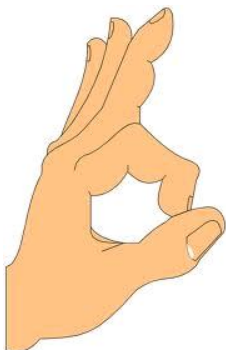


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**STRESS BREAK**

Participating in physical activities that improve your self-esteem is a great way to deal with stress. The better you feel about yourself, the less likely you are to be sensitive to the opinions of others. A few simple changes such as increased muscle tone, weight loss, improved posture can have a huge impact! Do something good for yourself, start a regular training program. You will see positive physical changes and may see a pleasant change in your attitude too 😊

**Muscular Strength and Endurance:**

Never before have the benefits of muscular strength and muscular endurance been so accepted and so frequently recommended by experts as being an important part of your physical fitness plan. Experts today have concluded that through the use of weight (resistance) training, building muscular strength and endurance is an integral part of good health and fitness for all ages. Simple everyday life activities such as climbing a flight of stairs, lifting a backpack full of books, practicing good posture, or any number of running and jumping activities can become easier and more efficient if weight training is a part of your fitness plan.

**Muscular Strength is the maximum amount of force a muscle or muscle group can exert against an opposing force.** Ex. The amount of weight a muscle group can lift one time (bench press)



**Muscular Endurance is the ability of the same muscle or muscle group to contract many times without fatigue or hold a single contraction for an extended period of time.** Ex. The number of times a muscle group can repeat an exercise without tiring (sit-ups) or how long a muscle group can hold a contraction (planks)

Both components of fitness are important to you now and for the future. The sooner you get started with a training program, the sooner you will protect your body against problems associated with poor strength and endurance. Weight/Resistance training is a safe and popular way to incorporate strength and endurance into your life but, before beginning a training program you must first understand how muscles work. Muscles are one of those things that most of us take completely for granted, but they are incredibly important for two key reasons:

- 1) Muscles are the "engine" that your body uses to propel itself. Although they work differently than a car engine or an electric motor, muscles do the same thing -- they turn energy into motion.
- 2) It would be impossible for you to do anything without your muscles. Absolutely everything that you conceive of with your brain is expressed as muscular motion. The only ways for you to express an idea are with the muscles of your larynx, mouth and tongue (spoken words), with the muscles of your fingers (written words or "talking with your hands") or with the skeletal muscles (body language, dancing, running, playing to name a few).

Because muscles are so crucial to us, they are incredibly sophisticated. They are efficient at turning fuel into motion, they are long-lasting, they are self-healing and they are able to grow stronger with practice. They do everything from allowing you to walk to keeping your blood flowing.



BELIEVE IT?...  
Or Not?

As we age our bodies shrink in size and strength... scientists believe it's due to inactivity and not aging...

**USE IT OR LOSE IT!**

There are 3 different types of muscles in your body

Smooth- involuntary muscles found in the lining of the hollow organs like your stomach, intestines, bladder and even blood vessels

Cardiac- involuntary (don't have to think about it) found in the heart

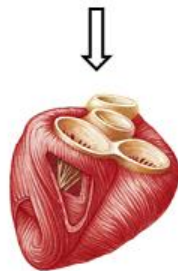
Skeletal- Voluntary muscles (your brain has to tell them to get to work!) connected to bones and allow the body to move

We will only focus on skeletal muscle in this unit. When skeletal muscles contract, they force bones and joints to move. Other connective tissues connect the muscles and bones together allowing them to move efficiently. Connective tissues include tendons (connecting muscle to bone), ligaments (connecting bone to bone) and cartilage (located in the joints that serve as a cushion between bones).

Smooth Muscle  
Tissue



Cardiac Muscle  
Tissue



Skeletal Muscle  
Tissue



### How a muscle works:

The basic action of any muscle is contraction. For example, when you think about flexing (bending) your arm, your brain sends a signal down a nerve cell telling your biceps muscle to contract. The amount of force that the muscle creates varies -- the muscle can contract a little or a lot depending on the signal that the nerve sends (ex. picking up your backpack when it's full vs. when it is empty)

### 2 types of muscle contractions:

1. Isotonic Contraction

1. Isometric Contraction

**1. Isotonic contractions** are those which cause the muscle to change length as it contracts creating movement at a joint. The muscle will either shorten (concentric) or lengthen (eccentric) as your body moves.

- **Concentric:** A concentric contraction is a type of muscle contraction in which the muscles shorten while generating force. An example is bending the arm (flexion), as when performing a "Biceps Curl" movement, taking the hand from your hip to your shoulder, causing a concentric contraction of the Biceps muscle. This is sometimes referred to as "positive" work.



Concentric muscle contraction- the bicep muscle is **shortening** while contracting



**Concentric contractions are the most common type of muscle contraction within the body and occur with general movement.**

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- **Eccentric:** During an eccentric contraction, the muscle lengthens as it contracts. Eccentric contractions normally occur as a braking force in opposition to a concentric contraction or gravity, to protect joints and muscles from injury. Using the same example as “biceps curl”- as you lower the weight from your shoulder to your hip, the bicep muscle now lengthens to prevent the weight from dropping too fast (due to gravity) Another example, your quadriceps lengthen to control the speed of a “squat” exercise to oppose gravity pulling down (and so you don’t fall to the floor). When eccentric contractions are performed in strength training exercises, they are normally referred to as “negatives”, as generally it involves a slow lowering of the resistance / weight – examples would be lowering the bar slowly to the chest during the bench press exercise, or the down part of a sit-up. Muscle work during the eccentric phase is necessary for development of muscle strength. Most weight training programs include both types of isotonic contractions.

Eccentric muscle contraction- the bicep muscle is **lengthening** while contracting



***Eccentric muscle contraction will result in a greater increase in muscle strength, while also resulting in great muscle soreness.***

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**2. Isometric Contractions:** Isometric contractions occur when the muscle develops tension to overcome a resistance but without any change in length, i.e. the muscle attachments remain the same distance apart (example= abdominal muscles during the plank exercise)



A number of gymnastic movements, such as the Iron Cross, where the body’s muscles are under considerable strain, yet are fully static in movement, are good examples of isometric contractions.

A more common, everyday example is grip strength, such as holding a bag of groceries. There will be no movement in muscles of the joint of the hand, but yet the static contraction keeps the bag within your hand.

Isometric exercises are often used in rehabilitation to get a muscle working even if the injured athlete isn’t supposed to be “moving” the injured area. Ex. “Squeezing” the quadriceps after knee surgery.

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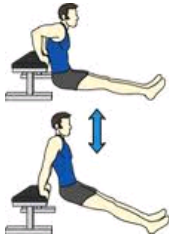

**Training for Strength vs. Endurance:**

Exercises used to develop muscular strength and endurance differ only in the number of repetitions (how many times you can do the exercise) and amount of resistance (weight/intensity). Building strength requires a high resistance which means you can only do a few repetitions (ex. Squat with heavy bar). Building endurance requires a higher number of repetitions but using less resistance (ex. Sit-ups)

## MUSCLES AND THEIR FUNCTIONS

Complete the chart below by filling in the appropriate information.

1. Location: where in the body you would find that muscle
2. Function: choose from the list below which of the 5 movements is created by that muscle
3. Joint: Which joint is moved by the muscle/group
4. Activity: Choose from the list below, which activity matches the muscle

MUSCLE	Location (be specific)	Function	Joint	Activity
Gastrocnemius		Flexion	Ankle	
Quadricep				
Bicep				
Hamstring				
Abdominals	Trunk		Intervertebral (spine)	
Pectoralis Major				
Tricep				<p style="text-align: center;">Bench Dips</p> 
Obliques		Rotation		
Deltoid				<p style="text-align: center;">Lateral Raise</p> 

### ACTIVITY:

V-Twist

Squat

Sit ups

Push-Ups

Arm Curl

Kicking

Toe Raises

### FUNCTION:

Flexion

Extension

Abduction

Adduction

Rotation

**Directions:** Describe the activity shown then determine if it is an example of Muscular Strength, Muscular Endurance or perhaps both. EXPLAIN your answer using information from the text for this unit.



**Activity**

**Example of**

**Why?**



**Activity**

**Example of**

**Why?**



**Activity**

**Example of**

**Why?**



**Activity**

**Example of**

**Why?**



**Activity**

**Example of**

**Why?**



**Activity**

**Example of**

**Why?**



**Activity**

**Example of**

**Why?**



**Activity**

**Example of**

**Why?**

What conclusions can you make from this activity?

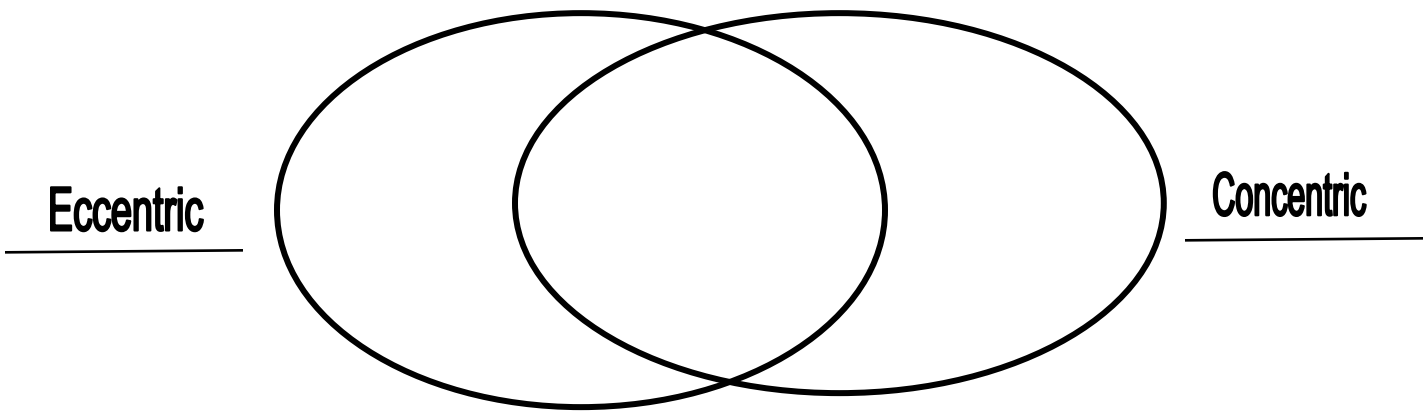
Review Questions: Using the information from your text.

1. \_\_\_\_\_ turn energy into motion
2. List 3 ways that participating in physical activities can decrease your stress levels and improve your self esteem. Use examples from the text.

3. Describe each of the 3 types of connective tissue mentioned in the text:

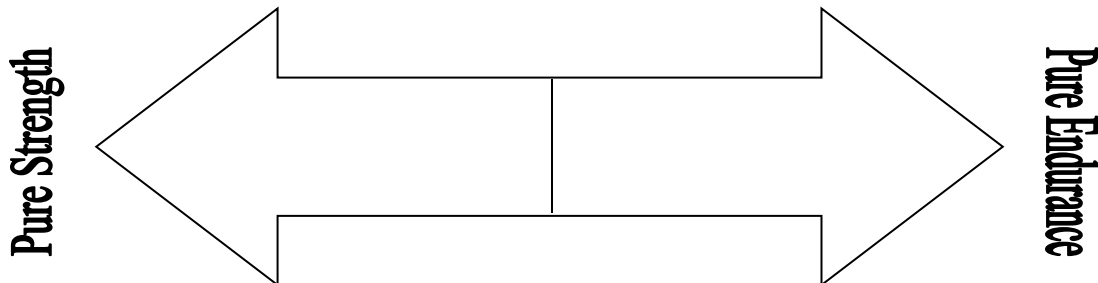
Tendon	
Ligament	
Cartilage	

4. Compare (what is the same) and Contrast (what is different) Concentric and Eccentric muscle contractions using the VIN diagram below.



5. \_\_\_\_\_ cells carry impulses from your brain to your muscle to create a contraction (movement).

6. Muscular Strength v. Muscular Endurance



Using the information from your text and the words below, fill in the chart above.

High Repetitions  
High Resistance

Low Repetitions  
Low Resistance

JIGSAW NOTES:

