when it contracts
B. maintaining tone and posture
C. heat production
D. pumping of blood around the human body during exercise
E. exerting force that moves loads

13. Which of the following happens during a skeletal muscle contraction?

A. adrenaline is released into the cleft of the neuromuscular junction
B. sarcomeres relax and the muscle lengthens
C. sarcomeres shorten and generate force
D. thin filaments form clusters
E. the uterus gets ready to deliver a baby

Critical thinking: ARQs (assertion reasoning questions)

These questions consist of two statements:
- an assertion, and
- a reason.

You must first determine whether each statement is *TRUE* or *FALSE*.
- If both statements are true, you must next determine whether the reason correctly explains the assertion. The answer will be option 1 or option 2.
- If one statement is true and the other is false then the answer is option 3 or option 4, depending on which of the statements is correct.
- If both statements are false, then the answer is option 5.

There is one option for each possible outcome.

Question 14

A = the Assertion	R = the Reason
An important function of the skeleton is to enable the human body to move	The skeleton provides for attachment of muscles that enable people to move their bones
Options	
1) Both A and R are true and R is the correct explanation of A	
2) Both A and R are true but R is NOT the explanation of A	
3) A is true but R is false	
4) A is false but R is true	
5) Both A and R are false	

Question 15

A = the Assertion	R = the Reason
A long bone is a complex type of tissue	A long bone comprises compact bone, spongy bone, cartilage and bone marrow
Options	
1) Both A and R are true and R is the correct explanation of A	
2) Both A and R are true but R is NOT the explanation of A	
3) A is true but R is false	
4) A is false but R is true	
5) Both A and R are false	

Question 16

A = the Assertion	R = the Reason
The spinal canal runs through the spinal vertebrae and contains the spinal cord and cerebrospinal fluid (CSF)	The function of intervertebral discs is to absorb vibrations and enable movement of the spine
Options	
1) Both A and R are true and R is the correct explanation of A	
2) Both A and R are true but R is NOT the explanation of A	
3) A is true but R is false	
4) A is false but R is true	
5) Both A and R are false	

Question 17

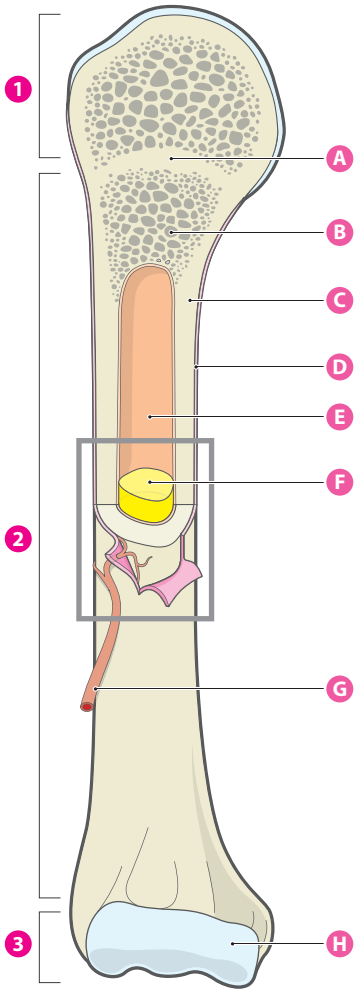
A = the Assertion	R = the Reason
Synovial joints are freely movable because they are lubricated by synovial fluid	Ball and socket joints allow movement in only one plane
Options	
1) Both A and R are true and R is the correct explanation of A	
2) Both A and R are true but R is NOT the explanation of A	
3) A is true but R is false	
4) A is false but R is true	
5) Both A and R are false	

Question 18

A = the Assertion	R = the Reason
Contraction of skeletal muscle fibres is activated by the arrival of nerve impulses at the neuromuscular junction	Release of acetylcholine into the neuromuscular junction triggers the contraction cycle and muscle shortening
Options	
1) Both A and R are true and R is the correct explanation of A	
2) Both A and R are true but R is NOT the explanation of A	
3) A is true but R is false	
4) A is false but R is true	
5) Both A and R are false	

Question 19

(a) Label the key regions 1–3 and structures A–H of a long bone:



1 _____

2 _____

3 _____

A _____

B _____

C _____

D _____

E _____

F _____

G _____

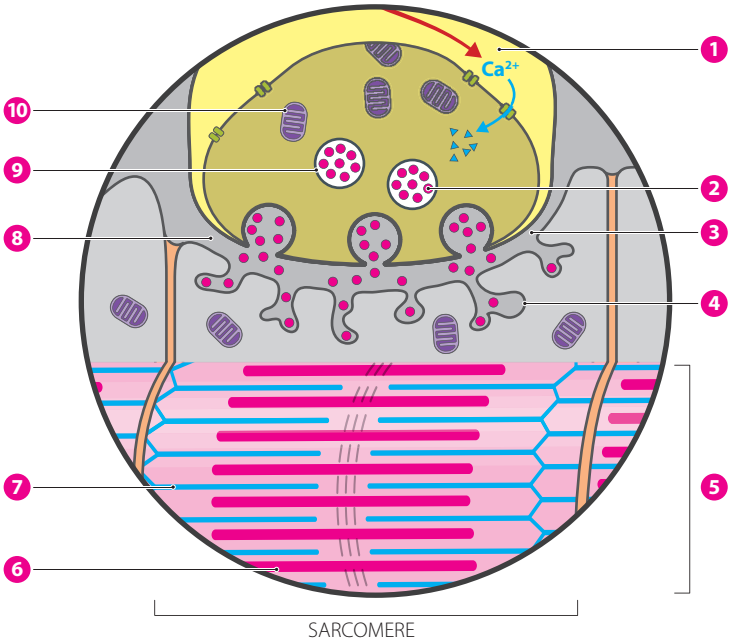
H _____

(b) Label the key structures 1–10 of a neuromuscular junction:

10 _____

1 _____

9 _____



2 _____

8 _____

3 _____

7 _____

4 _____

6 _____

5 _____

Question 20

Explain, using your own words, how the human body adapts to exercise.

Question 21

Create a flow diagram that describes the sequence of events that leads to contraction of the muscles of the calf to enable walking.

Answers to questions

Answers are supplied to most, but not all questions. Some may require you to carry out further research using the book.

Multiple Choice Questions (MCQs)

Each question consists of a stem statement or question, and 5 options. You must pick the one correct answer.

1. **What is the shaft of a long bone known as?**
   B. diaphysis
2. **The function of red bone marrow is to:**
   A. produce the components of blood
3. **The term periosteum refers to:**
   E. the tough, thin connective tissue that covers a bone
4. **Osteoclasts are bone cells that:**
   B. secrete enzymes and acid that resorbs bone tissue
5. **In anatomical terms, what are fontanelles?**
   D. flexible, membranous gaps between the cranial bones of a newborn baby
6. **How many thoracic vertebrae are there?**
   B. 12
7. **The thoracic cage is formed by:**
   C. the sternum, ribs and part of the spine
8. **The function of the quadriceps muscle is to:**
   D. straighten the knee
9. **Regarding tendons:**
   B. they attach muscles to bone
10. **The function of ligaments is to:**
    A. allow a limited movement to take place
11. **What are the thin filaments in skeletal muscle sarcomeres made of?**
    B. actin
12. **Which of the following is NOT a function of skeletal muscle?**
    D. pumping of blood around the human body during exercise
13. **Which of the following happens during a skeletal muscle contraction?**
    C. sarcomeres shorten and generate force

Critical thinking: ARQs (assertion reasoning questions)

These questions consist of two statements:
- an assertion, and
- a reason.

You must first determine whether each statement is *TRUE* or *FALSE*.
- If both statements are true, you must next determine whether the reason correctly explains the assertion. The answer will be option 1 or option 2.
- If one statement is true and the other is false then the answer is option 3 or option 4, depending on which of the statements is correct.
- If both statements are false, then the answer is option 5.
- There is one option for each possible outcome.

Question 14

A = the Assertion	R = the Reason
An important function of the skeleton is to enable the human body to move	The skeleton provides for attachment of muscles that enable people to move their bones

1. Both A and R are true and R is the correct explanation of A

Explanation

The Assertion (A) is *TRUE*. The skeleton has several functions. It supports and protects the human body, its bone marrow produces the components of blood, it stores minerals including calcium and sodium and it provides attachment points where tendons connect the bone with muscle. When the skeletal muscles contract they generate force, which enables the movement to take place.

The Reason (R) is also *TRUE*. When skeletal muscle contracts, it generates force and shortens. The force that is generated pulls on the bone, which acts as a lever. Thus R is a correct explanation for statement A.

Option 1 is the correct answer.

Question 15

A = the Assertion	R = the Reason
A long bone is a complex type of tissue	A long bone comprises compact bone, spongy bone, cartilage and bone marrow

4. A is false but R is true

Explanation

The Assertion (A) is *FALSE*. A tissue is defined as a group of cells that perform the same function in the body. A long bone is made up of several different types of tissue including those listed in the Reason (R), which is therefore *TRUE*.

Since A is false and R is true, **the correct solution is option 4.**

Question 16

A = the Assertion	R = the Reason
The spinal canal runs through the spinal vertebrae and contains the spinal cord and cerebrospinal fluid (CSF)	The function of intervertebral discs is to absorb vibrations and enable movement of the spine

2. Both A and R are true but R is NOT the explanation of A

Explanation

Both the Assertion (A) and Reason (R) are *TRUE*. Although both structures form part of the spine, their functions are different and not related.

Thus the Reason is not an explanation for the Assertion and **option 2 is the correct choice**.

Question 17

A = the Assertion	R = the Reason
Synovial joints are freely movable because they are lubricated by synovial fluid	Ball and socket joints allow movement in only one plane

3. A is true but R is false

Explanation

The Assertion (A) is *TRUE*. Synovial joints are lined by a synovial membrane which secretes synovial fluid that lubricates the joint, enabling the ends of the adjacent bones to move smoothly in relation to each other.

The Reason (R) is *FALSE*. The end of one bone in a ball and socket joint is rounded and fits into a hollow in the adjacent bone. Ball and socket joints are examples of synovial joints and the anatomical arrangement enables movement in nearly all planes.

Since A is True and R is False then **option 3 is correct**.

Question 18

A = the Assertion	R = the Reason
Contraction of skeletal muscle fibres is activated by the arrival of nerve impulses at the neuromuscular junction	Release of acetylcholine into the neuromuscular junction triggers the contraction cycle and muscle shortening

1. Both A and R are true and R is the correct explanation of A

Explanation

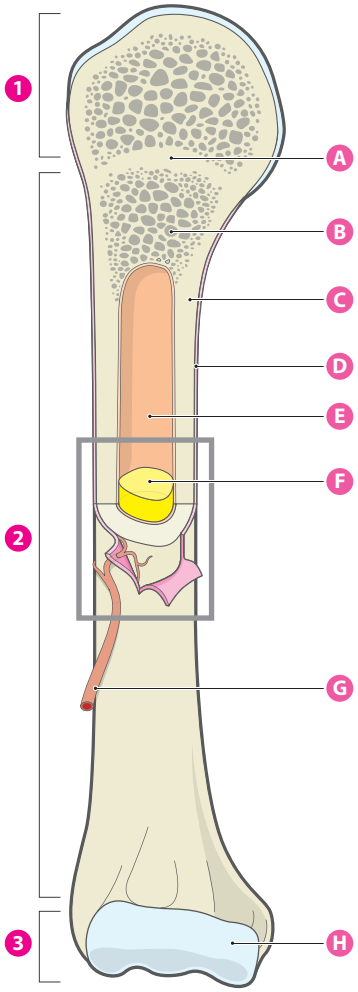
The Assertion (A) is *TRUE*. The neuromuscular junction is a specialised nerve ending, sometimes called a motor end plate. When impulses arrive at the neuromuscular junction they trigger a cascade of events within the muscle that are known as the contraction cycle.

The Reason (R) is also *TRUE*. Acetylcholine is the neurotransmitter for neuromuscular junctions in skeletal muscles. The arrival of a nerve impulse in the nerve ending triggers release of acetylcholine, which diffuses across the space between the nerve ending and the muscle fibrils. When it binds, acetylcholine activates the process of sarcomere shortening that causes muscle contraction.

Since the Reason statement explains the Assertion, then **option 1 is correct**.

Question 19

a) Label the key regions 1–3 and structures A–H of a long bone:



1. proximal epiphysis
2. diaphysis
3. distal epiphysis

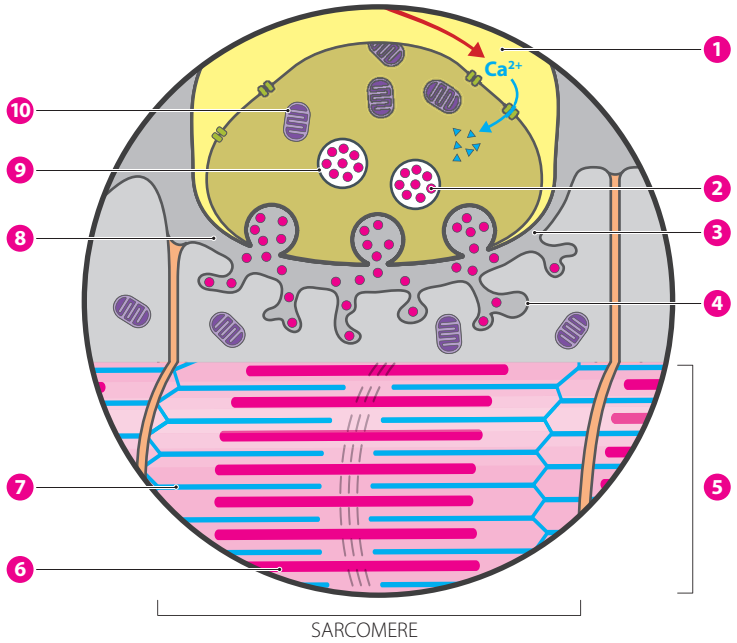
A. epiphyseal line
B. spongy bone
C. compact bone
D. periosteum
E. central cavity
F. yellow bone marrow
G. nutrient artery
H. articular cartilage

b) Label the key structures 1–10 of a neuromuscular junction:

10 mitochondrion

1 nerve impulse arriving at motor axon terminal

9 vesicle containing acetylcholine



2 molecules of acetylcholine

8 synaptic cleft

3 presynaptic membrane

7 thin filament made of actin

4 folds in the neuromuscular junction membrane

6 thick filament of myosin

5 part of muscle fibre (myofibril)