

Human Anatomy

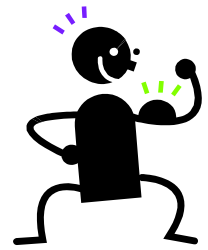
Unit 5– Chapter 7 – The Muscular System

Name _____ P.____ Date_____

Turn your stamp sheet in by day of test or one day after for chance at full credit. After that, max points = half credit. GET ANY INCOMPLETE WORK COMPLETED!!! Late work = 2pts if complete.

ASSIGNMENT	DATE TO BE COMPLETED	POINTS EARNED		
1) Muscle Nomenclature		4	2	0
2) PPT notes on muscle movement		4	2	0
3) Mary, Mary		2	1	0
4) Worksheet 4-5 naming muscle movement (3 pages) (teacher gives)		4	2	0
5) Anterior and Posterior Body Muscles label		4	2	0
6) Arm and Leg Muscles label		4	2	0
7) Worksheets 4-3 and 4-4 Muscles labels and crossword (teacher gives)		4	2	0
8) Worksheet 4-6 tendons (teacher gives)		4	2	0
9) “Don’t Get Muscled” worksheet		4	2	0
10) The Anatomy of a Muscle diagram + book notes worksheet		4	2	0
11) Worksheet 38 – muscle contraction (goes w/a video)		4	2	0
12) Muscle response reading and question		4	2	0
13) Review/study guide		4	2	0

Name _____ Period# _____



Muscle Nomenclature

Read the information below and use it to classify the muscles that follow.

The names of muscles basically come from six different sources

- ❖ **Size:** Used to compare two muscles in the same area, but of different sizes. Example: *gluteus maximus*.
- ❖ **Shape:** The name is based on what shape they look like. Example: *deltoid* is shaped like the Greek letter delta (Δ)
- ❖ **Direction that the muscle fibers run.** Example: *rectus abdominus* runs vertically in the abdomen.
- ❖ **Location.** Example: *biceps brachii* is found in the arm and brachii = branch/arm
- ❖ **Number of attachments the muscle has.** Example: *biceps brachii* has two points of attachment at the origin.
- ❖ **The action the muscle performs.** Example: The *extensor digitorum* extends the fingers or digits.

Classify the following muscles according to how they are named using the following categories: **Size, shape, fiber direction, location, # of attachments, or action.** (use pages 124-134 in the book to help)

MUSCLE	HOW NAMED	MUSCLE	HOW NAMED
Trapezius p. 127		Sternocleidomastoid p. 127	
Temporalis p. 126		Masseter p. 126	
Pectoralis major p. 130		Tibialis anterior p. 134	
Rectus Abdominus p. 129		Orbicularis oris p. 126	
External oblique p. 129		Latissimus dorsi p. 130	
Gluteus medius p. 132		Biceps femoris p. 133	

1. Are there some muscles above that fit into more than one category? Which categories often overlap?

2. Which category did most of the muscles fit into?

3. What is the **origin** of the muscle? (pg 124) _____

4. What is the **insertion** of the muscle? (pg 124) _____

5. What is the **prime mover?** (pg 124) _____

6. What are **synergists** (p. 124) and give an example.

7. What are **antagonists** (p. 124) and give an example.

8. How many skeletal muscle does your body have? (p 124)? _____ --

Muscle Movement and Connections – PowerPoint Notes

Basics of Muscle Contraction

- Muscles move your body by _____ on bones.
- Muscles pull by _____.
- Muscles _____ push
- Muscles can only pull in the direction that their _____ run.
- Muscles are attached to bones with _____.
- The *origin* is the bone the muscle is _____ that doesn't move when the muscle contracts.
- The *insertion* is the bone the muscle is attached to that _____
- Muscles often work in groups
 - The muscle doing most of the movement is the _____
 - The other muscles that help are the _____
 - An _____ is a muscle that does the opposite movement of a muscle.
 - The triceps straightens the arm whereas the biceps _____ the arm. They are antagonists.

Types of Movement

- *Flexion (flex)* _____ – usually bending the part towards the body.
- *Extension (extend)* _____ – usually straightening the body part. (draw in example for both)

- *Adduction* – moves body part toward the _____ brings them closer to the body
- *Abduction* – moves body part laterally _____ from the midline – moves them away from the body (draw in example for both)

- *Tone*: The _____ contraction of part of the muscle
- *Hypertrophy*: The _____ in muscular size due to sustained exercise
- *Atrophy*: The _____ of muscular size due to sustained inactivity

Mary, Mary, Quite Contrary, How does your Body Move?

By now you have lived long enough to know that your muscles move your bones, thereby moving your body. Muscles move by contracting and then pulling on bones. The type of movement they produce is described on **page 106** in your book.



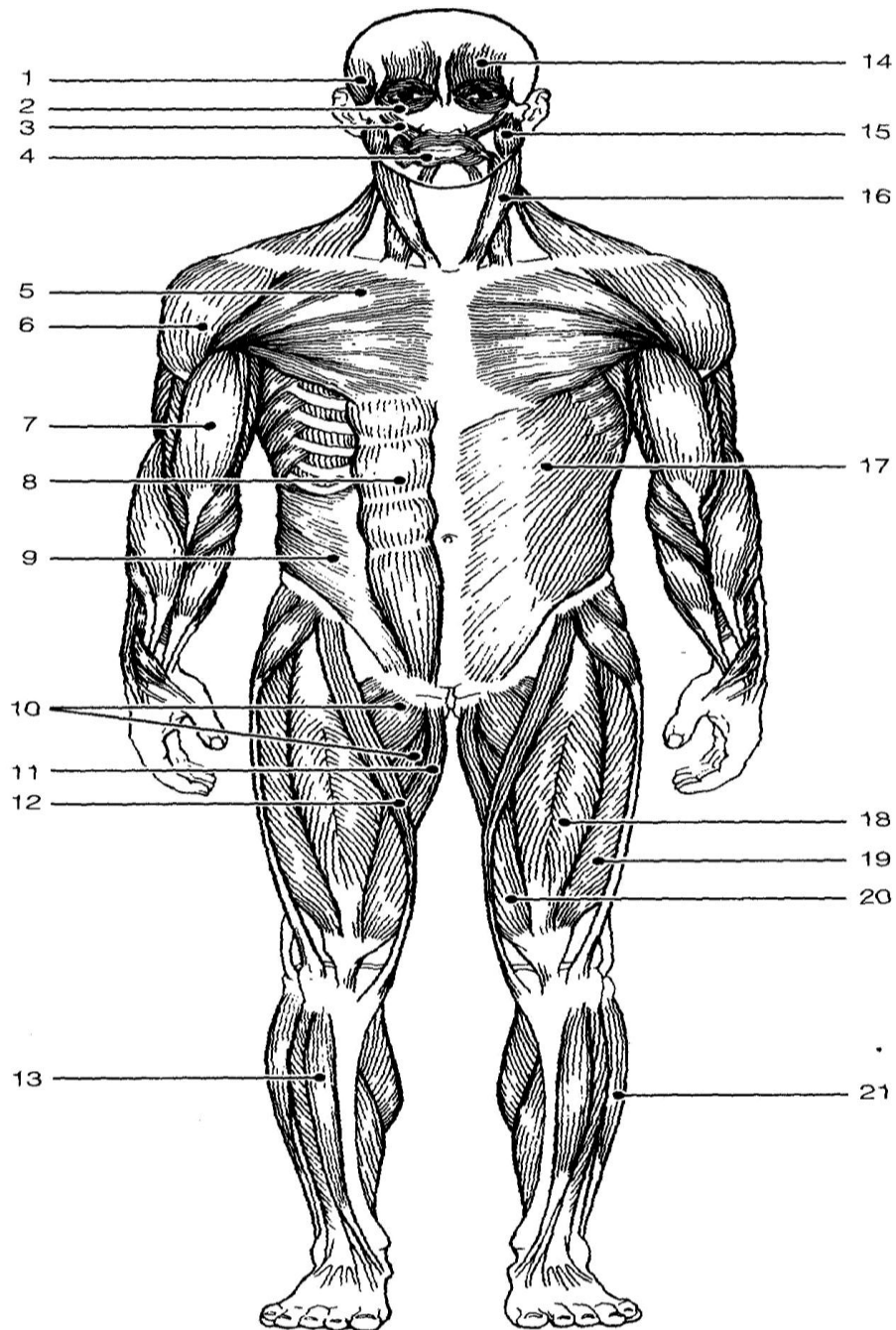
Read the description and decide the type of movement described. Write the type of movement in the blank next to the description. Also, while reading, try to move the way it is described in your book.

- | | | |
|-------|----|--|
| _____ | 1) | A body part is moved around its own axis |
| _____ | 2) | Reduces the joint angle, like bending of the knee |
| _____ | 3) | To move away from the midline |
| _____ | 4) | When you lift your shoulder while shrugging |
| _____ | 5) | To move toward the midline |
| _____ | 6) | Increases the joint angle, like when straightening arm |

Name_____ P.____ Date_____

ANTERIOR VIEW OF SKELETAL MUSCLES

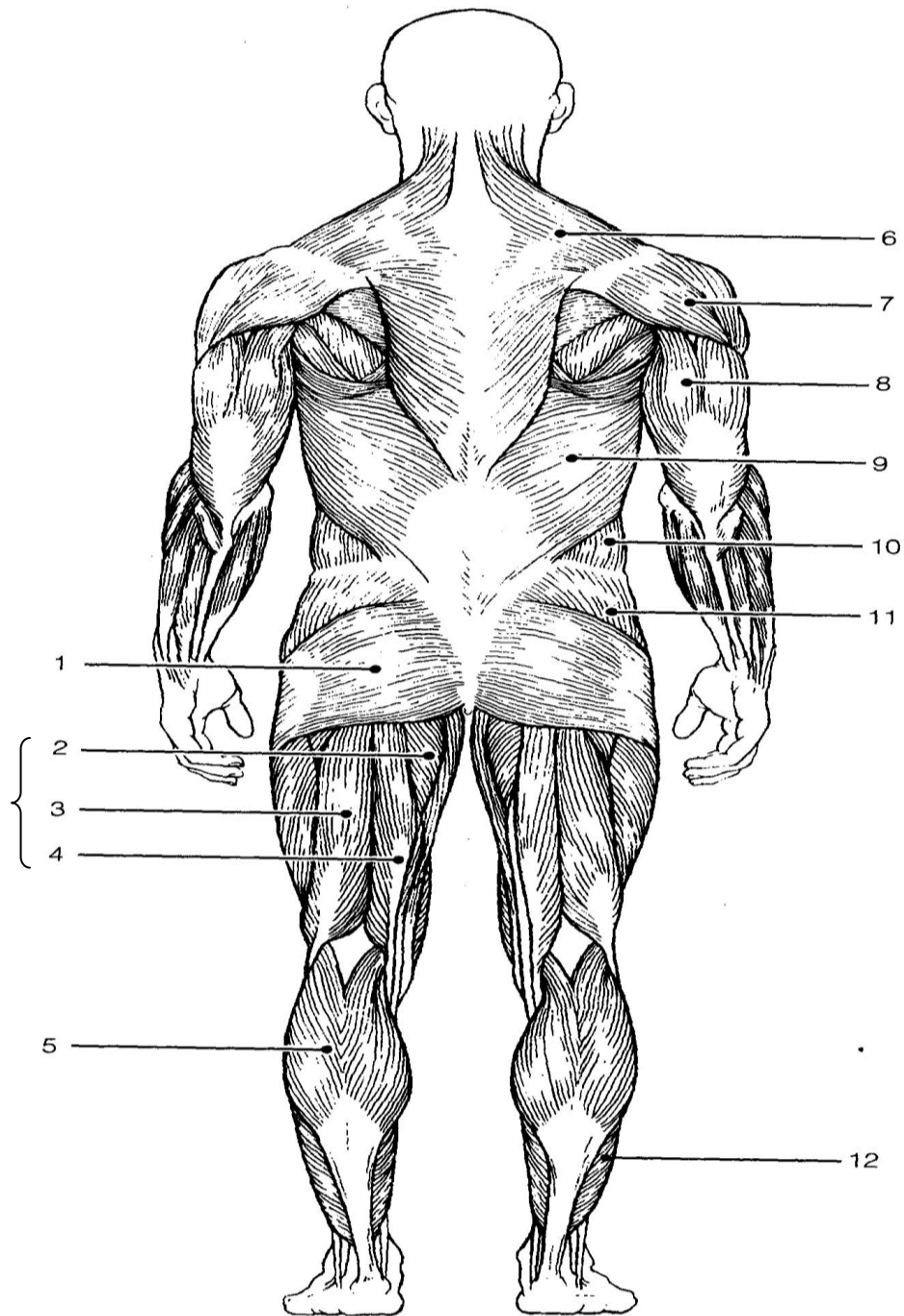
Use page 125 in the book to label AND color code all of these muscles. Use the word bank to get correct labels.



adductors group	deltoid	biceps brachii
external oblique	frontalis	gracilis
internal oblique	masseter	orbicularis oculi
orbicularis oris	pectoralis major	rectus abdominus
rectus femoris	sartorius	peroneus longus
sternocleidomastoid	temporalis	tibialis anterior
vastus lateralis	vastus medialis	zygomaticus

POSTERIOR VIEW OF SKELETAL MUSCLES

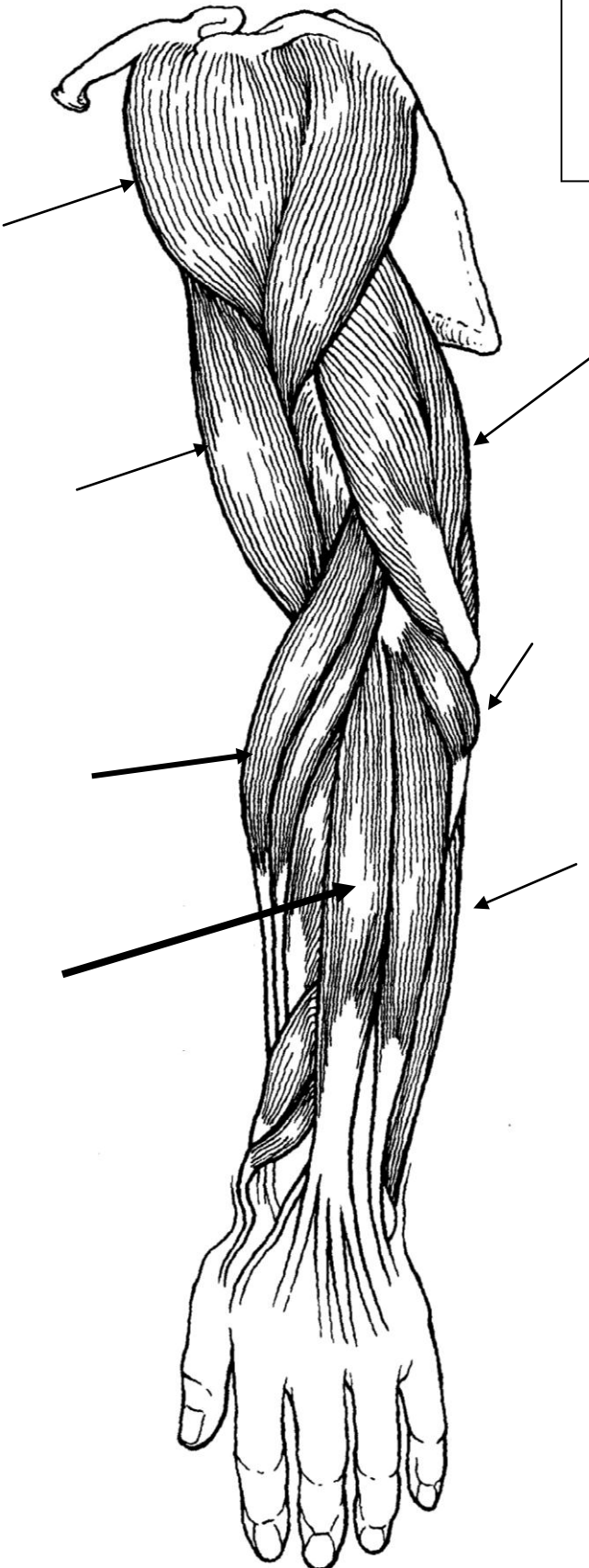
Use page 125 in the book to label AND color code all of these muscles. Use the word bank to get correct labels.



Trapezius	Deltoid	Triceps brachii
Latissimus dorsi	External oblique	Gluteus medius
Gluteus maximus	Soleus	Gastrocnemius
Hamstrings		

Muscles of the arm and forearm

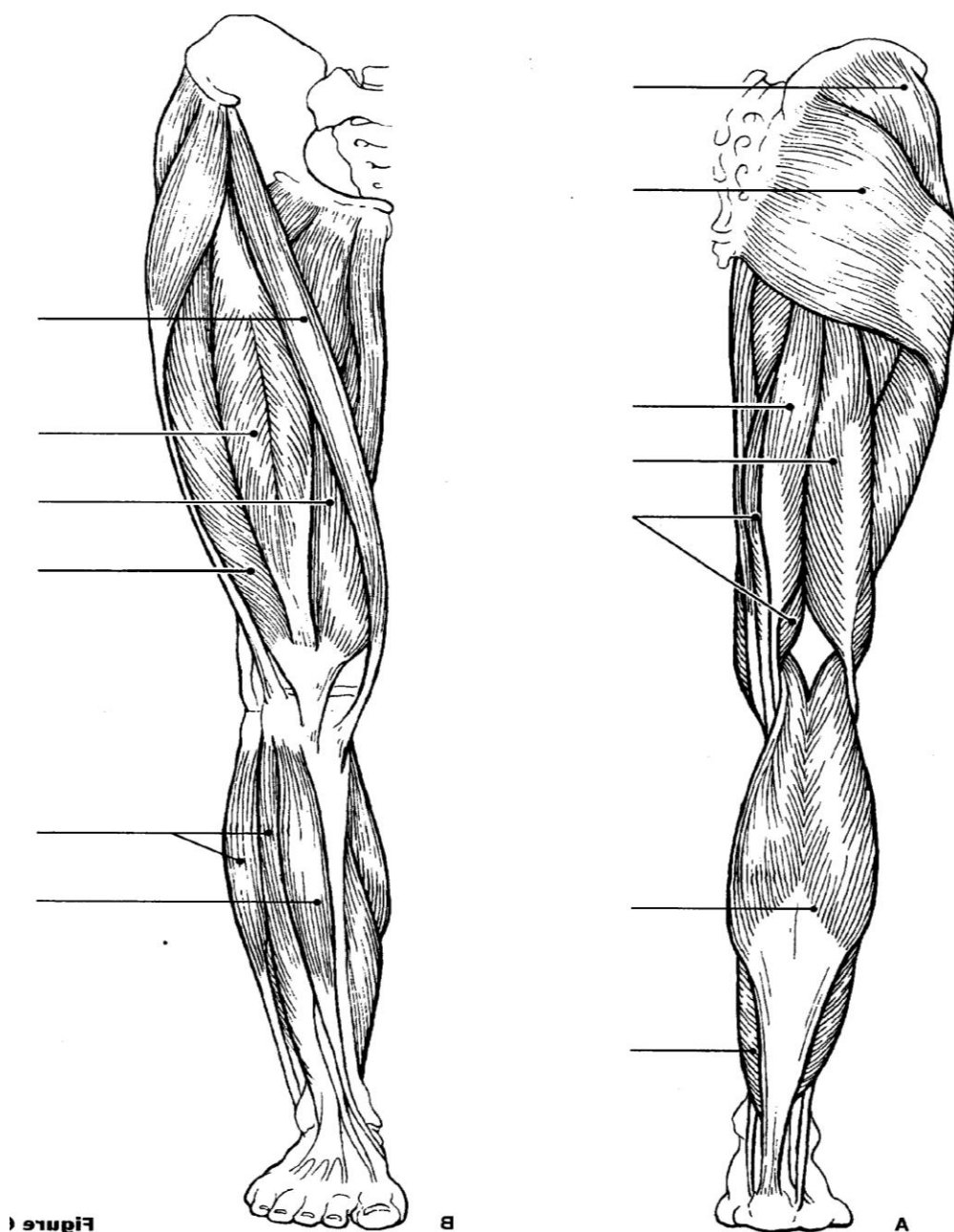
COLOR AND LABEL!



DELTOID
TRICEPS BRACHII
BICEPS BRACHII
EXTENSOR CARPI RADIALIS
BRACHIORADIALIS
FLEXOR CARPI ULNARIS
EXTENSOR DIGITORUM

LEG MUSCLES

Use page 133 in the book to label AND color code all of these muscles. Use the word bank to get correct labels.



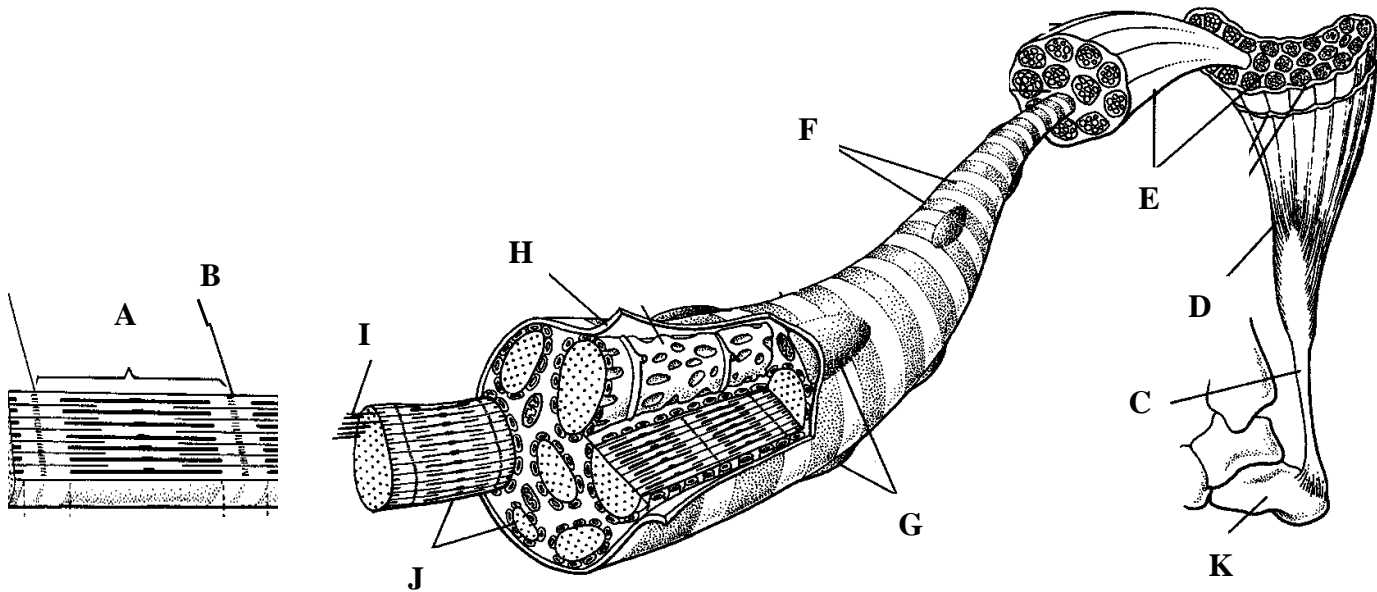
Semimembranosus	Rectus femoris	Tibialis anterior
Biceps femoris	Vastus medialis	Gluteus medius
Gluteus maximus	Soleus	Gastrocnemius
Sartorius	Vastus lateralis	Fibularis
Semitendinosus		

Name _____

Period # _____

Don't Get Muscled Out of This!

Use the pictures below, the handout and pages 115-117 in your text to answer the questions below.



Letter	Name	Letter	Name
A		B	
C		D	
E		F	
G		H	
I		J	
K			

- What is the advantage of having muscle divided into such small segments?

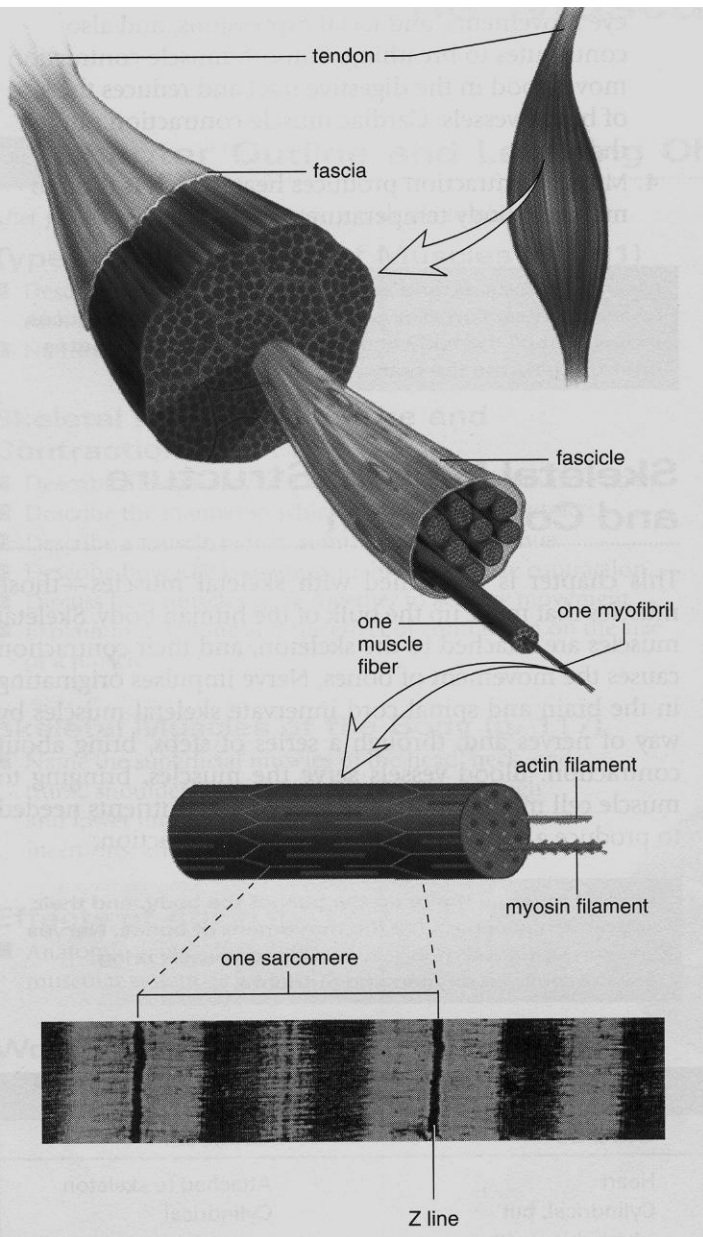
- Find a source that describes what actin and myosin look like. Explain how their shape might help with their function. (pg 119)

- What accounts for the striated appearance of skeletal muscle?

- Explain why tendons connect muscle to bones at the end. Why wouldn't it be as effective if it was connected in the middle or at many points along the bone? Use the back if you need more space.

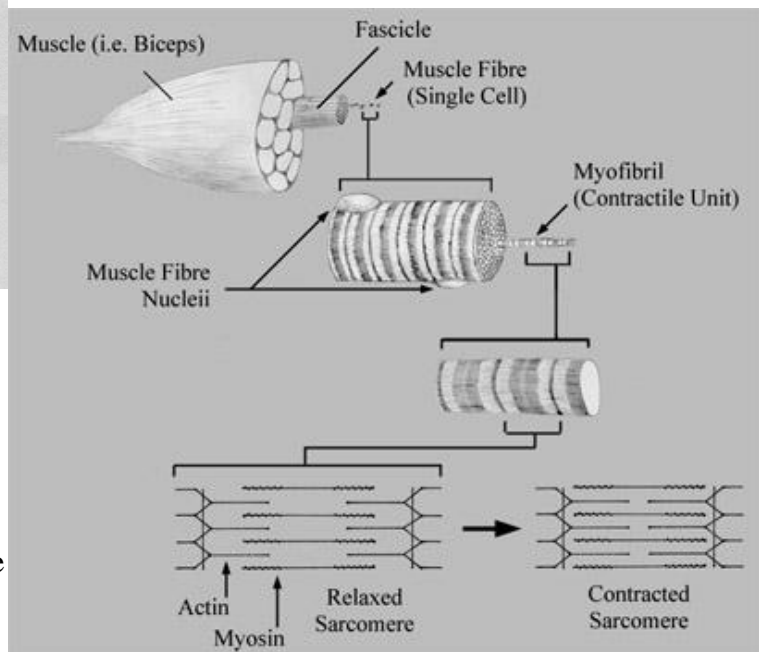
The Anatomy of a Muscle

Use the diagrams to fill in the missing information



All skeletal muscles have the same basic anatomy.

- _____ connect the muscles to the bones
- Muscle is coated with a thin sheath made of protein called the _____.
- Each bundle of muscle is also covered with a sheath called the _____.
- Within each bundle are individual fibers. Each of these is essentially one cell.
- Each fiber is made of many _____ which are themselves made of two proteins: _____ and _____.
- These fibers are broken into individual segments called _____. Each one can be identified because it exists between two dark, thin lines in the muscle called ____—lines.



- When muscles contract, the actin and myosin together and grip. Similar to Velcro™.
- Muscle cells have a _____ reticulum instead of an endoplasmic reticulum. main function of this is calcium storage, release reabsorption. Calcium ions (Ca^{+2}) are necessary for muscular contractions and release.

slide

The and

Muscle Anatomy Book Notes - Chapter 7.2 - page 116+

Name _____ P. ____ Date _____

Skeletal muscle tissue has alternating _____ - and _____ bands, giving it a striated appearance

I. Muscle Fiber

In a muscle cell (aka muscle _____) the plasma membrane is called the _____, the cytoplasm is called the _____, and the endoplasmic reticulum is called the _____.

T- tubules dip down into the muscle fiber. _____ ions, which are needed for muscle _____, are stored in the T-tubules.

Muscle fibers are made of _____ fibrils.

A. A sarcomere is a portion of a _____ (from one _____ line to another)

B. Myofibrils are made of 2 types of protein _____. The thick filament is made of the protein _____, and the thin filament is made of the protein _____.

C. The darker region of the A band in the sarcomere is produced by overlapping _____ and _____ filaments.

D. The thick filaments are made of _____ molecules which are shaped like a _____.

E. The thin filaments are made of 2 intertwining strands of _____ molecules.

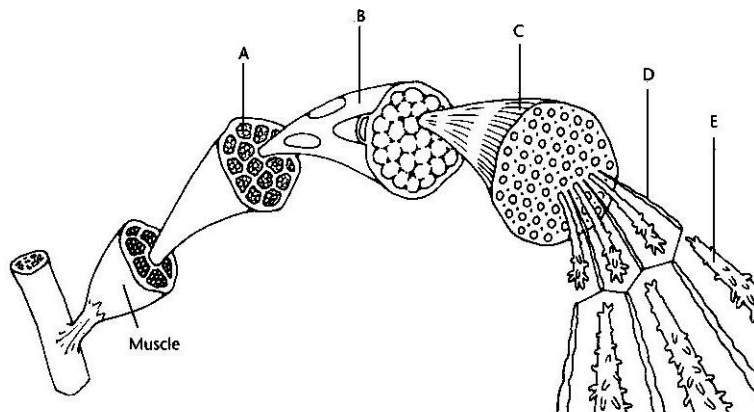
F. A muscle contracts when the _____ filaments begin to slide toward each other.

G. _____ provides the energy for muscle contraction.

Worksheet 38

Muscle Contraction

PART A Using the diagram below, match each letter with the correct term by writing a letter in each space provided. Some letters will be used more than once.



1. _____ actin
2. _____ myofibril
3. _____ muscle fiber
4. _____ thick filament
5. _____ thin filament
6. _____ muscle bundle
7. _____ myosin
8. _____ individual muscle cell

PART B Answer the following.

	DURING MUSCLE CONTRACTION	DURING MUSCLE RELAXATION
How does sarcomere shape change?	a.	c.
How does the distance between Z lines change?	b.	d.

1. Complete the table.
2. Explain why the accepted theory of how skeletal muscles move is called the "sliding filament" theory.

3. Describe the role of ATP in muscle contraction.

4. What is the role of Calcium ions in muscle contractions?

When a muscle fiber receives a nerve impulse from the m _____ neuron, c _____ ion channels open and allow calcium ions to flow into the s _____. The presence of the calcium is needed for the c _____ to form between the actin and the myosin filaments.

MUSCLE RESPONSE

An important characteristic of skeletal muscle is its ability to contract to varying degrees. Although each fiber either contracts fully or doesn't, known as the **all-or-none law**, a muscle, like the biceps, contracts with varying degrees of force depending on the circumstance (this is also referred to as a graded response). Muscles do this by a process called summation, specifically by motor unit summation and wave summation.

Motor Unit Summation - the degree of contraction of a skeletal muscle is influenced by the number of motor units being stimulated (with a motor unit being a motor neuron plus all of the muscle fibers it innervates; see diagram below). Skeletal muscles consist of numerous motor units and, therefore, stimulating more motor units creates a stronger contraction.

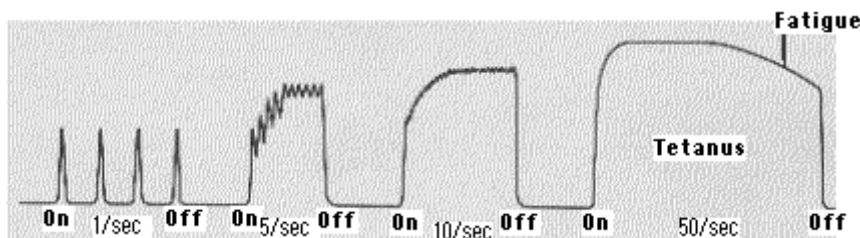
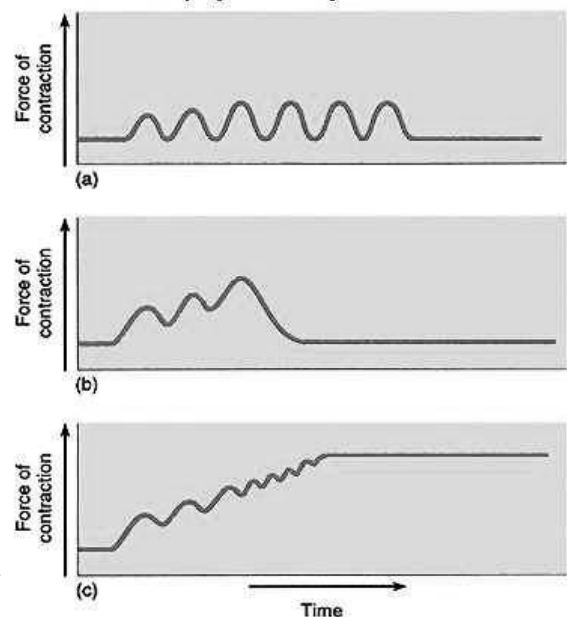
Wave Summation - an increase in the frequency with which a muscle is stimulated increases the strength of contraction. This is illustrated in (b). With rapid stimulation (so rapid that a muscle does not completely relax between successive stimulations), a muscle fiber is re-stimulated while there is still some contractile activity. As a result, there is a 'summation' of the contractile force. In addition, with rapid stimulation there isn't enough time between successive stimulations to remove all the calcium from the sarcoplasm. So, with several stimulations in rapid succession, calcium levels in the sarcoplasm increase. More calcium means more active cross-bridges and, therefore, a stronger contraction.

If a muscle fiber is stimulated so rapidly that it does not relax at all between stimuli, a smooth, sustained contraction called **tetanus** occurs (illustrated by the straight line in c above & in the diagram below).

So, under most circumstances, calcium is the "switch" that turns muscle "on and off" (contracting and relaxing).

Hole's Human Anatomy and Physiology, 7th edition, by Shier, et al.
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Myograms. Figure 9.16

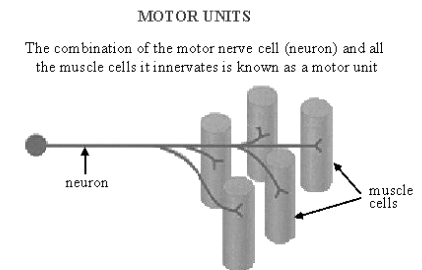


When a muscle is used for an extended period, ATP supplies can diminish. As ATP concentration in a muscle declines, the MYOSIN HEADS remain bound to actin and can no longer swivel. This decline in ATP levels in a muscle causes **MUSCLE FATIGUE**. Even though calcium is still present (and a nervous impulse is being transmitted to the muscle), contraction (or at least a strong contraction) is not possible.

Even when some muscles appear to be at rest, they exhibit **tone**, when some of their fibers are still contracting slightly. Tone allows us to keep our posture. If all of our muscles were to completely relax, we would collapse – like when a person becomes unconscious.

If muscles are not used they **atrophy**, or become weaker and shorter. When muscles are used forcefully for extended amounts of time the **hypertrophy**, or become stronger why increasing the number of myofibrils within the muscle fiber.

There are 2 types of muscle fibers, slow-twitch and fast-twitch. Slow twitch muscles tend to use aerobic respiration to metabolize sugars thereby giving them more energy. They have more mitochondria and appear darker due to more



When an electrical impulse travels down the axon, all muscle cells attached to the motor unit contract simultaneously

myoglobin. These muscles are used during endurance type exercising like marathon running. They do not respond as quickly as the fast-twitch fibers so they fatigue slower.

Fast-twitch muscles tend to be anaerobic, so they can get energy from sugars quickly, but they don't get a lot of energy so they fatigue quickly too. Fast-twitch muscles are lighter in color and have less mitochondria. They are used during explosive type exercising like weight-lifting or sprint running.

QUESTIONS

1. Although individual muscle fibers either contract fully or not at all ("the all or none principle"), a muscle has the ability to contract to _____ degrees.
2. What is a motor unit made of? _____
3. The muscles of the eye have a one motor neuron connected to 23 muscle fibers, whereas the gastrocnemius has one motor neuron connected to 1,000 muscle fibers. Why would there be such a difference in the ratio of neuron to fibers between these two muscles?

4. In a strong contraction more _____ are stimulated than in a weaker contraction.
5. In a muscle a rapid succession of stimulations will result in a (stronger/weaker) contraction.
6. Explain why a rapid succession of stimulations results in an increase of calcium levels in the sarcoplasm.

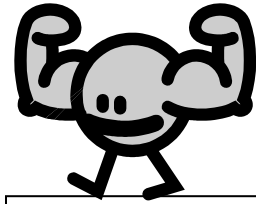
7. Calcium is involved with the formation of _____ - _____, which are involved in muscle contraction.
8. Explain what "tetanus" is and how it happens _____
9. Why do muscles fatigue after awhile even though calcium levels are high and the muscles are still getting the nerve impulse?

10. What is tone? _____
11. Why can slow-twitch muscles contract longer than fast-twitch muscles? _____

12. Think back to your Biology days – why do your muscles fatigue more quickly if you are not breathing while exercising?

13. Why can't a fast sprinter run a marathon? _____

Chap 7 – Test Review Guide



Answer Bank

Antagonist
Atrophy
Biceps brachii
Blood
Branch
Cardiac
Diaphragm
Digestive
Heart
Hypertrophy
Insertion
Intestine
Involuntary
Myo
Nerves
Origin
Pull
Skeletal
Skeletal
Smooth
Striated
Summation
Tendon
Tetanus
Tone

- 1) The 3 type of muscles are _____, _____ and _____.
- 2) The bone that the muscle is attached to and pulls on is the _____ point.
- 3) Cardiac muscle is found in the _____. Cardiac muscle, like skeletal muscle is _____, but unlike skeletal muscle, its fibers _____, like a tree.
- 4) The bone that the muscle is attached to and anchored to is the _____.
- 5) Two muscles are needed to move bones back and forth because muscles can only _____.
- 6) The most numerous muscles in the body are _____ muscles.
- 7) Smooth muscle is not striated and is found in the _____ and other organs.
- 8) Smooth muscles are considered _____ since they contract on their own, you don't control it.
- 9) The muscles help maintain homeostasis of the body by pumping _____, allowing for eyes to move, contracting the _____ for breathing, and moving food through _____ system
- 10) Muscles move in response to messages from _____.
- 11) The tissue that holds muscle to bone is called a _____.
- 12) The root word _____ means "muscle".
- 13) A continuous contraction due to a fusion of twitches is _____.
- 14) The growth of muscles due to heavy use and the repair of small tears is _____.
- 15) A type of tetanus in which only a small number of fibers contract affecting posture is _____.
- 16) A muscle warm up phenomenon in which single twitches rapidly follow each other is _____.
- 17) The deterioration of muscles due to lack of use is _____.
- 18) The muscles in a group that relax during the action is the definition of a(n) _____.
- 19) The _____ is named this because it has 2 points of attachment.

- 20) The _____ is named this because it has a triangular shape.
- 21) The _____ is named this because it extends the digits.
- 22) The _____ is named this because of its size.
- 23) The _____ is named this because of the direction that its fibers run.
- 24) Muscles are made of muscle _____, which are made of muscle fibers. Muscle fibers are made of _____ which are made of myofilaments (_____ or myosin).
- 25) When a muscle contracts in a spasm without relaxing, the result is _____.
- 26) The chemical that blocks the inhibitor in a muscle contraction is _____.
- 27) During a muscle contraction after the ATP is broken down, the actin slides towards each other in the _____.

Answer Bank

A cramp
Actin
Bundles
Ca++
Deltoid
Extensor digitorum
Gluteus maximus
Myofibrils
Rectus abdominus
Sarcomere

Be able to identify the following muscles on a diagram.

Sternocleidomastoid	Deltoid	Masseter	Trapezius	Pectoralis major
Biceps brachii	Latissimus dorsi	Triceps brachii		Gluteus maximus
Rectus femoris	Biceps femoris	Gastrocnemius		Achilles tendon