STUDY GUIDE 7

1. Types of Muscle Tissues

Match the types of muscle tissues with the words and phrases.

1) Skeletal 2) Smooth 3) Cardiac

1, 3	Striated	**2**	Walls of blood vessels
2, 3	Single nucleus	**3**	Heart muscle
2, 3	Involuntary	**2**	Walls of digestive tract
3	Intercalated disks	**1**	Skeletal muscles
3	Branching network	**1**	Easily fatigued

2. Structure of Skeletal Muscle

Write the terms that match the statements in the spaces at the right.

1) A bundle of fibers enveloped by connective tissue.	**Fasciculus**
2) Binds all fasciculi together.	**Fibrous connective tissue**
3) Connective tissue covering entire muscle.	**Deep fascia**
4) Cordlike attachment of a muscle.	**Tendon**
5) Sheetlike attachment of a muscle.	**Aponeurosis**
6) Plasma membrane of muscle cell.	**Sarcolemma**
7) Cytoplasm of a muscle cell.	**Sarcoplasm**
8) Threadlike contractile elements.	**Myofibrils**
9) Thinner protein filaments in myofibrils.	**Actin**
10) Thicker protein filaments in myofibrils.	**Myosin**
11) Portion of a myofibril between Z lines.	**Sarcomere**
12) Light and dark bands on myofibrils.	**Striations**
13) Attachment of motor axon to sarcolemma.	**Neuromuscular junction**
14) Depression in sarcolemma receiving axon tip.	**Synaptic cleft**
15) Motor neuron and its attached muscle fibers.	**Motor unit**

3. Physiology of Muscle Contraction

a. Write the words that complete the sentences in the spaces at the right.

The axon tip of an activated motor neuron releases ____1___ into the ____2___ , where it combines with ____3___ on the sarcolemma. This stimulates the release of ____4___ from storage areas, which exposes the active sites on ____5___ filaments. Cross-bridges of ____6___ attach to the exposed active sites and exert a power stroke, which pulls the ____7___ filaments and the Z lines toward the center of the A band. This process is rapidly repeated until ____8___ is complete.

1) **Acetylcholine**
2) **Synaptic cleft**
3) **Receptors**
4) **Calcium ions**
5) **Actin**
6) **Myosin**
7) **Actin**
8) **Contraction**

b. Write the terms that match the statements in the spaces provided.

1) Decomposes acetylcholine. **Cholinesterase**
2) Combines with oxygen to store small amounts of oxygen in muscle cells. **Myoglobin**
3) Phase of cellular respiration that requires oxygen. **Aerobic**
4) Products of pyruvic acid breakdown when adequate oxygen is present. **CO_2, H_2O, energy**
5) Acid formed from pyruvic acid when adequate oxygen is not available. **Lactic acid**
6) Provides direct energy for muscle contraction. **ATP**
7) Process releasing energy from nutrients in cells. **Cellular respiration**
8) Chemical whose accumulation produces an oxygen debt. **Lactic acid**
9) Released from creatine phosphate to quickly re-form ATP. **High energy phosphate**

c. Write the terms that match the statements in the spaces at the right.

1) Smallest stimulus causing a contraction. **Minimal or threshold**
2) Activation of a muscle fiber causes a (all-or-none, graded) contraction. **All-or-none**
3) Primary cause of fatigue. **Lactic acid**
4) Type of contractions observed in whole muscles (all-or-none, graded). **Graded**
5) Smallest stimulus that activates all motor units of a muscle. **Maximal**
6) Activation of an increasing number of motor units in a series of contractions. **Recruitment**
7) Controls the number of motor units that are activated. **Nervous system**
8) State of constant, partial contraction. **Muscle tone**
9) State of constant, complete contraction. **Tetanus**

4. Actions of Skeletal Muscles

a. Write the terms that match the statements in the spaces provided.

1) Fixed end of a muscle. **Origin**
2) Movable end of a muscle. **Insertion**
3) Muscles opposing agonists. **Antagonists**

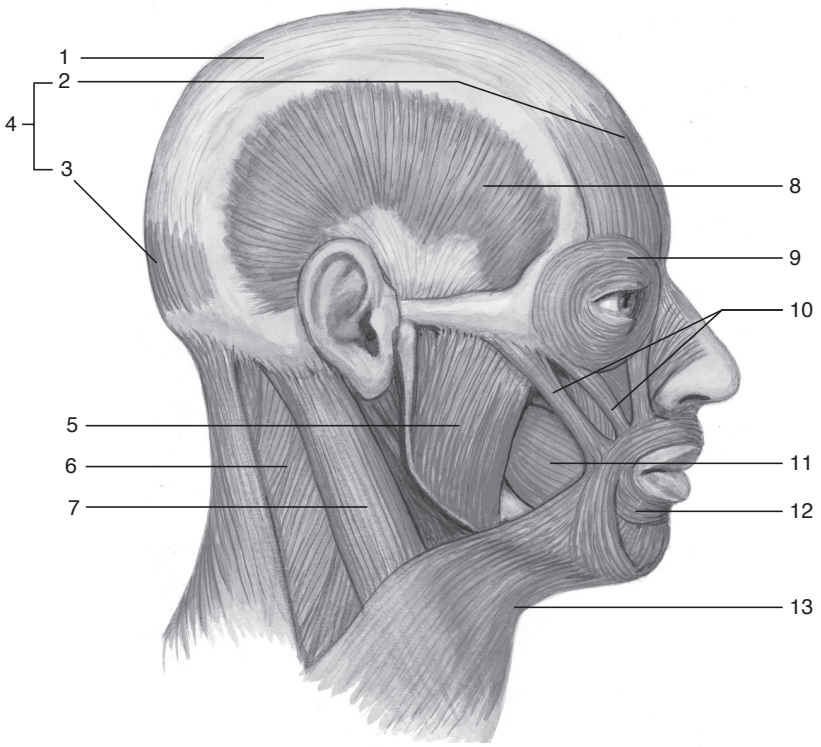
b. Write the names of the muscles that match the actions.

1) Closes and puckers lips. **Orbicularis oris**
2) Pulls angle of mouth upwards. **Zygomaticus**
3) Helps masseter raise the mandible. **Temporalis**
4) Compresses cheeks. **Buccinator**
5) Pair of neck muscles that flex head. **Sternocleidomastoid**

6) Pair of neck muscles that extend head. **Splenius capitus**
7) Innermost muscle of abdominal wall. **Transversus abdominis**
8) Raises ribs during inspiration. **External intercostals**
9) Elevates clavicle and scapula. **Trapezius**
10) Draws scapula downward and anteriorly. **Serratus anterior**
11) Adducts and draws humerus across chest. **Pectoralis major**
12) Sheetlike muscle of lower back that adducts and extends humerus. **Latissimus dorsi**
13) Abducts, flexes, and extends humerus. **Deltoid**
14) Rotates humerus laterally. **Infraspinatus**
15) Assists deltoid in abducting humerus. **Supraspinatus**
16) Assists latissimus dorsi. **Teres major**
17) Assists biceps brachii (two muscles). **Brachialis**
Brachioradialis
18) Extends forearm. **Triceps brachii**
19) Flexes and rotates forearm laterally. **Biceps brachii**
20) Flexes and abducts wrist. **Flexor carpi radialis**
21) Flexes and adducts wrist. **Flexor carpi ulnaris**
22) Extends fingers. **Extensor digitorum**
23) Extends and adducts wrist. **Extensor carpi ulnaris**
24) Extends and abducts wrist. **Extensor carpi radialis longus**
25) Adducts, flexes, and rotates thigh laterally (two muscles). **Adductor longus**
Adductor magnus
26) Abducts and rotates thigh medially. **Gluteus medius**
27) Extends and rotates thigh laterally. **Gluteus maximus**
28) Flexes and abducts thigh. **Tensor fasciae latae**
29) Flexes thigh only (two muscles). **Iliacus**
Psoas major
30) Flexes leg and thigh. **Sartorius**
31) Flexes leg and adducts thigh. **Gracilis**
32) Group of four muscles that extend leg. **Quadriceps femoris**
33) Three muscles that flex the leg and extend the thigh. **Biceps femoris**
Semitendinosus
Semimembranosus
34) Dorsiflexes and inverts foot. **Tibialis anterior**
35) Flexes leg and plantar flexes foot. **Gastrocnemius**
36) Extends toes and dorsiflexes and everts foot. **Extensor digitorum longus**
37) Plantar flexes and everts foot. **Peroneus longus**

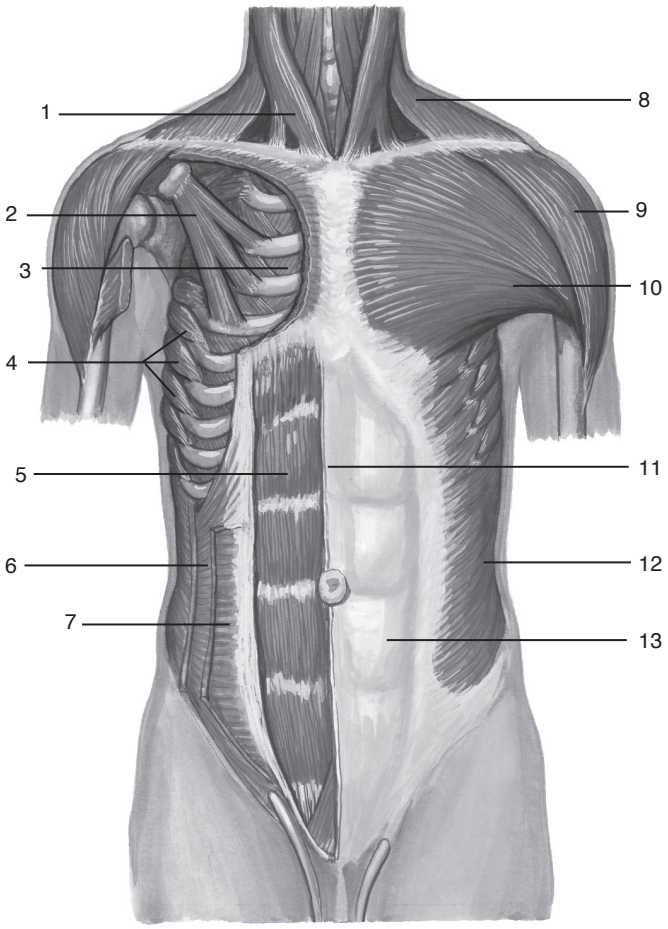
5. Major Skeletal Muscles

Label the muscles and associated structures in the following diagrams by writing the names of the labeled parts in the spaces provided. After labeling, color-code the muscles to help you to distinguish them.



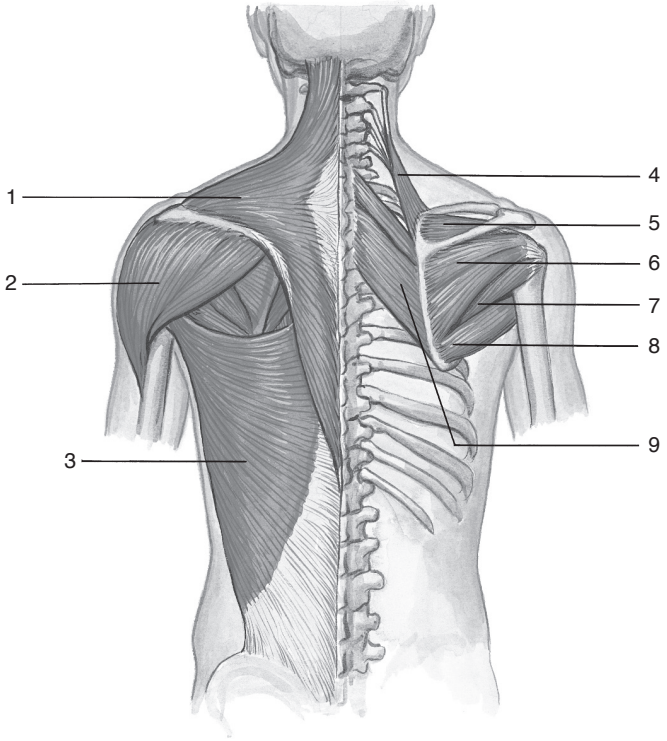
Head and Neck

1) **Epicranial aponeurosis**
2) **Frontalis**
3) **Occipitalis**
4) **Epicranius**
5) **Masseter**
6) **Splenius capitus**
7) **Sternocleidomastoid**
8) **Temporalis**
9) **Orbicularilis oculi**
10) **Zygomaticus**
11) **Buccinator**
12) **Orbicularis oris**
13) **Platysma**



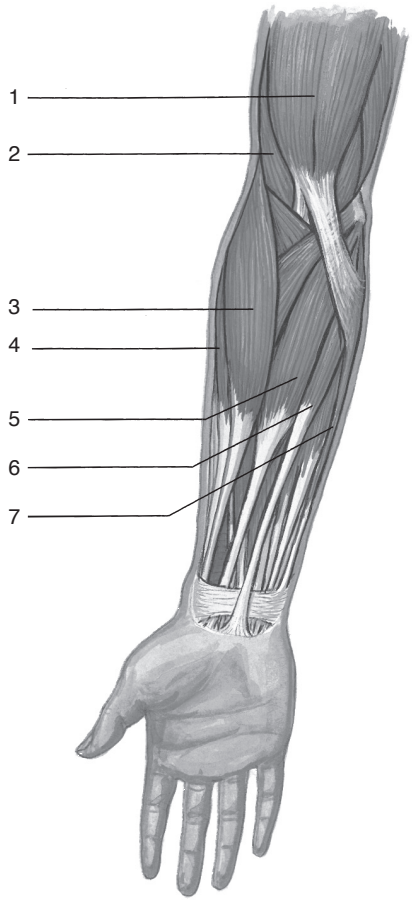
Anterior Trunk

1) **Sternocleidomastoid**
2) **Pectoralis minor**
3) **Internal intercostal**
4) **Serratus anterior**
5) **Rectus abdominus**
6) **Internal oblique**
7) **Transversus abdominus**
8) **Trapezius**
9) **Deltoid**
10) **Pectoralis major**
11) **Linea alba**
12) **External oblique**
13) **Aponeurosis of external oblique**



Posterior Trunk

1) **Trapezius**
2) **Deltiod**
3) **Latissimus dorsi**
4) **Levator scapuli**
5) **Supraspinatus**
6) **Infraspinatus**
7) **Teres minor**
8) **Teres major**
9) **Rhomboideus major**

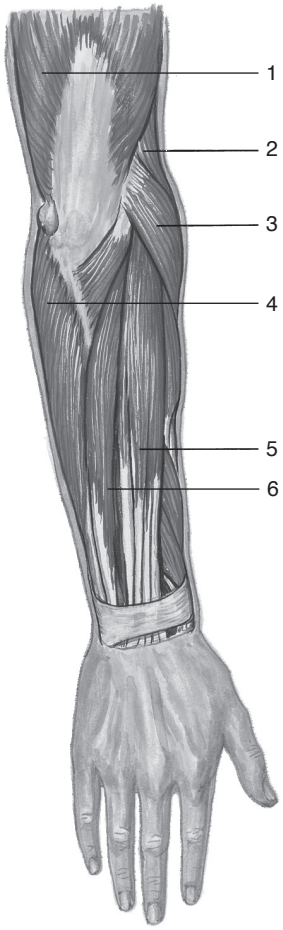


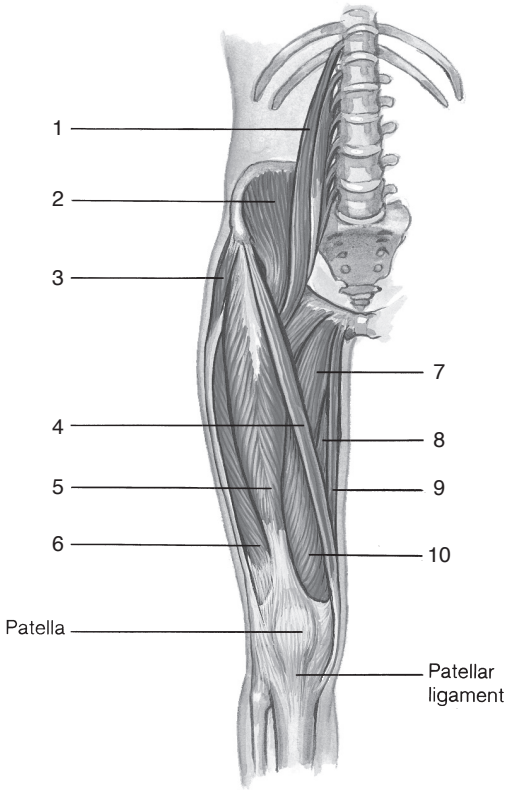
Anterior Forearm

1) **Biceps brachii**
2) **Brachialis**
3) **Brachioradialis**
4) **Extensor carpi radialis longus**
5) **Flexor carpi radialis**
6) **Palmerus longus**
7) **Flexor carpi ulnaris**

Posterior Forearm

1) **Triceps brachii**
2) **Brachioradialis**
3) **Extensor carpi radialis longus**
4) **Flexor carpi ulnaris**
5) **Extensor digitorum**
6) **Extensor carpi ulnaris**



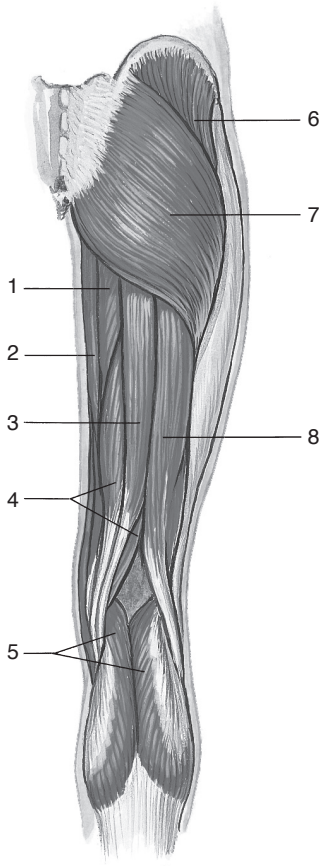


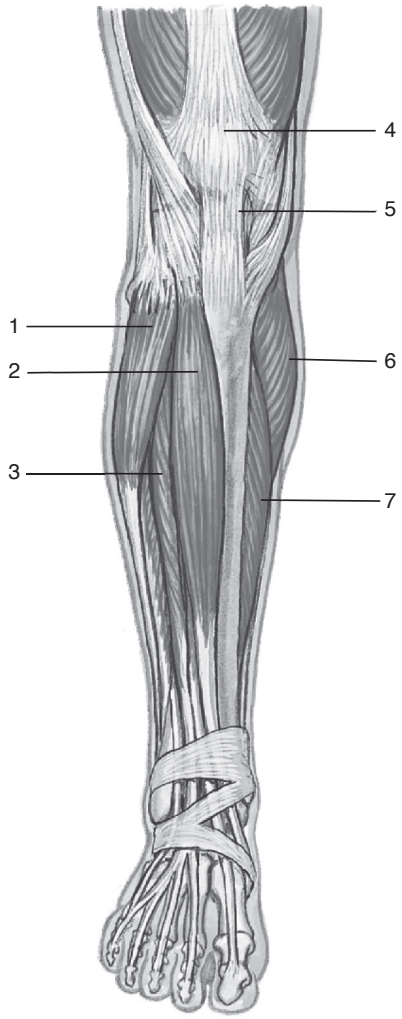
Anterior Thigh

1) **Psoas major**
2) **Iliacus**
3) **Tensor fasciae latae**
4) **Sartorius**
5) **Rectus femoris**
6) **Vastus lateralis**
7) **Adductor longus**
8) **Adductor magnus**
9) **Gracilis**
10) **Vastus medialis**

Posterior Thigh

1) **Adductor magnus**
2) **Gracilis**
3) **Semiteudinosus**
4) **Semimembranosus**
5) **Gastrocnemius**
6) **Gluteus medius**
7) **Gluteus maximus**
8) **Biceps femoris**



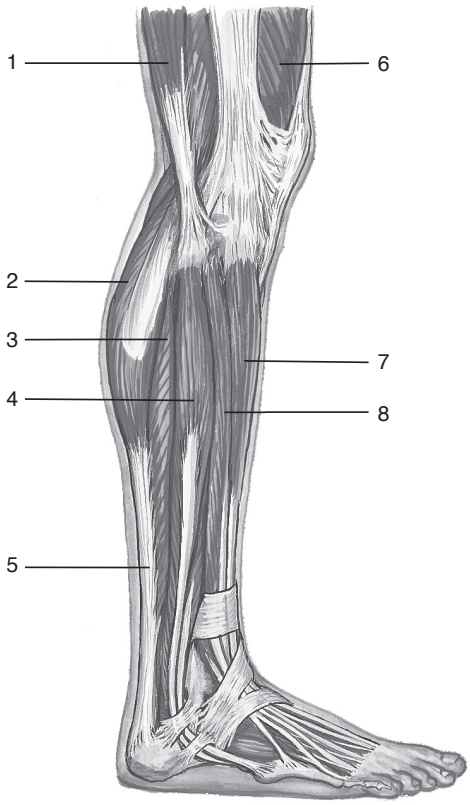


Anterior Leg

1) **Peroneus longusnus**
2) **Tibialis anterior**
3) **Extensor digitorum longus**
4) **Patella**
5) **Patellar ligament**
6) **Gastrocnemius**
7) **Soleus**

Lateral Leg

1) **Biceps femoris**
2) **Gastrocnemius**
3) **Soleus**
4) **Peroneus longus**
5) **Calcaneal tendon**
6) **Vastus lateralis**
7) **Tibialis anterior**
8) **Extensor digitorum longus**



6. Disorders of the Muscle System

Write the names of the disorders in the spaces provided.

1) Inflammation of connective tissues of muscles. **Fibrositis**
2) Involuntary, tetanic contraction of a muscle. **Cramp**
3) Antibodies attach to acetylcholine receptors, preventing normal stimulation of muscles. **Myasthenia gravis**
4) Inflammation of muscle tissue. **Myositis**
5) A pulled muscle. **Strain**
6) Abnormal increase of fibrous connective tissue in a muscle. **Fibrosis**
7) Viral disease that destroys motor neurons and paralyzes skeletal muscles. **Poliomyelitis**
8) Group of diseases characterized by the progressive degeneration of muscles. **Muscular dystrophy**
9) A bacterial disease that prevents the release of acetylcholine from axon tips. **Botulism**
10) A bacterial disease commonly called "lockjaw." **Tetanus**
11) Sudden, involuntary weak contractions of a muscle or group of muscles. **Spasms**

7. Clinical Applications 

a. The accumulation of lactic acid can make muscles sore. Would heat or cold applications be best to alleviate the soreness? **Heat** Explain. **Heat increases blood flow to the affected area which speeds up removal of waste products.**

b. While playing tennis, Jim had a sudden pain on the back of his left thigh. Was this a sprain or a strain? **A strain.** What muscles were probably involved? **Biceps femoris, semimembranosus & semitendinosus**

c. Tom has been working out to build up his muscles. At the microscopic level, how does a muscle increase in size and strength? **Heavy exercise increases the number of myofibrils in muscle fibers (cells).**