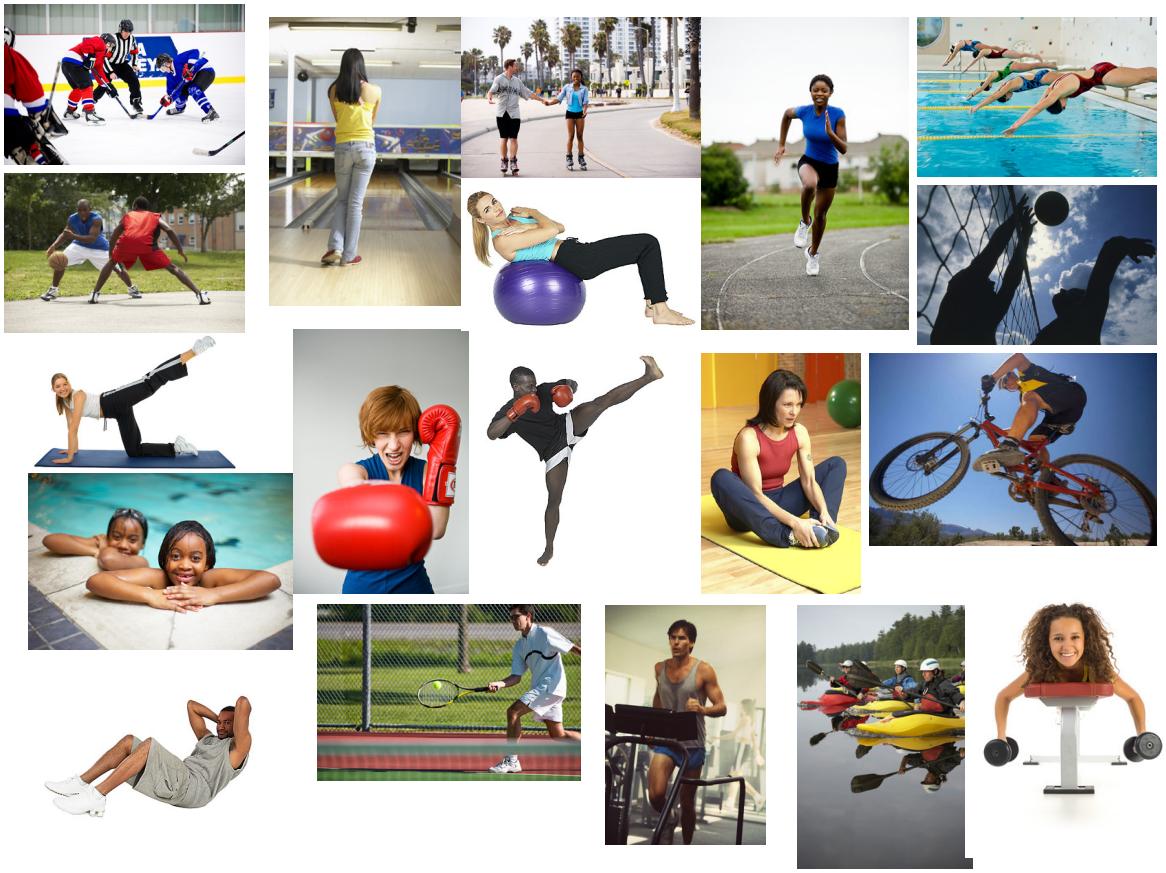
FITNESS AND EXERCISE



FOR A BETTER YOU

by
Mathew Smith

CONTENTS

Topic: Fitness and Exercise for a Better You
Integrated Physical Education and Health Unit
Grade level: 9-12
Time: 6 Weeks

Introduction

1. It has been established in Genesis that God created all things.
2. John reiterates that indeed He, (God) made everything.
3. In turn, God made male and female in His own image.
4. Ellen White records in Patriarchs and Prophets that man was loftily and perfectly made.
5. God declares that His creation is His crowning work.

Purpose

Seventh-Day-Adventist education as a whole has been designed to recreate in students the image of our Maker. In all that we do we must honor God. In our thoughts, worship, work, and play we are obligated to Him, our Creator. We are stewards of the bodies that God has graciously given us, therefore, we should strive to do our best, feel our best, look our best and should rightly represent Him.
The purpose of this unit is to:

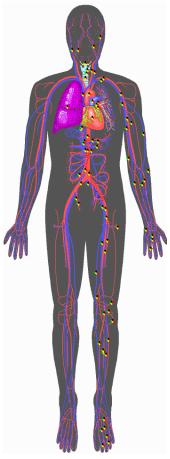
1. inform students of the importance of fitness
2. alert students to the benefits of exercise
3. help students understand how to plan a fitness program
4. acquaint students with the common myths of exercise
5. encourage students to establish routines that contribute to their overall fitness

Understanding Fitness

Fitness is a state of readiness, the ability of the entire body to handle day-to-day circumstances at its highest level possible and have enough reserve energy to respond to unexpected demands. Physical fitness is "a set of attributes that are either health or skill related." Health-related fitness includes cardiorespiratory endurance, muscular strength and endurance, flexibility, and body composition; skill-related fitness includes balance, agility, power, reaction time, speed, and coordination.
In this section we will only examine of the health-related fitness components.

Cardiorespiratory Endurance

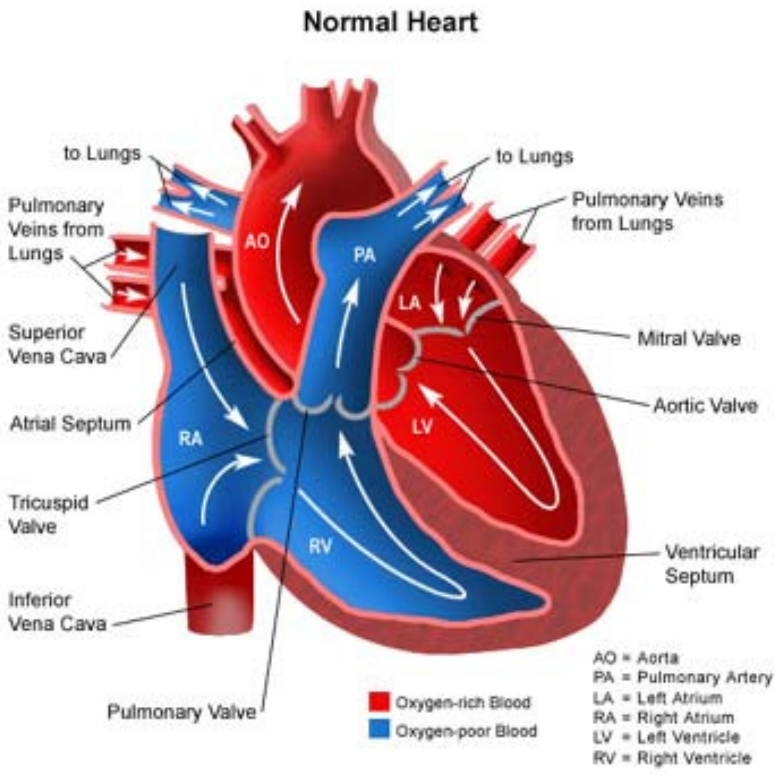
Cardiorespiratory endurance relates to the body's ability to efficiently use oxygen, nutrients, and excrete wastes during long sessions of vigorous exercise. Endurance depends on nutritional support for a muscle. The most important determinant of nutritional support to a muscle is how well the heart and lungs can supply the muscle with oxygen when the muscle energy demands are at their maximum level. To better understand this let's examine how the heart functions in general.
The heart is a small but extremely important muscle located in the chest leaning slightly to the left. The heart must circulate blood throughout the body and it accomplishes that task by acting as a pump. To work like a pump, the structure of the heart is divided into a right and left side separated by a thick wall called the septum. Each side has an upper chamber called an atrium and a lower chamber called a ventricle. Each chamber of the heart contains valves, the tricuspid on the right and bicuspid (mitral) on the left. These valves keep blood flowing in one direction acting as a trap door. Here is how blood circulates in the heart. First, deoxygenated blood returns from the body and empties into the right atrium. When the heart contracts the blood is forced through a valve into the right ventricle. At the next contraction, blood is forced through a valve called the pulmonary semilunar to the pulmonary artery. This artery takes the blood to the lungs where it is purified and carbon dioxide in the blood is exchanged for oxygen. Oxygen rich blood from the lungs then enters the left atrium. When it is full, the pressure from the blood will force the valve near the bottom to open, allowing the blood to flow down into the left ventricle. Then when the heart contracts again, the blood will be forced from the thick muscular walls of the left ventricle through the aortic valve, into the aorta, the largest artery in the body. The blood then will be propelled and distributed to the entire body through smaller arteries and capillaries.



After receiving this information on how the heart works, you should have no problems understanding how this magnificent muscle performs during exercise. As the muscles in your legs, arms, shoulders, and other parts of the body alternately contract and relax the heart must pump more blood at a faster pace. Because of the increased needs of your muscles you breathe more rapidly and deeply. The energy needed to supply the muscles comes from chemical reactions in which oxygen combined with nutrients in the blood is delivered to all parts of the body. The more intense the muscle contractions are, the more oxygen and nutrients are needed. As you exercise, sympathetic nerves cause the heart to beat faster and more forcefully. Sympathetic nerves also cause veins to constrict or get smaller. Smaller veins allow more blood to travel through at a faster rate resulting in an enormously greater amount of blood being pumped. When at rest the heart pumps about 5 liters per minute. When exercising the heart can pump about 25 liters per minute, which is 5 times the amount of resting. The harder you work, the harder your heart works.

Building Heart and Lung Endurance

The ability of the body to consume oxygen is a determinant of how much exertion a person can withstand. This means that oxygen uptake capability of the body will determine how much endurance a body has and therefore how hard a body can work. When the body is exercising at its maximum capacity, the oxygen uptake is known as VO2 max where V = velocity or rate and O2 is the symbol for molecular oxygen. There are two things oxygen uptake depends upon: first, how well the respiratory system can ventilate (bring air into), the lungs so that there is enough oxygen to feed the blood, and secondly, how fast the heart can pump oxygenated blood to the muscles. How fast the heart can pump blood to the muscles also depends on two things: the rate and stroke volume. Heart rate x stroke volume = cardiac output. Therefore, a measurement of oxygen uptake (VO2 max), cardiac output, and heart rate will determine the heart's pumping ability and the respiratory system's ability to bring air into the lungs during exercise.



Each person's maximal exercise level is unique to just that person. For example, marathon runners have one of the highest levels of endurance of any human being. Their hearts are up to 40 percent larger and are capable of pumping 40 percent more blood than other very athletic individuals. A person's fitness level, age, sex, medical history, chemical and hormonal variations are all factors that influence how much power (the amount of work performed over a certain period of time), a person can produce when exercising to the maximal limit.

Label Your Heart

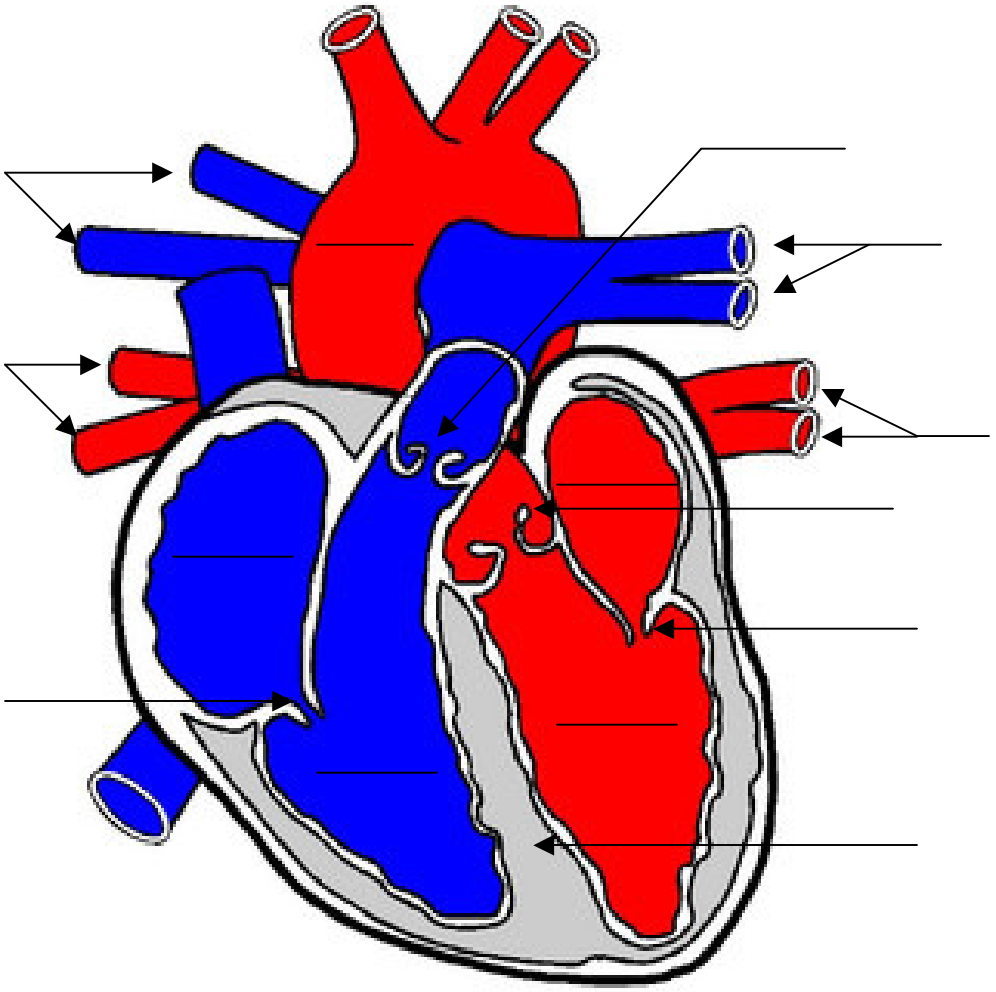
Name _____

Date _____

Activity Worksheet

Match each vocabulary term on the right with the model description on the left.
Write the **boldface** letter of the correct description on the line provided.
Some letters may be used more than once.

For further information have your students check the website listed below after completion of this activity on the heart.
http://www.wisc-online.com/objects/ViewObject.aspx?ID=AP12504



a. right ventricle
b. aortic valve
c. pulmonary semilunar
d. bicuspid valve
e. left atrium
f. septum
g. pulmonary arteries
h. left ventricle
i. aorta
j. right atrium
k. pulmonary veins
l. tricuspid valve

The Heart / Quiz

Name _____

Date _____

Activity Worksheet

Write the letter of the correct answer on the line provided.

_____ 1. How many chambers does the human heart contain?
a. 2 **c.** 4
b. 3 **d.** 5

_____ 2. The right ventricle of the heart receives blood from the right atrium and pumps it to the:
a. coronary artery **c.** pulmonary artery
b. vena cava **d.** aorta

_____ 3. What is the organ that pumps blood throughout the human body?
a. the lungs **c.** the kidneys
b. the heart **d.** blood vessels and capillaries

_____ 4. What happens to the heart when muscles work harder?
b. the heart pumps blood slowly so the muscles can relax
c. the heart pumps blood faster so the muscles get more oxygen
d. the heart slows down
e. the heart gets tired

____ 5. The upper chamber of the heart is called:
a. atrium **c.** ventricle
b. palladium **d.** vena cava

____ 6. Blood returning from the lungs enters the heart through the:
a. pulmonary semilunar valve **c.** right ventricle
b. mitral valve **d.** left atrium
e. vena cava

____ 7. Which of the following structures keep blood flowing in one direction acting as a trap door?
a. chambers **c.** valves
b. cutaneous membrane **d.** capillaries

____ 8. What causes veins to constrict?
a. semilunar valves **c.** capillaries
b. muscle contractions **d.** sympathetic nerves

____ 9. Which blood vessel takes blood to the lungs?
a. capillary **c.** venule
b. artery **d.** vein

____ 10. The term pulmonary refers to:
a. kidney **c.** heart
b. lungs **d.** muscles

____ 11. Cardiorespiratory endurance is the body's ability to use and excrete:
a. oxygen, waste and nutrients **c.** waste, nutrients and oxygen
b. nutrients, oxygen and waste **d.** all of the above

____ 12. When at rest the heart pumps about this many liters per minute:
a. 25 liters **c.** 10 liters
b. 15 liters **d.** 5 liters

____ 13. What thick muscular wall chamber forces blood to the aortic valve?
a. left ventricle **c.** right atrium
b. right ventricle **d.** left atrium

____ 14. Name the largest artery in the body:
a. vena cava **c.** pulmonary vein
b. aorta **d.** aortic valve

____ 15. This thick wall structure separates the right and left sides of the heart:
a. tricuspid **c.** septum
b. ventricle **d.** aorta

____ 16. When the body is exercising at its maximum capacity, the oxygen uptake is known as?
a. VO 2 max **c.** O2 max
b. V max **d.** O2V max

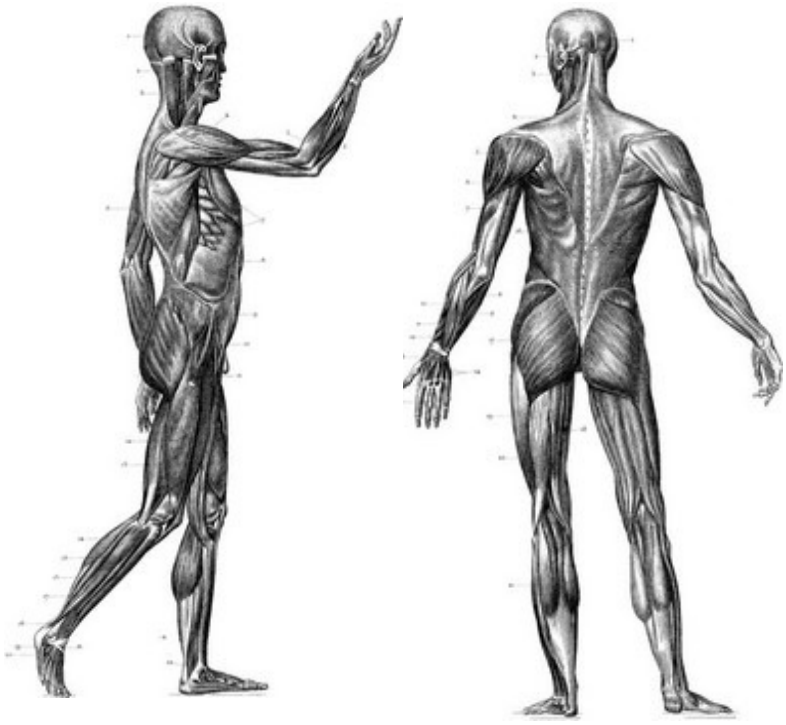
____ 17. Oxygen uptake depends on two things:
a. how fast the heart rate is and how well the muscles contract during exercise.
b. how well the lungs ventilate oxygen to the blood and the consistency of the stroke volume.
c. the heart rate and the speed at which heart can pump blood to the muscles.
d. how well the respiratory system can ventilate the lungs to supply enough oxygen to feed the blood and how fast the heart can pump oxygenated blood to the muscles.

Muscular Strength and Endurance

Webster defines a muscle as:
1. a body tissue consisting of long cells that contract when stimulated and produce motion
2. an organ consisting of this tissue and functioning in moving a body part

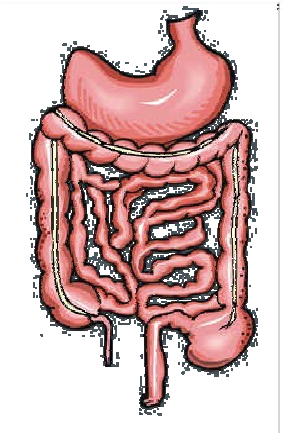
The term muscle comes from the Latin *musculus,* diminutive of *mus* "mouse". There are over 600 muscles in the body. They do everything from pumping blood throughout your body to helping you lift heavy objects. Some of your muscles are self-controlled while others (like your heart) do their jobs without conscious thought. Muscle tissue is classified as three types:

1. striated or skeletal
2. smooth
3. cardiac, according to its structure and function



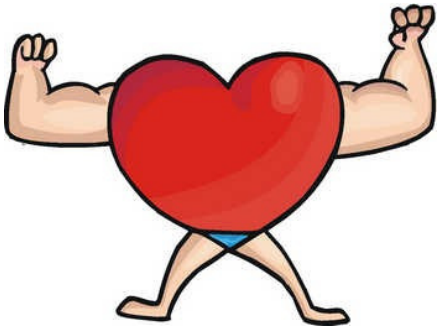
Striated or skeletal are voluntary muscles. They are under conscious control.

Examples of this movement are the legs and arms. They are attached to bones by thick strands of connective tissue called tendons. Two or more of these muscles may oppose each other's action. Muscles that bend (contract or shorten) a limb at the joint are known as flexors. Muscles that straighten (lengthen or relax) a limb are called extensors. Examples of these are the biceps and triceps located in the upper arm. To move the lower arm toward the upper arm the biceps contract and the triceps relax, thus the arm bends. When biceps relax and triceps contract the arm is extended, thus the arm lengthens. Always keep in mind as you move about in your daily routine that with every movement of a muscle there is another muscle working as well.



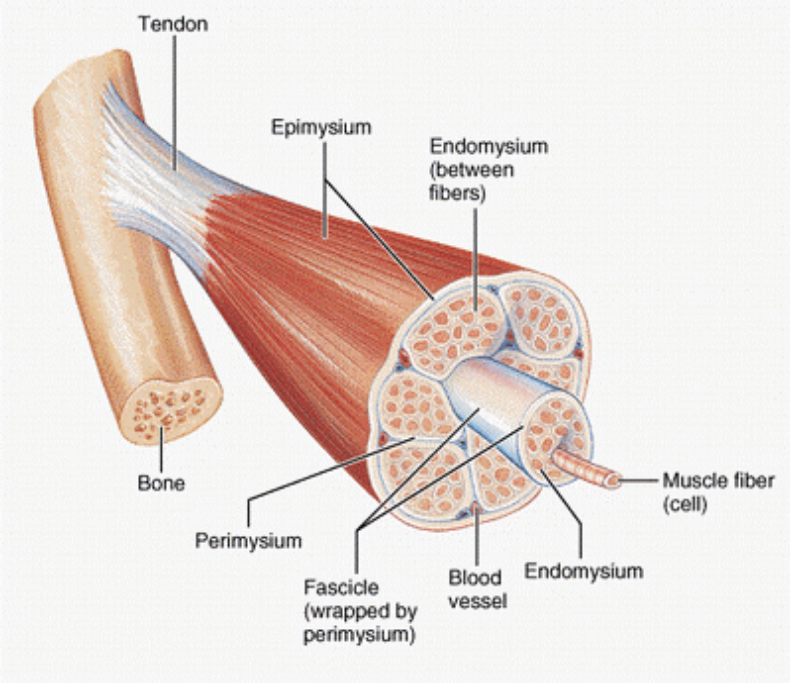
Smooth muscles on the other hand are involuntary. They work without a person's conscious control. Involuntary controlled muscles work automatically to regulate movement in internal organs like the intestines, and the esophagus through the process called peristalsis. In addition, the walls of blood vessels, the bladder and bronchi of the lungs are also included. These internal organs do their jobs without any thought process from us.

Our most important muscle in the body is the cardiac muscle. The cardiac muscle found only in the heart is also involuntary. It contracts rhythmically about 100,000 times per day. These contractions keep blood traversing in our bodies through arteries, veins, and capillaries.



Muscles are to produce force and cause motion. The cells of muscles called fibers are stimulated by chemical impulses from the nervous system. They are the tissues in the body that contract and affect the movement of and within the body. All of the body's muscles use energy when they contract.

Muscular strength is the ability of a muscle or a group of muscles to exert or resist a force on physical objects. Muscles are made up of a group of fixed fibers. They work by contracting their individual fibers causing the muscle to bunch up and get shorter. Muscles consist of two types of fiber, slow (Type I fiber) and fast (Type II fiber) twitch. (The slow twitch is responsible for the strength and endurance of a muscle.) They are found throughout your body with a high concentration along the postural muscles of your spine. Slow twitch muscles are highly fatigue resistant. This allows them to maintain your posture, both sitting and standing for hours at a time before you feel any tiredness or soreness in them. Athletes who are born with a higher percentage of slow twitch fibers in their body tend to excel in events where endurance is required, such as in running a marathon.



The fast muscle fibers are responsible for giving the athlete his speed, agility, quickness, and power. Fast twitch fibers are up to 10 times faster than slow fibers. Fast twitch muscle fibers are activated during short bursts of speed and strength such as in sprinting or bodybuilding. These muscle fibers are also designed to grow larger in response to training, unlike slow twitch muscle fibers. As you consistently exercise your muscles will gradually adapt to the stress. They will become stronger and burn more calories at rest when you increase your muscular strength. You will start to see an improvement in your appearance, in addition to simply feeling marvelous.

How Is Strength Measured?

Manual muscle-testing and the use of a dynamometer are the most common methods to measure strength. It is popular because it is inexpensive and readily available. Using the manual muscle-testing procedure, which is the most popular strength test, the physical therapist will push on your body in specific directions while you resist the pressure. A score or grade is then assigned, depending on how much you were able to resist the pressure. Strength is measured on a five-point scale:

- 0/5 score means you are unable to create any visible or noticeable contraction in a specific muscle. This occurs when a muscle is paralyzed, as with a stroke or spinal cord injury. (Pain also can prevent a muscle from contracting).
- 1/5 grade indicates muscle contraction is noted but no movement occurs. The muscle is not strong enough to lift the particular body part against gravity or move it when in a gravity-reduced position.
- 2/5 score means your muscle can contract but cannot move the body part fully against gravity. When gravity is reduced or eliminated during a change in body position, the muscle is able to move the body part through its full range of motion.
- 3/5 grade reveals that you are able to fully contract your muscle and move your body part through its full range of motion against the force of gravity. Unfortunately, when resistance is applied, the muscle is unable to maintain the contraction.
- 4/5 grade indicates that the muscle yields to maximum resistance. The muscle is able to contract and provide some resistance, but when your physical therapist presses on the body part, the muscle is unable to maintain the contraction.
- 5/5 means that the muscle is functioning normally and is able to maintain its position even when maximum resistance is applied.

Dynamometer Testing

Using a dynamometer device is the other method for testing. Your physical therapist will hold the device as you press it. The instrument will electronically display the amount of force you are exerting in pounds or kilograms. Smaller, handheld dynamometers can measure grip strength; even smaller pinch-grip dynamometers can measure your pinch strength. This device can help test for small changes in your ability to contract a specific muscle or muscle group. The downside to this is that the standard device can be quite expensive and bulky, making it difficult to use in the home-care setting.

Muscular endurance is having the ability to do an activity for a long period of time. Endurance will help an athlete in competition and will also assist in maintaining a healthy lifestyle. As mentioned earlier, muscular endurance coupled with strength is determined by how well your slow twitch muscle fibers are developed. If you participate in sports or are involved in any physical activity that requires a lengthy time frame, it is important to pay close attention to this component. Endurance makes it possible to compete in many activities. For example, a soccer player might also be very good in flag football or tennis because players in both sports use a lot of the same muscles. If you are looking to improve muscular endurance, the best way would be to involve yourself in just about any cardiovascular activity. Remember, as you gradually gain strength in specific muscle groups, your muscles over time will build up so that you can perform a task for longer periods of time.

Recalling Some Facts

Name _____

Date _____

Activity Worksheet

1. What are the three types of muscles?

2. The term muscle, *musculus* or *mus* in Latin means?

3. Muscles that bend or contract are known as?

4. Name the fiber responsible for power, speed, and quickness.

5. Name a type of muscle that is conscious controlled.

6. What is the most important muscle in the body?

7. The thick strands of connective tissue attached to the bones are called?

8. How many muscles are there in the body?

9. What are muscles made of?

10. How many times a day does the heart rhythmically contract?

11. Give two examples of smooth muscles.

12. What muscle fiber is responsible for endurance?

13. Name two methods used to measure strength.

14. Which score in the manual muscle-testing method means the muscle is functioning normally?

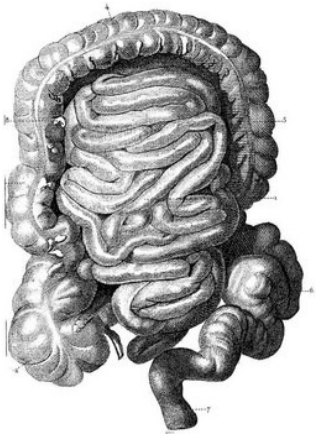
15. A handheld dynamometer measures this type of strength?

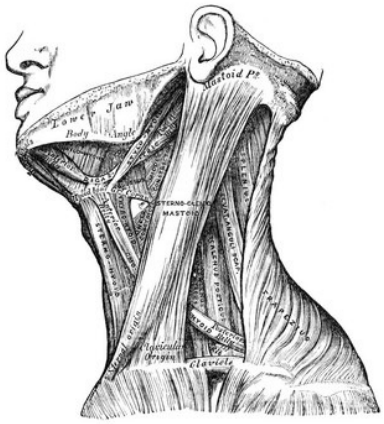
Muscle Presentation

Assignment: Cooperative Learning /
Muscle Tissue Presentation
Duration of Activity: 3 Class Periods

Ask students to form three groups, and assign each group one of the types of muscle tissue: **skeletal**, **smooth**, or **cardiac**. Have group members read about their assigned type of muscle, discuss the information, and consider how they can most effectively share their findings with the rest of the class. Then let the members of each group describe and explain their assigned muscle type in a 10-12 minute presentation.

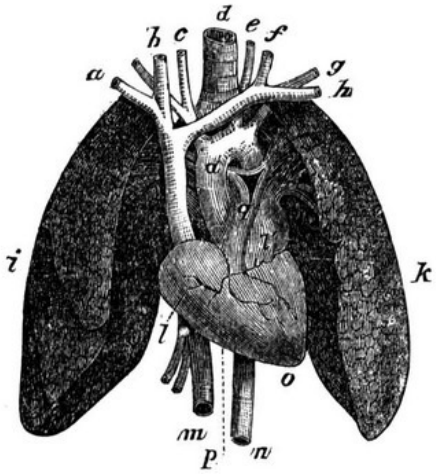
<u>smooth</u>





<u>skeletal</u>

<u>cardiac</u>



Muscle Strength and Endurance Exercise

Classroom Activity: 20 minutes
Materials: Deck of Rook Cards

Explain that students are going to perform some exercises that address the muscular strength and endurance components of fitness. Remind them of the difference between muscular strength and muscular endurance. (Endurance is when you can sustain the activity for multiple repetitions, whereas muscular strength is when you increase the weight to the maximum amount of force a muscle can put out when it contracts.) For students who work out regularly this will be more of a muscular endurance exercise, and for students who work out less frequently it will build muscular strength.

Rook Card Activity: Have students select an exercise they can do that strengthens:
the upper body without using any equipment. (Push-ups are an example.)
the lower body without any equipment. (Lunges or squats are examples.)
the core and trunk areas without equipment. (Sit-ups for lower abs, stomach crunches for upper abs, or back extension chest raise are examples.)
total-body without equipment. (Squat thrusts, skipping are examples.)
Have someone demonstrate each of these exercises. See page 13 for more exercises.

- Show the Rook cards and explain that each student, one at a time, is going to draw a card from the deck. If the suit is **red**, the class will do the upper-body exercise and if the suit is **black** the class will perform the lower-body exercise. If the suit is **green** the class will complete core and trunk exercises, and if **yellow** the class will do total-body exercises. The number represented on the card shall determine the repetitions. You may modify the repetitions or any part of this activity according to the student's physical ability. (Students holding card numbers 11-14 should only do 10 repetitions until they develop more strength and endurance.)

- Answer students' questions at this point. Let them know that they are not going to go through the whole deck. They will just perform a couple of rotations, if time allows. Encourage the students to do the best they can on each of the exercises.

- Have a student draw a card and lay it face up. Have students complete the corresponding exercise.

- Have each student take a turn to draw a card. After several turns, stop and discuss how this exercise can be done at any time, anywhere as long as a deck of cards is available. The goal is to finish the whole deck of cards in 12 to 15 minutes. Listed below are examples of upper, lower, core, and total body exercises you can incorporate in this activity:

Muscular Endurance Battery Test

Activity Worksheet
Dynamic Muscular Endurance Battery Test
Muscle Strength / Endurance Exercises

For this test, you perform seven different strength exercises using resistance that is a set percentage of your total body weight.

Equipment:

1. Flat bench (with or without racks),
2. Barbell, assorted weight plates, and collars to hold weight plates in place,
3. Lat pull-down machine,
4. Pull-down machine for triceps extension,
5. Leg curl machine,
6. Incline board (sit-up station),
7. Weight scale.

Preparation: Weigh yourself: _____ lb. Fill in the appropriate resistance column (men or women) in the chart below by multiplying the percent body weight number by your body weight. These calculations determine the amount of weight you should lift for each exercise. Try each exercise a few times so that you can practice your technique and warm up your muscles.

Instructions: Perform each exercise as described below, using the amount of resistance you calculated and entered in the chart. Perform as many repetitions as possible, up to a maximum of 15. Record the number of repetitions of each exercise you perform.

- Arm/bicep curl (free weights)
- Bench press (free weights)
- Lat pull-down (lat machine)
- Triceps extension (pull-down station): Stand with feet shoulder-distance apart. Grasp the bar with a pronated (palms away) grip; elbows should be close to the body and hands should be in line with the elbows. The bar should be at about face level. Press the bar down by fully extending the elbows. Return to the starting position and repeat.
- Leg curl (leg curl or knee flexion machine)
- Bent-knee sit-up (incline board sit-up station and free weights): Lie on your back on the incline board with knees bent and feet hooked under the support. Arms should be crossed on your chest. Keeping your middle and low back flat on the board, raise your head and shoulders off the board. Return to the starting position.

Exercise	Men: Percent body weight to be lifted	Men: Amount of resistance	Women: Percent body weight to be lifted	Women: Amount of resistance	Repetitions (maximum = 15)
Arm curl	0.33	_____	0.25	_____	_____
Bench press	0.66	_____	0.50	_____	_____
Lat pull-down	0.66	_____	0.50	_____	_____
Triceps extension	0.33	_____	0.33	_____	_____
Leg extension	0.50	_____	0.50	_____	_____
Leg curl	0.33	_____	0.33	_____	_____
Bent-knee sit-up	–	_____	–	_____	_____
TOTAL	_____				

Rating Your Dynamic Muscular Endurance

Total your repetitions for each exercise to calculate your overall score. Find your rating in the table below.
Rating: _____

Total repetitions	Fitness category
91–105	Excellent
77–90	Very good
63–76	Good
49–62	Fair
35–48	Poor
<35	Very poor

Flexibility

Flexibility is defined by *Gummerson* as " the absolute range of movement in a joint or series of joints that is attainable in a momentary effort with the help of a partner or a piece of equipment." Flexibility is not something general but is specific to a particular joint or set of joints. Each joint has a different potential range of motion. It is a myth that some people are innately flexible throughout their entire body. Being flexible in one particular area or joint does not necessarily imply being flexible in another. Flexibility provides anti-aging benefits. As you age, your muscles tighten and range of motion in a joint can be minimized. This can put a stop to active lifestyles and even impede day-to-day, normal motions. There are different types of flexibility and most people are unaware of that fact. These different types of flexibility are grouped according to the various types of activities involved in athletic training. Dynamic flexibility involves motion. Static flexibility does not.

Dynamic Flexibility

Dynamic flexibility (also called kinetic flexibility) is the ability to perform dynamic (or kinetic) movements of the muscles to bring a limb through its full range of motion in the joints. Dynamic flexibility is flexibility in motion. An example of this is seen in the picture on the left, a martial artist reaching to land a powerful kick on his opponent. Dynamic flexibility is generally more sport specific than other forms of mobility. It increases core temperature, elongates the muscles, stimulates the nervous system, and helps decrease the chance of injury.

The greatest aspect of developing dynamic flexibility is its excellent convenience. In training it should become part of your warm up. (Warm-ups are so important before dynamic stretching and working out that it is vital to know how to warm up. A warm-up is any low-intensity, continuous activity that warms up the body. Walking, jogging, cycling, and slow rope jumping are commonly used. Other activities might include dribbling a basketball or soccer ball, calisthenics, and low-level tag or other games. After a warm-up, a dynamic stretch is performed to prepare the body for the workout). Dynamic stretching consists of controlled leg and arm movements that take you gently to the limits of your range of motion. It only takes between 10-15 minutes to do a sufficient volume of stretches to warrant an increase. If you want to reach full dynamic flexibility quicker or maximize this ability it should be carried out daily, a couple times a day, once in the morning and late in the afternoon. Do it before breakfast because a heavy meal can cause a diminished blood flow to the muscles.

Remember, **static flexibility** is flexibility that does not involve movement. It is a measure of the full range of motion of a joint and its related muscular involvement. There are two types of static flexibility; **Static Active** and **Static Passive**.

Static Active Flexibility

Static active flexibility refers to the ability to maintain a position of an extended range of motion while stretching the antagonist muscles (muscles that act in opposition to another), using only the tension of the agonistic (straining for effect), and synergistic muscles for support. The ability to assume and hold the stretched position comes solely from your muscles. The static active flexibility is dependent upon the static passive flexibility in combination with the static strength of the stabilizing muscles. The picture on the right is an example of a static active flexibility. Notice that while standing on one leg the subject raises and holds the other leg out in front of her without any other external support. The hamstring (antagonist) is being stretched while the quadriceps and hip flexors (agonists) are holding the leg up. The static technique involves gradually stretching a muscle to the point of mild discomfort by holding it in a maximal stretch for an extended period. Holding time may range from 10 to 60 seconds.

Static Passive Flexibility

Static passive flexibility refers to the ability to maintain an extended position using some external force. This external force can be your own weight, your arms, your hands, even some kind of apparatus or a partner. The ability to assume and hold the stretched position does not come solely from the muscles of concern as in static active flexibility. Using the example above and to the left, the martial artist holds his legs out resting them on the floor using both gravity and his hands. Once you understand the types of flexibility your body can exhibit, you can match this with the appropriate type of flexibility stretches in your training for fitness program.

Here are some general guidelines to bear in mind when following a flexibility program:

- You should be thoroughly warmed up before performing exercises
- Stretch to just before the point of discomfort
- Breath out into the stretch. Avoid breath holding
- Hold each stretch for 10-30 seconds
- If tightness intensifies or you feel pain, stop the stretch
- Shake out limbs between stretches
- Complete 2-3 stretches before moving onto the next exercise

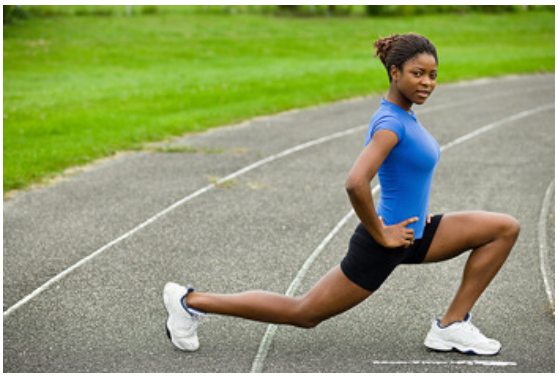
Ballistic, Isometric, and Assisted stretching are three other techniques that can be embodied for flexibility.

Ballistic Stretching

Ballistic stretching uses the momentum of a moving body or a limb (repetitive bouncing movements), in an attempt to force it beyond its normal range of motion. However, this technique has been virtually abandoned by many of the experts in the field due to safety concerns that may lead to injury.

Isometric Stretching

Isometric stretching is a type of static stretching which involves the resistance of muscle groups through isometric contractions (tensing) of the stretched muscles. It is one of the fastest ways to develop increased static-passive flexibility and more effective than either passive stretching or active stretching alone. It develops strength in the tensed muscles and best of all it decreases the amount of pain usually associated with stretching. You can apply resistance manually to one's own limbs (as seen here on the left), have a partner apply the resistance, or use an apparatus such as a wall (or the floor) to provide resistance.



Assisted Stretching

Assisted stretching involves the assistance of a partner who must fully understand what their role is otherwise the risk of injury is high. This technique is the fastest and most effective way known to increase muscle flexibility. It combines passive and isometric stretching to achieve maximum static flexibility. There are three steps to this process, which are:

1. Lengthening the muscle with assisted stretching
2. Activating the target muscle with an isometric contraction
3. Stretching the target muscle to a new range-of-motion

Assisted Stretching

PNF Stretches

PNF stands for Proprioceptive Neuromuscular Facilitation and consists of very effective stretching techniques. It can take on several forms including hold-relax; contract-relax; and rhythmic initiation. PNF stretching is a specific flexibility protocol that uses a combination of isometric contractions and partner-assisted stretching techniques. There are several styles that are used, but the most practical one is the CRAC (contract-relax, antagonist-contract) technique.

Here is a sample of a PNF stretch using this technique with the hamstrings. Have the subject lie on the ground in a supine position (facing up) with one leg fully extended and the other leg bent at a 45-degree angle with your foot flat on the ground or both limbs can be fully extended. Raise the straight leg (if the other is bent) contracting the hip flexors, rectus femoris and lliopsoas as a starting point as high as possible but stop before feeling any discomfort or pain. Have your partner assist you by supporting the raised limb in this position as seen in the picture on the left. Hold the stretch for 15 seconds. Next, forcefully push against your partner by contracting the antagonistic muscles (hamstrings) for 6 seconds (trying to force your heel to the ground.) While you are contracting, your partner should aim to resist any movement of the limb by holding it steady. After 6 seconds, relax. Now, pull your raised leg forward towards your body again. This will stretch your hamstring. As you reposition your leg by pulling it farther back, your partner will again stabilize your raised leg to provide resistance against your motion. Remember to hold the stretch for 15 seconds. Repeat two or three times. After the initial contraction and relaxation, you will notice an ability to comfortably stretch farther. This type of stretching is best after a light warm-up like cycling or walking briskly for 5-10 minutes.

PNF is not ballistic stretching. If you want to improve your flexibility in the shortest time possible, gain strength while you're stretching, and recover more quickly from workouts then PNF is the flexibility routine you should consider.

Partner Assisted Website Research

Classroom Activity
Research the following sites to view various techniques and muscle groups used in partner assisted stretching.

http://www.fitbyfabian.com/images/Partner%20Assisted%20Stretching.pdf

http://www.tothenextlevel.org/docs/coaches_corner/physiology/flexibility/default.asp

http://www.wellnessletter.com/html/fw/fwFit02Stretching.html (Basic stretching session)

http://www.bodybuilding.com/fun/mohr103.htm

Developing Partner Assisted Routines

Name _____
Date _____

Activity Worksheet

1. I enjoy participating most in...?

2. What are my personal needs?

3. What area of the body am I targeting for this activity?

4. Which muscle groups am I working on?

5. How long will I work out?
   I will begin my program with _____ minutes of stretching exercises and I will work towards _____ minutes.

6. How often will I work out?
   I will work out _____ times a week.

7. Which routines will I use?

8. How will I stay motivated?

9. How long will I keep up my program?

10. Which type of flexibility routine did I use or enjoy the most?

Body and Muscle Directory

http://www.exrx.net/Lists/Directory.html

(Most muscular diagrams used with permission by ExRx.net)

This directory is being provided as a tool to assist you with your answers on pages 22-23. Using the website posted above you are able to view the location of various muscles, their execution of movement, and general information of the body part/muscle group. Click a specific muscle in the "Exercises" column for descriptions of the best and most relevant exercises for that body part and piece of equipment. Click the "Muscles" column to view a specific muscle and its location. Several body parts are available for viewing on pages 25-39. This directory can also be used in other assignments in this unit plan.

Neck – sternocleidomastoid, splenius

Shoulders – Deltoid (anterior, lateral, posterior) supraspinatus

Upper Arms – triceps brachii, biceps brachii, brachialis

Forearms – brachioradialis, **Wrist** – flexors, extensors, pronators, supinators

Back – latissimus dorsi & teres major, **Trapezius** - (upper, middle, lower), levator scapulae, rhomboids, infraspinatus & teres minor, subscapularis

Chest – Pectoralis Major, sternal, clavicular, pectoralis minor, serratus anterior

Waist – rectus abdominis, transverse abdominus, obliques, quadratus lumborum, erector spinae

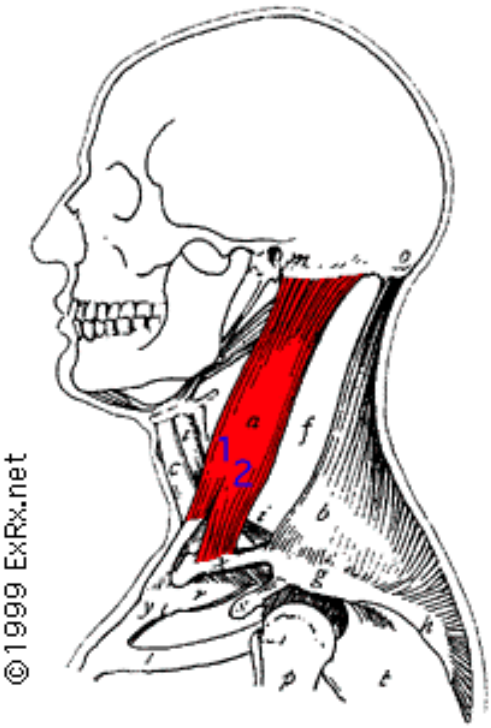
Hips – gluteus maximus, tensor fasciae latae, deep external rotators

Thighs – quadriceps, hamstrings, hip adductors

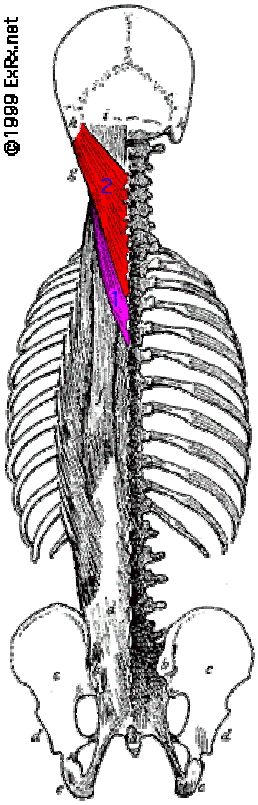
Calves – gastrocnemius, soleus, tibialis anterior, popliteus

Neck

A. Sternocleidomastoid



B. Splenius



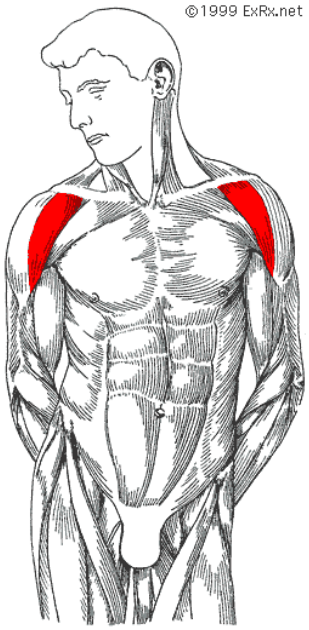
- Adapted from: "Images used with permission by ExRx.net"

Here are some exercises you may be able to perform:

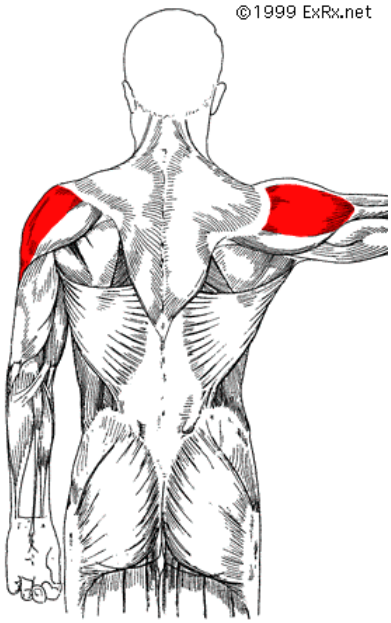
- Cable Neck Flexion
- Behind The Neck Press
- Rear Neck Bridge

Shoulder 1

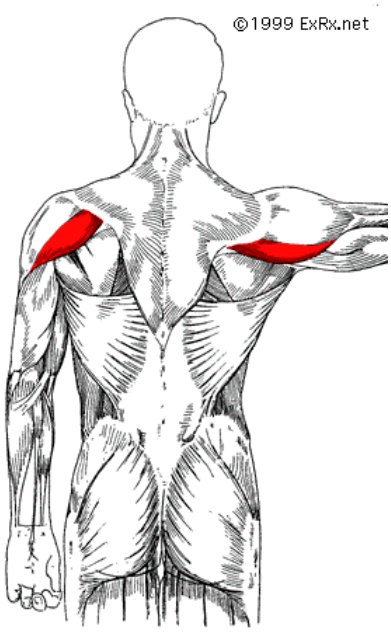
A. Deltoid Anterior



B. Deltoid Lateral



C. Deltoid Posterior



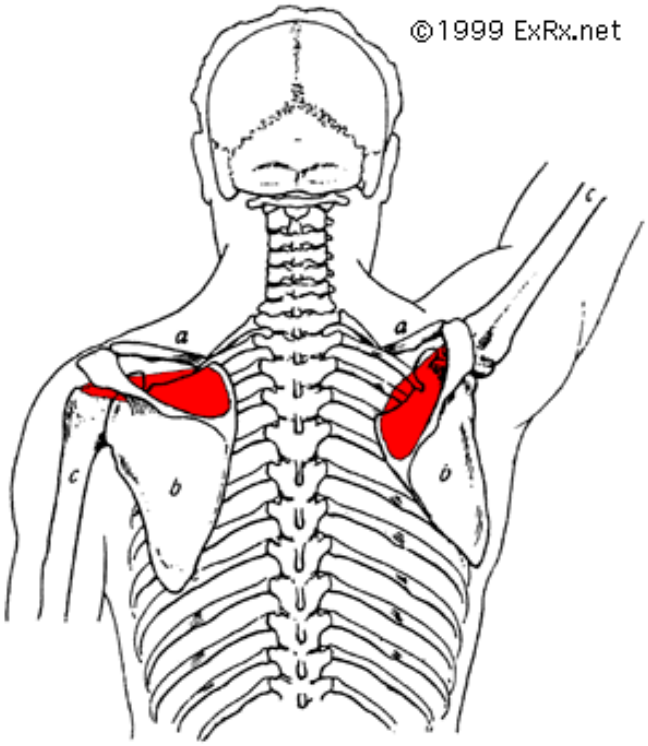
- Adapted from: "Images used with permission by ExRx.net"

Here are additional exercises for the deltoids:

- Military Press
- Dumbbell Shoulder Press
- Dumbbell Lateral Raises
- Rear Deltoid Inverted Row

Shoulder 2

Supraspinatus



- Adapted from: "Image used with permission by ExRx.net"

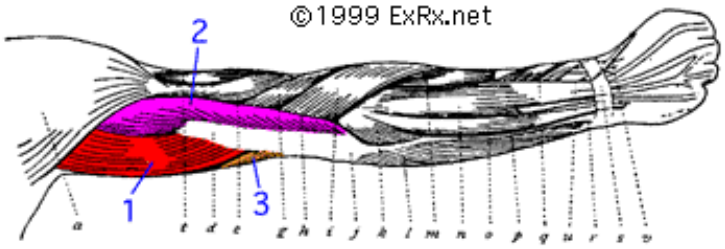
Try these exercises in your routine.

- Cable Front Lateral Raise
- Rear Deltoid Inverted Row
- Cable Bar Behind Neck Press

Upper Arm

A. Biceps brachii

B. Triceps brachii



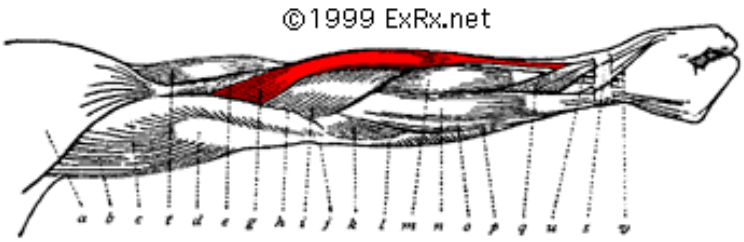
C. Brachialis

- Adapted from: "Images used with permission by ExRx.net"

Consider the following exercises in your workout:

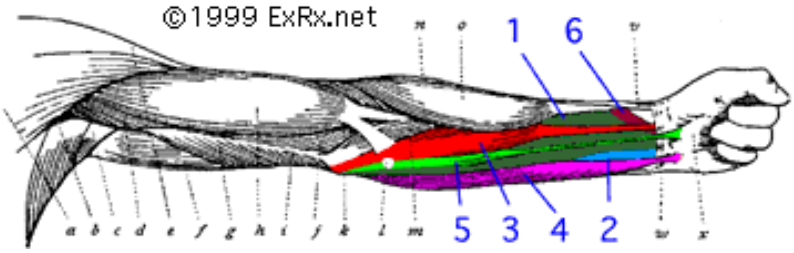
- Dumbbell Biceps Curl
- Reverse Grip Bench Press
- Cable Rope Triceps Extensions

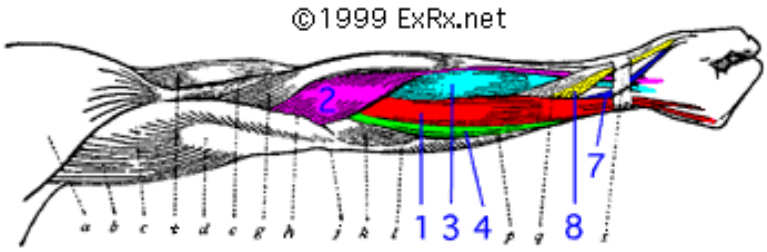
Forearms 1



A. Brachioradialis

B. Flexors





C. Extensors

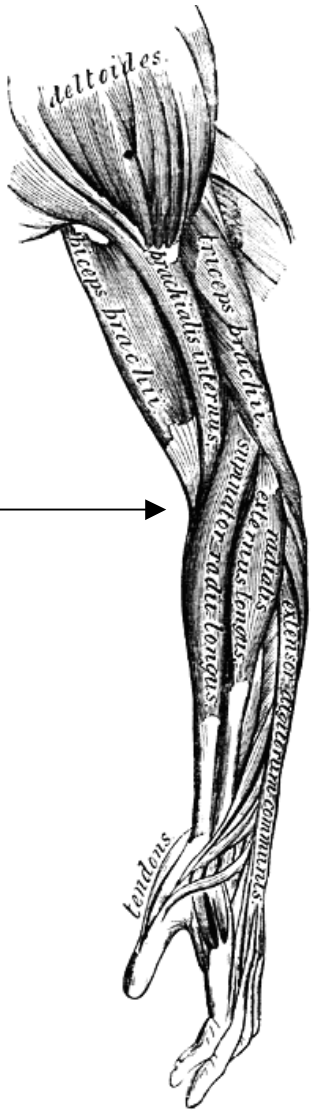
- Adapted from: "Images used with permission by ExRx.net"

Additional exercises to perform:

- Reverse Barbell Curls
- Dumbbell Hammer Curls
- Cable Wrist Curls Extension & Flexion

Forearms 2

Supinator



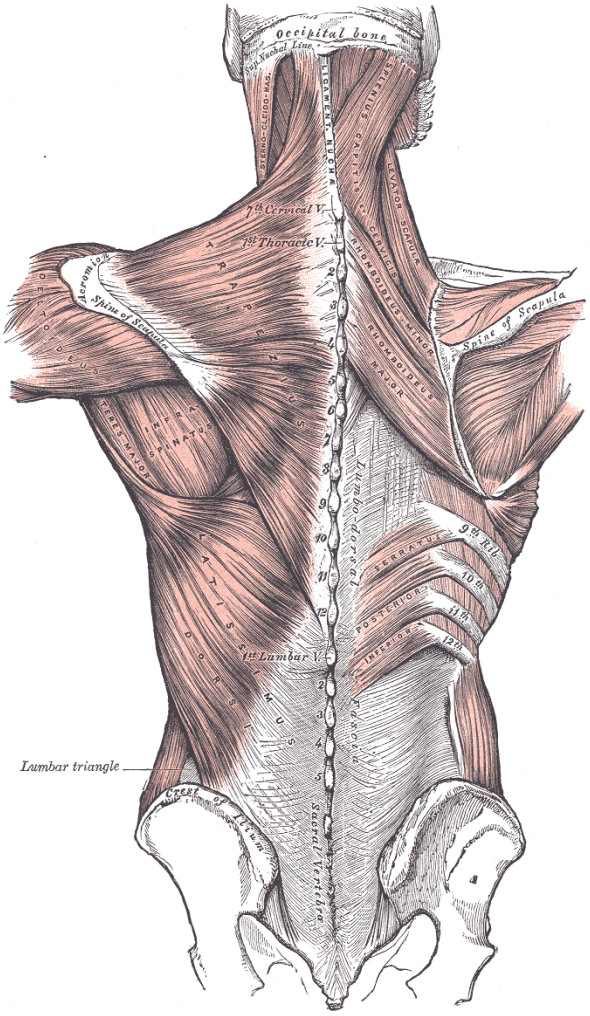
Supinator ⟶

Here you can view the supinator muscle more clearly.

- **Adapted from:** http://etc.usf.edu/clipart

Back

Latissimus dori, Teres major, Trapezius, Levator scapulae, Rhomboids, Infraspinatus & Teres minor



- Adapted from: www.bartleby.com

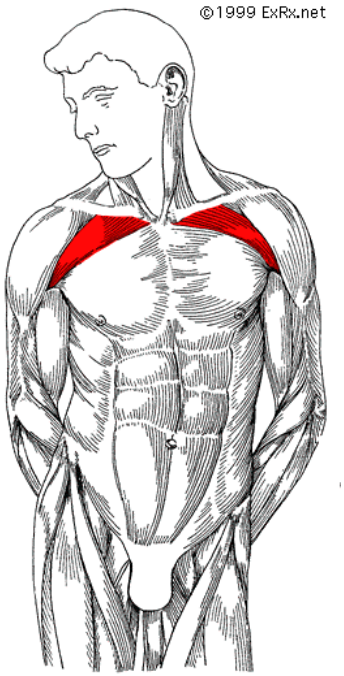
Here are some exercises you may be able to perform:

- Pull-ups
- Dumbbell Pullovers
- Lever Shoulder External Rotation

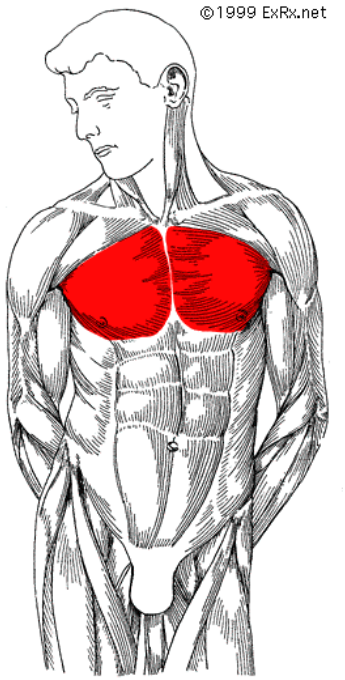
Chest 1

Pectoralis Major

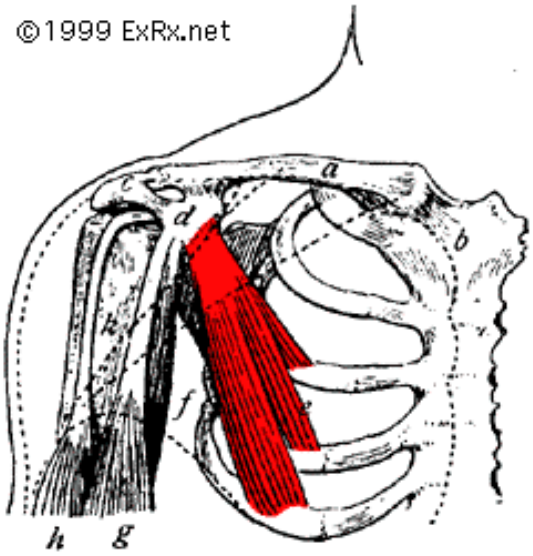
clavicular head



sternal head



Pectoralis minor



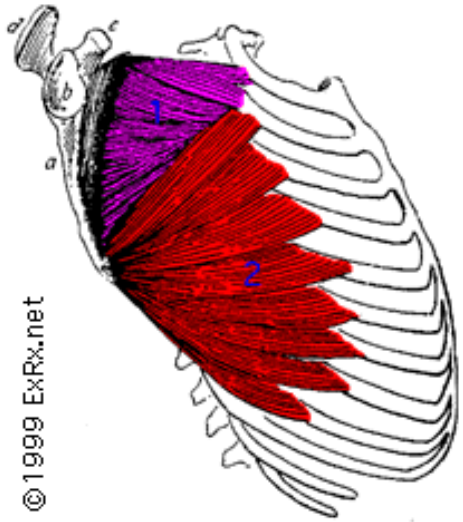
- Adapted from: "Images used with permission by ExRx.net"

Try these exercises:

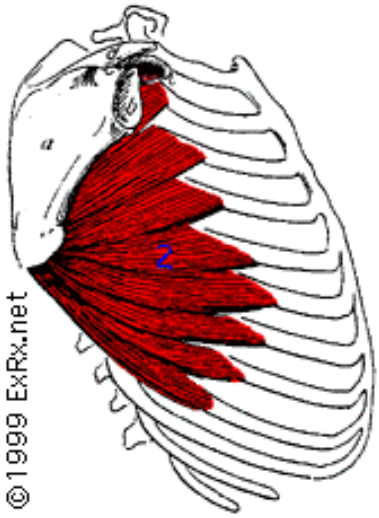
- Dumbbell Chest Flies
- Barbell Bench Press
- Cable Chest Flies
- Plometric (Explosive) Push-ups
- Iso-Lateral Dumbell Bench Press
- Stability Ball Bench Press
- Stability Ball Dumbbell Chest Press

Chest 2

Serratus Anterior (pull)



Serratus Anterior (side)



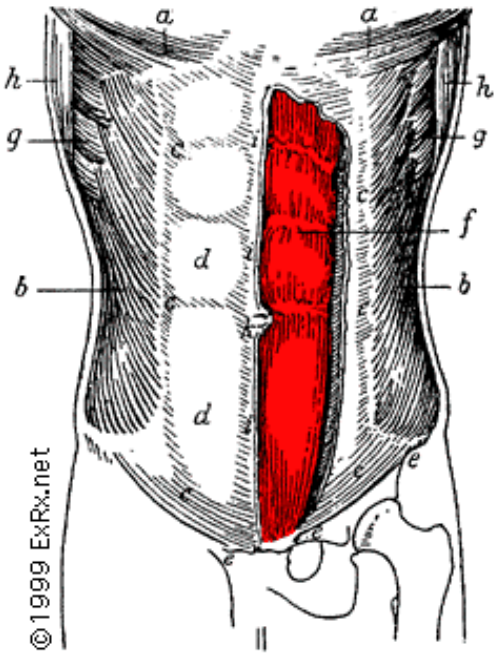
- Adapted from: "Images used with permission by ExRx.net"

Practice the following exercises.

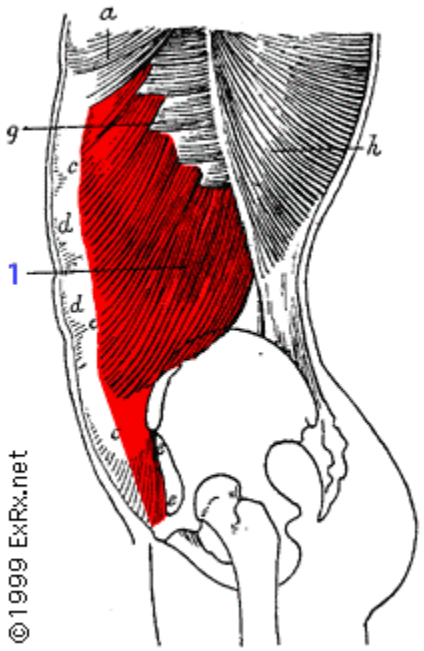
- Clap Push-up
- Depth Push-up
- Lever Incline Shoulder Raise

Waist 1

Rectus abdominis



Obliques



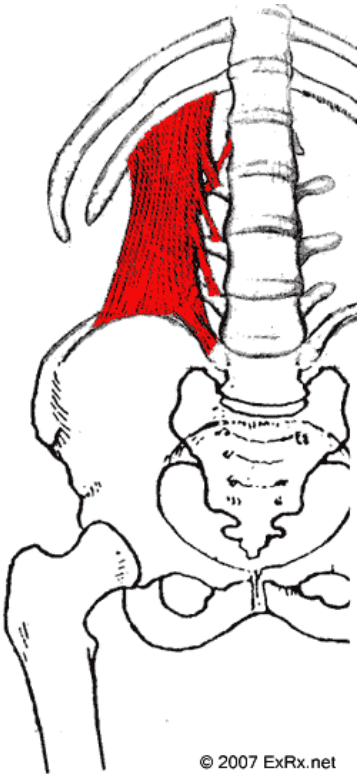
- Adapted from: "Images used with permission by ExRx.net"

Attempt these exercises:

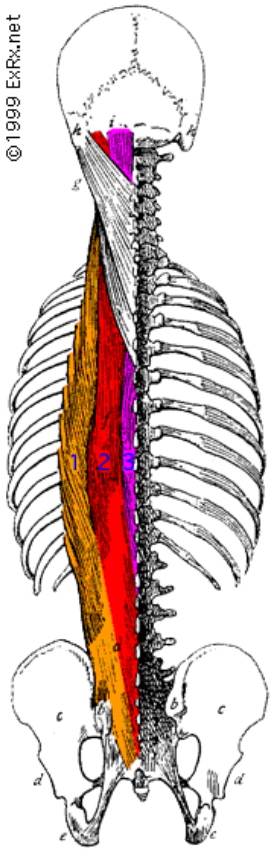
- Hanging Leg Raises
- Big 40s (Leg Rolls & Circles)
- Side Turns
- Scissors

Waist 2

Quadratus lumborum



Erector Spinae



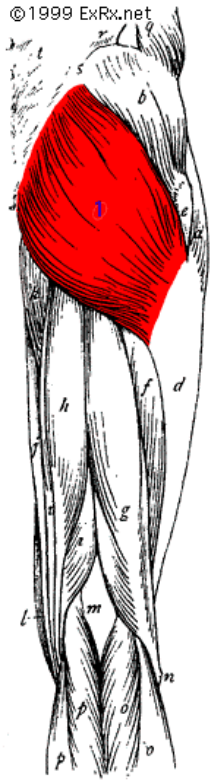
- Adapted from: "Images used with permission by ExRx.net"

More exercises for your routine:

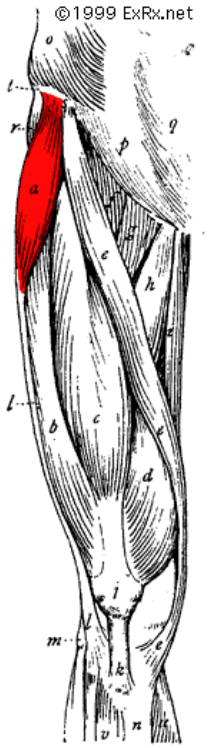
- Bird Dog
- Back Extension (on stability ball, arms down)
- Decline & Incline Back Bridge

Hips

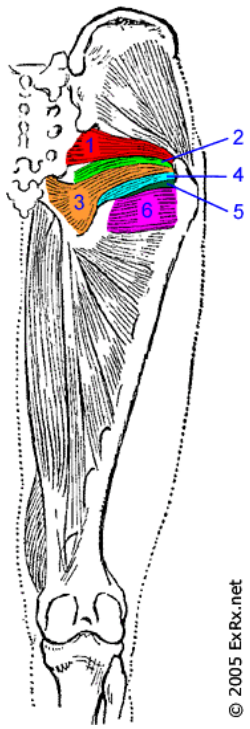
Glutteus maximus



tensor fasciae latae



deep external rotators



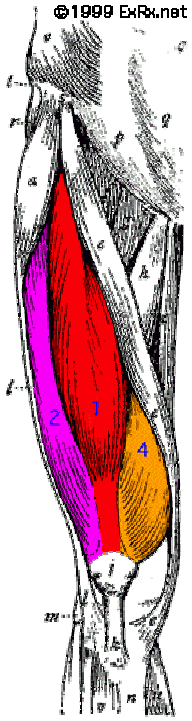
- Adapted from: "Images used with permission by ExRx.net"

Try these exercises in your workout:

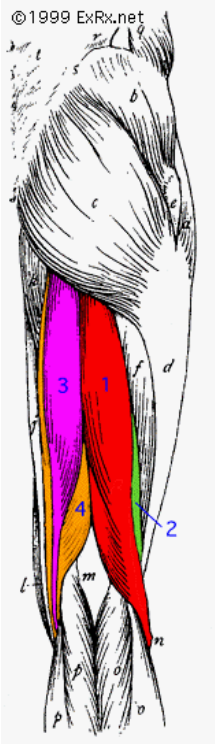
- Elevated Split Squats
- Bulgarian Split Squats
- Cable Seated Hip External Rotation

Thighs

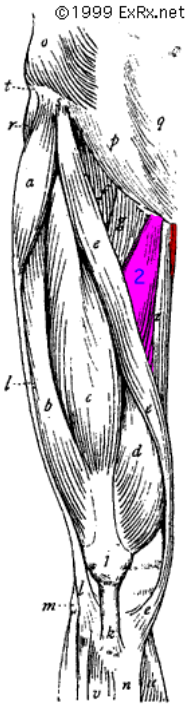
Quadriceps



Hamstrings



Hip adductors



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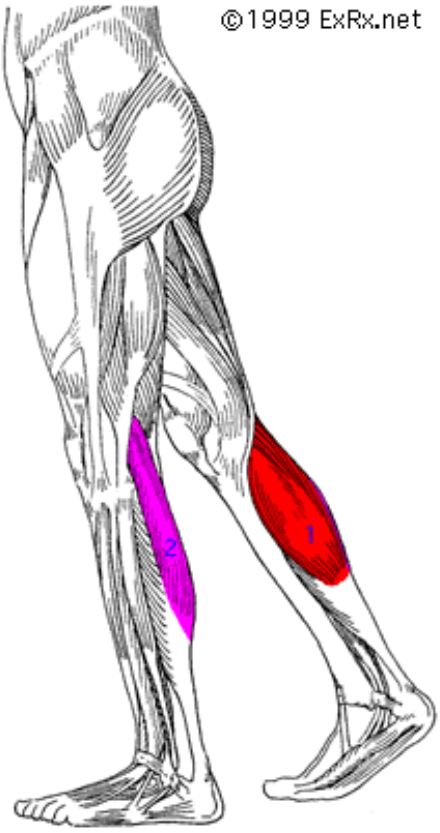
Additional exercises to consider:

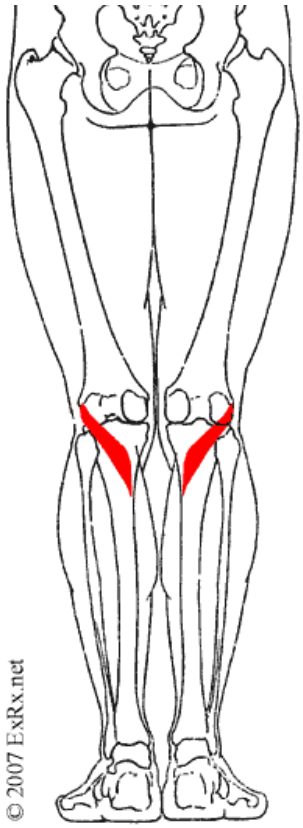
- Stability Ball Hamstring Curls
- Romanian Dead Lifts
- Stability Ball Bridge Hip Extensions

Calves 1

Gastrocnemius



Popliteus



- Adapted from: "Images used with permission by ExRx.net"

Exercisers to add to your routine:

- Calves Static Stretch
- Seated Calve Raise
- Kneeling Leg Curls

Calves 2

Soleus Lateral

Tibialis Anterior

- Adapted from: "Images used with permission by ExRx.net"

Try these exercises:

- Cable Reverse Calf Raise
- Elevated Toe Walk
- Alternating Bent Knee Seated Calf Extension

Flex Appeal

Name _____

Date _____

Activity Worksheet

1. Gummerson defines flexibility as "the absolute _____ of _____ in a _____ or series of _____ that is attainable in a _____ effort with the help of a _____ or a piece of _____."

2. One benefit of flexibility is that it provides _____.

3. One type of flexibility that involves motion is called _____.

4. List the four advantages of this flexibility:
   _____
   _____
   _____
   _____

5. _____ flexibility does not involve the use of motion.

6. The two classifications of this flexibility term are _____ and _____.

7. The picture on the right shows a man holding his leg out in front. The hamstring (muscle being stretched), is known as the _____ while the quadriceps and hip flexors (muscles holding the leg up), are known as the _____.

8. Holding this same extended position using body weight or some other external force like a chair under the stretched leg is known as _____.

9. Stretching the muscles by repetitive bouncing as a way to force it beyond its normal range of motion is known as _____.

10. This technique of flexibility develops strength in the tensed muscles and best of all decreases the amount of pain usually associated with stretching. Resistance can be applied manually by one's own limbs, a partner, or by an apparatus. This is called _____.

11. This type of stretching is the fastest and most effective way known to increase muscle flexibility. It combines two techniques to achieve a specific maximum flexibility component. This is called _____.

12. List three steps to the above process:
    a. _____.

    b. _____.

    c. _____.

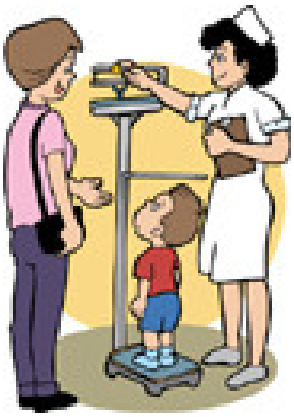
13. What assisted stretching style uses the contract-relax and antagonist-contract technique? _____.

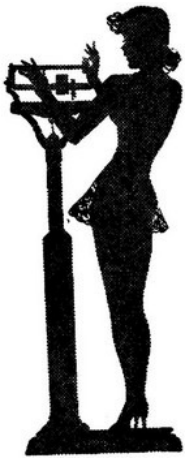
Body Composition

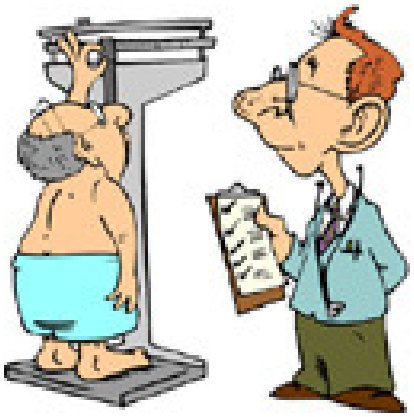
Probably one of the biggest reasons why people exercise and watch what they eat is appearance. This component of physical fitness is the amount of body fat compared to fat-free mass. Fat-free mass refers to bone, lean muscle, water, and connective tissue. Some fat is necessary for overall health; it helps protect internal organs, provides energy and regulates hormones that perform various functions in body regulation. When someone is overweight or obese they have an excessive accumulation of body fat. The two terms are used interchangeably but they are not the same. Being overweight is a condition in which a person is heavier than the standard weight range for his or her height. Obesity is having an excess amount of body fat. If you take in more calories than you actually use, the excess calories are stored in the body as fat. It is estimated that 3,500 calories is equal to one pound of fat. When you take in fewer calories than you burn, you lose weight. If you take in more calories than you burn, you gain weight.

Body fat is a lipid (fat) that is produced in the body, and this may be influenced by diet, exercise, and genetics. Having a high percentage of body fat can lead to a negative effect on your overall well-being. There is also nonessential body fat, extra fat stored in the body. This extra fat is located in fat cells or adipose tissue, subcutaneously (below the skin) and surrounding internal organs. Adipose tissue helps to cushion and insulate the body. Heredity, gender and diet influence the amount of one's excess nonessential fat.

Maintaining a healthy body composition will reduce the stress on the cardiovascular system and decrease the wear and tear on the bones and joints. Excess fat has been linked to several health related problems such as arthritis, cancer, diabetes, asthma, heart and liver disease. It also strains the muscular system. Too little fat leads to fatigue and a decreased ability to fight illness. A combination of diet and physical activity is essential for weight control. Therefore, your body composition is based not on how much you weigh, but on how much of your weight is fat. One of the ways to improve physical fitness is to control the percentage of body fat to total body weight. An individual's weight and fat-lean ratio varies for men and women and by age. The minimum percent of body fat considered safe for good health is 5 percent for men and 12 percent for women. The average adult body fat is closer to 15 to 18 percent for men and 22 to 25 percent for women.







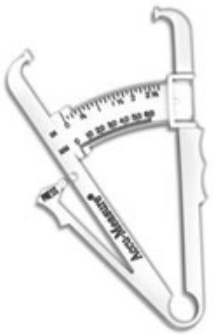
There are five ways to determine the percentage of body fat; one method is underwater weighing (hydrostatic weighing.) This requires being submerged in a specialized tank of water. The aim of underwater weighing is to measure the density of the body, and from that figure calculate percentage body fat. The equipment consist of a hydrostatic stainless steel weighing tank, including underwater mounted chair and scale, weighted belt and nose clip. The procedure is to first determine the dry weight of the subject. The subject, in minimal clothing, then sits on a specialized seat, expels all the air from the lungs, and is lowered into the tank until all body parts are emerged. The person must remain motionless underwater while the underwater weight is recorded. This procedure is repeated several times to get a dependable underwater weight measure. Underwater weighing is very accurate but impractical and expensive.

Another is bioelectric impedance analysis (BIA). BIA determines the electrical impedance or opposition to the flow of an electric current through the body. Muscle has high water content, and is highly conductive, while fat has lower water content and is not highly conductive. Based on the strength of the impedance along with height and weight metrics, the BIA scale will estimate fat-free body mass and body fat percentage. Most BIA devices are tetrapolar (have four electrodes). They apply current of 500 micro amps at a single frequency of 50 kHz or more. With tetrapolar configuration, two electrodes inject the current while the other two electrodes sense the emerging current. The 500 micro Amp current that is applied is not strong enough to be felt by the subject. The subject lies in a supine position on a nonconductive surface without the arms touching the trunk of the body. The thighs do not touch and ankles should be at least 20 cm apart. Remove any metallic object along with socks and shoes. Attach the electrodes on the hand, wrist, foot, and ankles. The device is turned on and the analysis begins. BIA is easy to administer and inexpensive but the accuracy is questionable.

A third is called anthropometric. This method uses body circumference measurements to estimate body fat percentages. Anthropometric is easy to administer and cheap, but body fat is not directly measured, which makes it questionable for accuracy.

The DEXA Scan known as the dual energy x-ray is based on a three-compartment model that divides the body into total body mineral, fat-free soft (lean) mass, and fat tissue mass. This is a non-invasive test and requires very little preparation. DEXA is so accurate that your follow up DEXA Scan can be used to monitor your treatment to learn if your plan is working. The downside to this procedure is that it is very expensive.

Lastly, is a skinfold measurement caliper. This instrument seen on the right is used to measure body fat by pinching the skin. The skin and underlying layer of fat are pinched together usually on the upper arm, calf, or the midriff area. Measurements are taken three times then compared with those on a chart for an estimated percentage of body fat. In general, if the fold of skin is more than one inch (2.5 centimeters) thick, you may have excess fat. This method is accurate, dependable, and repeatable.



Use these sites to learn more about how to calculate body fat when measuring with this devise.

http://www.acefitness.org/calculators/bodyfat-calculator.aspx
http://www.sport-fitness-advisor.com/bodyfatcalipers.html
http://www.brianmac.co.uk/fatyuhasz.htm
http://www.exrx.net/Testing/SkinfoldProcedures.html
http://www.health-calc.com/miscellaneous/guides/15-how-to-measure-body-fat-with-a-skinfold-caliper
http://fellrnr.com/wiki/Skinfold_Calipers

Body Mass Index

Another alternative for direct measurement of body fat and whether your weight is within a healthy range is a fairly reliable method called body mass index (BMI.) The BMI formula was developed by Belgium statistician Adolphe Quetelet (1796-1874), and was known as the Quetelet Index. Today, BMI is an internationally used measure of obesity. BMI is a number calculated from a person's weight and height. It is a screening tool to identify possible weight problems for adults. Calculating BMI is an inexpensive and an easy-to-use tool in indicating a person being overweight or obese. Keep in mind that BMI for children and teens takes age and gender into account. There are different charts for males, females and adults. Overall, BMI allows you to compare your own weight status to that of the general population. To calculate your body mass index for adults with the metric system, use the formula below:

Weight in kilograms divided by height in meters squared (weight (kg) / [height (m)]^2).

Since height is commonly measured in centimeters, divide height in centimeters by 100 to obtain height in meters.

Here is an example of calculating BMI using the formula:
Height = 165 cm (1.65 m), Weight = 68 kg

BMI Calculation: 68 ÷ $(1.65)^2$ = 24.98

- Adapted from: http://bmi.emedtv.com/bmi/how-to-calculate-bmi.html
  February 09, 2009

Using the English system for adults, you can learn how to calculate BMI by using the following formula:

Weight in pounds (lbs) divided by height in inches (in) squared and multiplied by a conversion factor of 703 (weight (lbs) / [height (in)^2] x 703).

Therefore, to calculate BMI, take the weight (lbs) and divide it by height (in). Take the result of that calculation and divide it by height again. Then, multiply that number by 703. Round to the second decimal place.

Here is an example of calculating with the BMI formula:

Weight = 150 lbs, Height = 5'5" (65 inches)
BMI Calculation: $[150 \div (65)^2] \times 703 = 24.96$

- Adapted from: http://bmi.emedtv.com/bmi/how-to-calculate-bmi.html
February 09, 2009

If you were wondering, the "703" in the English version of the formula is just a conversion factor. The more exact conversion factor is 703.069579639159, which means that if you are using English units and the formula listed above, your BMI is actually about 0.01% higher than the calculator reports, which of course, doesn't really matter.

What will the results of your findings mean? An optimal BMI is considered anywhere between 18.5 and 25. If you have a BMI lower than 18.5, you are considered by the BMI calculation to be underweight. Anything over 25 is considered overweight, anything over 30 is considered obese, and over 40 is considered morbidly obese. Use the BMI chart on the next page to calculate your range of body mass.

BMI	Weight Classification
Under 18.5	Underweight
18.5 to 24.99	Normal Weight
25 to 29.99	Overweight
30 - 39.99	Obese
40 or Greater	Morbidly Obese

- Adapted from: www.drgrabermd.com

BMI Chart

To use the table, find your height in the left-hand column labeled "height."
Locate your weight (in pounds) to the right. The number at the bottom of that weight column is the BMI for your height and weight.

Height	Weight in Pounds (without clothes)													
4'11"	94<	99	104	109	114	119	124	128	133	138	143	148	173	198
5'	97	102	107	112	118	123	128	133	138	143	148	153	179	204
5'1"	100	106	111	116	122	127	132	137	143	148	153	158	185	211
5'2"	104	109	115	120	126	131	136	142	147	153	158	164	191	218
5'3"	107	113	118	124	130	135	141	146	152	158	163	169	197	225
5'4"	110	116	122	128	134	140	145	151	157	163	169	174	204	232
5'5"	114	120	126	132	138	144	150	156	162	168	174	180	210	240
5'6"	118	124	130	136	142	148	155	161	167	173	179	186	216	247
5'7"	121	127	134	140	146	153	159	166	172	178	185	191	223	255
5'8"	125	131	138	144	151	158	164	171	177	184	190	197	230	262
5'9"	128	135	142	149	155	162	169	176	182	189	196	203	236	270
5'10"	132	139	146	153	160	167	174	181	188	195	202	207	243	278
5'11"	136	143	150	157	165	172	179	186	193	200	208	215	250	286
6'	140	147	154	162	169	177	184	191	199	206	213	221	258	294
6'1"	144	151	159	166	174	182	189	197	204	212	219	227	265	302
6'2"	148	155	163	171	179	186	194	202	210	218	225	233	272	311
6'3"	152	160	168	176	184	192	200	208	216	224	232	240	279	319
6'4"	156	164	172	180	189	197	205	213	221	230	238	246	287	328
BMI	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**35**	**40**

- Adapted from: http://www.aicr.org

It is very important to know your personal BMI and to monitor it regularly. As this is now one of the most relevant tools used in healthcare, it can tell you whether or not you are at a healthy weight or if you need to gain or lose weight for better health. Check your BMI today and take the appropriate steps to ensure that you are at the right BMI necessary for enjoying a healthy life. Whenever you notice weight

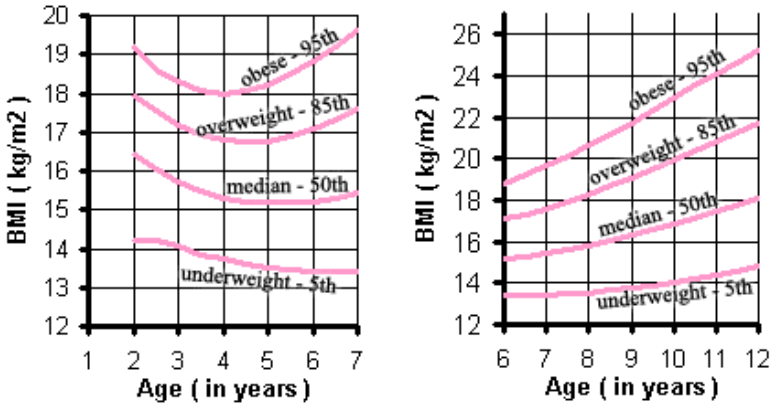
gain or loss, it is time to once again check your BMI so that you can keep track of your own health. Please remember that the body mass index is not a diagnostic tool, but an indicator of weight status.

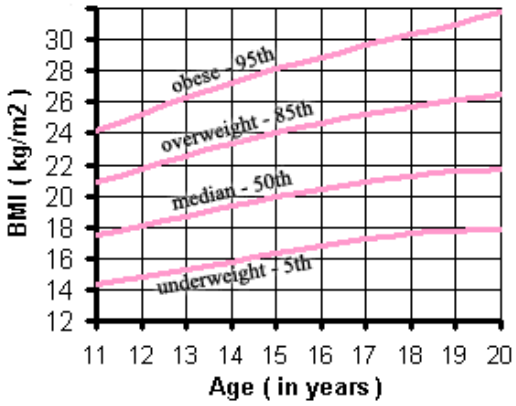
Calculating BMI in children is different from the way it is calculated in adults. Because BMI for children and teens takes age and gender into account, different charts are used for males and females. Here are charts to determine BMI for a 16 year old girl weighing 120 lbs and is 59 inches tall. Find the results in the chart. BMI chart indicates she is in the high 50th percentile. If your BMI falls above the 85th percentile or below the 5th percentile, consult a health care professional for further evaluation. Check the BMI categories for kids listed below.

English - BMI = weight (in pounds) x 703 / [height (in inches)]^2
Metric - BMI = [weight / (height x height)]

Example in lbs
BMI = 120 x 703 / 59^2
BMI = 84360 / 3481
BMI = 24.2

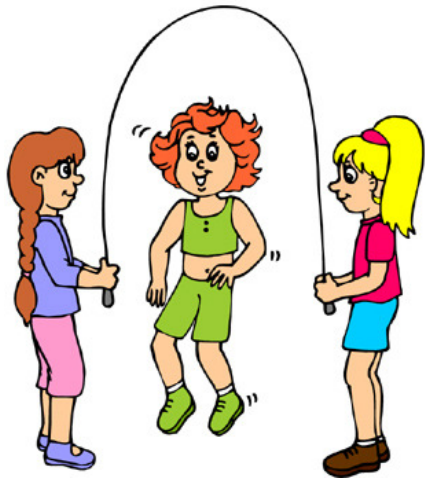
Example in metrics
BMI = 0.054431 /149.86^2
BMI = 0.054431/22458.02
BMI = 24.2





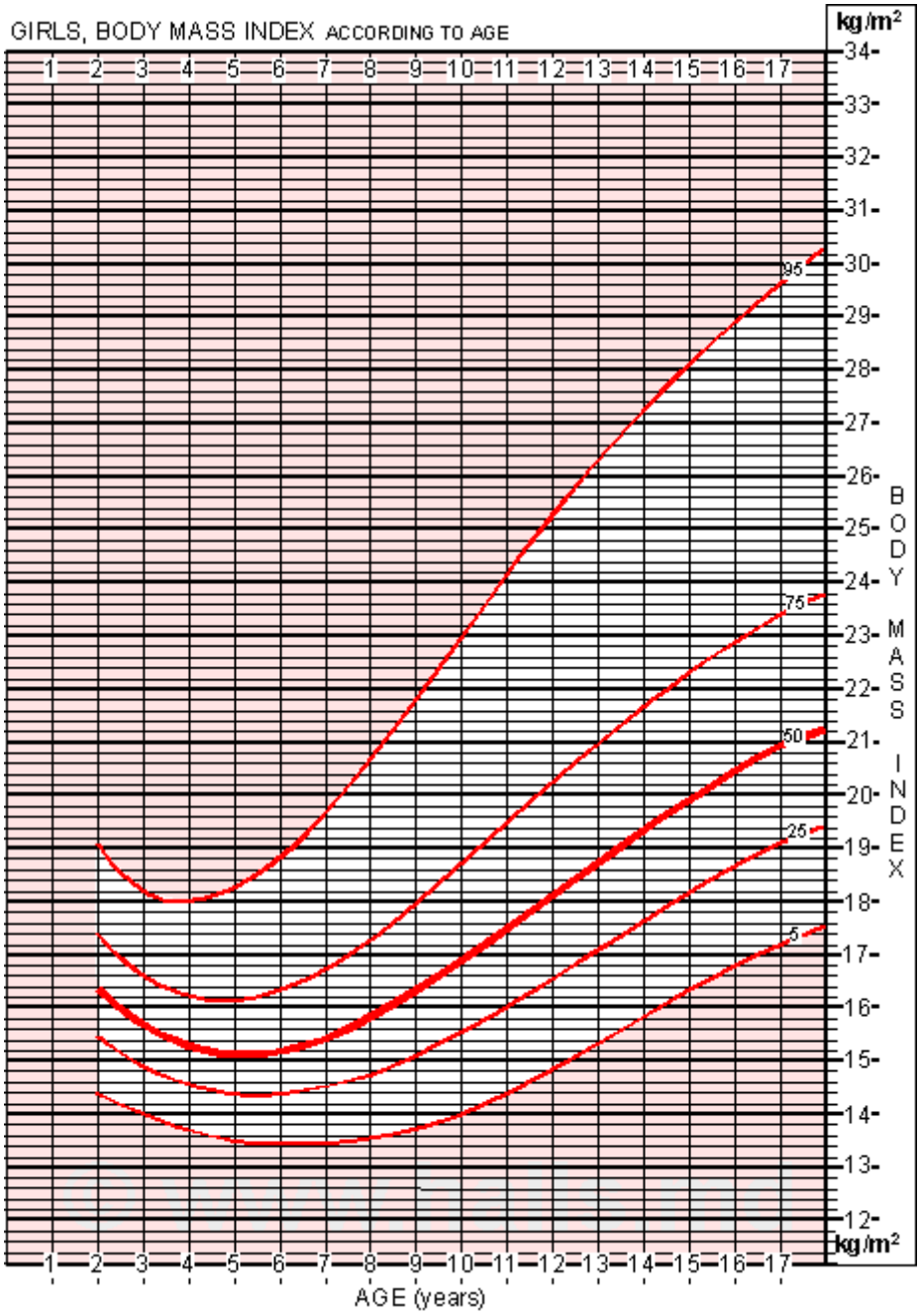
BMI Categories for Kids

- **Underweight** - BMI less than the 5th percentile
- **Healthy Weight** - BMI 5th percentile up to the 85th percentile
- **At Risk of Overweight** - BMI 85th to less than the 95th percentile
- **Overweight** - BMI greater than or equal to the 95th percentile



- Adapted from: http://www.halls.md/body-mass-index/age.htm
  Nov 10, 2003

This is a more complete version of the girls' body mass index for Age chart:



- Adapted from: http://www.halls.md/body-mass-index/age.htm
  Nov 10, 2003

You can also download the CDC's pdf version of the chart, CDC girls' BMI chart.pdf which has the best printed appearance. Perhaps, you'd like to see a chart of adult Women's BMI, because a woman doesn't stop changing at age 20.

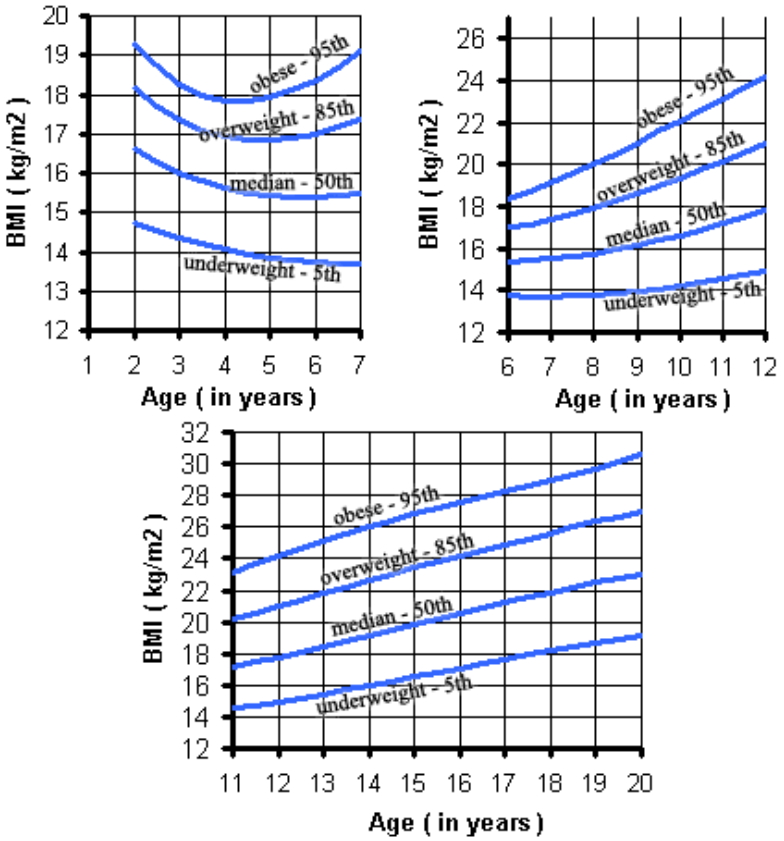
Here are charts to determine BMI for a 16 year old boy who weighs 145 lbs and is 69 inches tall:

English - BMI = weight (in pounds) x 703 / [height (in inches)]^2
Metric - BMI = [weight / (height x height)]

Example in lbs
BMI = 145 x 703 / 69^2
BMI = 101,935 / 4,761
BMI = 21.41

Example in metrics
BMI = 65.7708/175.26^2
BMI = 65.7708/30716.07
BMI = 21.41

Find the results in the chart. The BMI chart indicates he is in the median - 50th percentile. If your BMI falls above the 85th percentile or below the 5th percentile, consult a health care professional for further evaluation. Check the BMI categories for kids listed below.

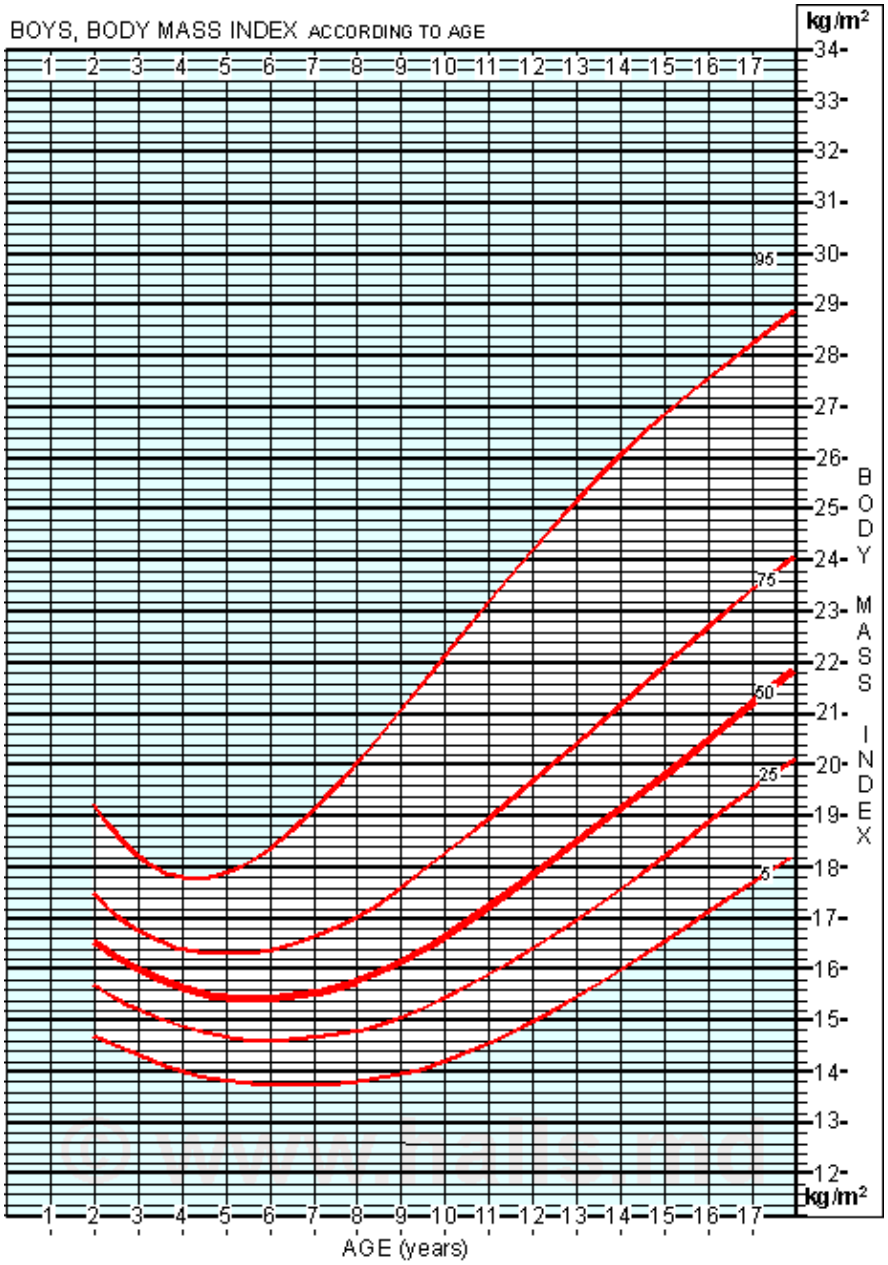


BMI Categories for Kids

- **Underweight** - BMI less than the 5th percentile
- **Healthy Weight** - BMI 5th percentile up to the 85th percentile
- **At Risk of Overweight** - BMI 85th to less than the 95th percentile
- **Overweight** - BMI greater than or equal to the 95th percentile

- Adapted from: http://www.halls.md/body-mass-index/boys.htm
May 24, 2008

This is a more complete version of the boys' body mass index for Age chart:



- Adapted from: http://www.halls.md/body-mass-index/boys.htm
  May 24, 2008

You can also download the CDC's pdf version of the chart, CDC boys' BMI chart.pdf, which has the best printed appearance. You can also look at the Men's Body Mass Index chart, which shows how BMI changes during adult ages.

FYI: BMI may not be an accurate measure for everyone; Namely, individuals who have more muscle mass (like athletes), seniors with less muscle mass or individuals under 5 feet tall.

Target Questions On BMI

Name _____

Date _____

Activity Worksheet

1. What does the term “body composition” refer to?

2. What does “fat-free mass” refer to?

3. In what ways is body fat important to good health?

4. What are some ways in which body fat can be measured?

5. Why is having too much fat, or too little fat, a potentially serious health problem?

6. Explain the procedure in hydrostatic weighing.

BMI Quiz

Name _____

Date _____

Activity Worksheet

1. What do the initials BMI represent?

2. How is BMI measured?

3. Within what values is an adult considered underweight?

4. A BMI in the 95th percentile in girls or boys is considered to be?

5. What values will indicate that an adult male is overweight?

6. What values will indicate that an adult is obese?

7. Into what category would an11year old girl with a BMI (kg/m^2) of 17 fall?

8. Why is it important to regularly check your BMI?

9. Name the statistician who developed the BMI formula.

10. Explain the difference in calculating BMI for adults and children.

Measuring Fitness Components

Cardiorespiratory Endurance

Here are a couple of ways to measure cardiorespiratory endurance:

1. Endurance run/walk testing
2. The 3-minute step test

The **Endurance Run/Walk** event measures heart and lung endurance. This is a 1-mile (1.6km) run/walk activity. Use a large enough area necessary to complete a mile distance. Below, you will find a conversion chart if you are not using a track that is measured in miles:

440 yard track	400 meter track
1- mile = 4 laps	1- mile = 4 laps + 9 meters
¾ - mile = 3 laps	¾ - mile = 3 laps + 6.75 meters
½ - mile = 2 laps	½ - mile = 2 laps + 4.5 meters
¼ - mile = 1 lap	¼ - mile = 1 lap + 2.25 meters

Students begin running on the "Ready? Go!" command. Students may intersperse walking with running but they must cover the mile distance in as short a time as possible. Record each student's times in minutes and seconds. As a caveat, always review students' health status before administering this test and have sufficient time for warming up and cooling down before and after the test.

Score Chart for Cardiorespiratory Endurance

Male	Female	Rating
Under 7 minutes	Under 8 minutes	Excellent
7:01 – 7:30	8:01 – 8:30	Good
7:31 – 8:00	8:31 – 9:00	Average
8:01 – 8:30	9:01 – 9:30	Fair
8:31 – 9:00	9:31 – 10:00	Low
9:01 – or longer	10:01 – or longer	Poor

The 3-Minute Step Test

Here is the procedure for measuring cardiorespiratory endurance with the 3-minute step test. Caution: Always perform a short warm-up before performing any fitness testing.

- With a sturdy bench or stepper apparatus about 8–12 inches (20–30 cm) high, step up and down every 2 seconds for 3 minutes.

- Extend each leg fully as you step. Step up with the right foot, then your left. Then step down with the right foot first, followed by the left foot. Stepping up and down the platform must be a continuous action.
- Subject must step at the rate of 24 steps per minute for 3 minutes.
- Stop immediately after completion of the test, then sit down and stay still.
- Within 5 seconds, count your pulse for 1 minute. The tester finds the subject's pulse either on the wrist or on the side of the neck.

This count gives you your pulse recovery rate, which is the rate at which your heart beats following activity.

Score Chart for Cardiorespiratory Endurance
Pulse Recovery Rate

Scoring (number of heartbeats)	Rating
70 – 80	Excellent
81 – 105	Good
106 – 119	Average
120 – 130	Fair
131 – or more	Poor

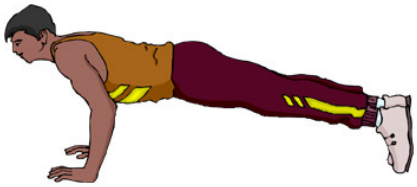
The total one-minute post-exercise heart rate is the subject's score for the test.

Other cardiovascular endurance exercises you can use are:

a. Jump rope
b. Jog
c. Shuttle runs.

Upper Body Strength and Endurance

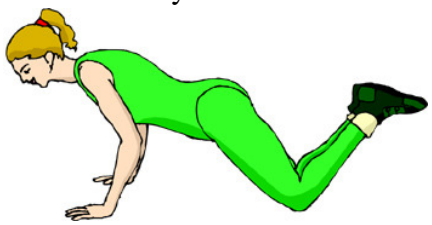
Push-ups can measure upper body strength and endurance. While performing push-ups, you lift close to 75% of your total body weight. If using a modified push-up position, the amount is reduced to about 60% of your total body weight. Always perform a short warm up before any type of fitness testing.



- A push-up position begins on the hands and toes with hands shoulder-width apart and elbows fully extended.
- While keeping a straight line from the toes, to hips, and to the shoulders, lower your upper body so your elbows bend to 90 degrees.
- Push back up to the start position. This equals one rep.
- Continue with this form and complete as many repetitions as possible.
- Record the total number of full push-ups completed.

The modified push-up version is used for females who tend to have less relative upper body strength than males. The test is conducted in the same way as above, but uses a modified "on the knee" push-up position. A short warm-up is necessary before testing.

- Begin in a modified push-up position, on the hands and knees with hands shoulder-width apart and elbows fully extended.



  - Drop the hips, and move the hands forward until you create a straight line from the knees, to the hips, and to the shoulders.
  - While keeping a straight position from the knees to the shoulders, lower your upper body so your elbows bend to 90 degrees.
  - Push back up to the start position. This equals one rep.
- Continue with this form and complete as many repetitions as possible.
- Record the total number of full-modified push-ups completed.

After completing your test, compare the results with the test norms listed for the recommended age and gender on the next page.

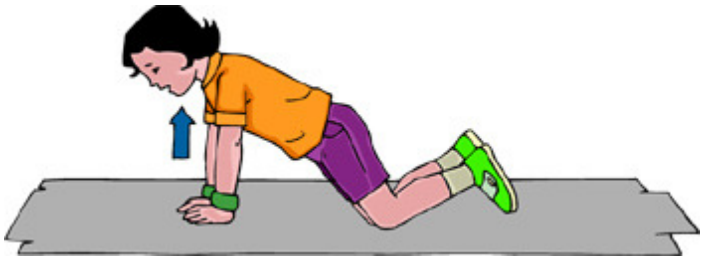
Score Chart for Upper Body Strength and Endurance
Push-ups (males)

Age	**13**	**14**	**15**	**16**	**17**	**18**
Rating			Repetitions			
Excellent	31	36	41	41	41	65
Good	26	31	36	36	36	50
Average	12	17	22	22	22	35

Score Chart for Upper Body Strength and Endurance
Modified push-ups (females)

Age	13	14	15	16	17	18
Rating			Repetitions			
Excellent	21	21	21	21	21	25
Good	16	16	16	16	16	20
Average	7	7	7	7	7	10

Primary muscles used during the push-ups are the shoulders; anterior and medial deltoids, chest pectorals, upper arms and triceps.



Other upper body strength exercises you can use are:

a. Arm circle variations
b. Reverse position push-ups

Abdominal Strength and Endurance

Test your abdominal strength and endurance with a one-minute modified sit-up test. A stop watch and partner are needed. Attention: Always conduct a short warm-up before testing.

- Begin by lying in a supine position with knees slightly bent. Your partner should hold your ankles for support. Your heels should be 1 to 1 ½ feet from your buttocks.
- With your arms crossed on your chest, do as many modified sit-ups as you can in one minute. Elbows should touch your thighs each time.
- Return to full starting position with your back to the floor in between each sit-up.
- Breathe normally. Do not hold your breath.
- Your partner should keep time and sit-up count.

Score Chart for Abdominal Strength and Endurance

Scoring (number of sit-ups in 1 minute)

Male	**Female**	**Rating**
40 or more	30 or more	Excellent
33 – 39	24 – 29	Good
29 – 32	18 – 23	Average
21 - 28	11 – 17	Fair
Less than 21	Less than 11	Poor

Other abdominal strength exercises you can use are:

a. Partial up and hold
b. Curl ups
c. Back extension chest raise

Measuring Body Flexibility

The sit and reach test is a common measure of flexibility. It measures the flexibility of the lower back and the hamstring muscles. You should do some light stretching to warm up your muscles before testing. Avoid ballistic stretching (jerking or bouncing movements) while warming up. A gradual and slow reach is recommended. Here is the testing procedure to measure flexibility:

- Sit on the floor with your legs straight in front of you with your shoes removed. Your heels should touch a piece of tape on the floor and be about 5 inches (13 cm) apart.
- Place a yardstick or meter stick between your legs so that it rests on the floor with the 36-inch or (1 meter) end pointing away from your body. The 15-inch (38 cm) mark on the stick is to be even with your heels. If possible secure the measuring tape so that it does not move.
- Gradually reach with both hands as far forward as possible and hold this position. Ensure that the hands remain at the same level, not reaching further than the other. After some practice reaches, signal when ready and reach out and hold that position for a few seconds while the distance is being recorded. Remember not to bounce or jerk.
- Record the most distant point reached by the fingertips on the measuring stick.

Score Chart for the Body Flexibility Test

Scoring

Male	**Female**	**Rating**
22 inches (56 cm) or more	23 inches (58 cm) or more	Excellent
17 – 21 inches (43 – 53 cm)	20 – 22 inches (51 – 56 cm	Good
13 – 16 inches (33 – 41 cm)	17 – 19 inches (43 – 48 cm)	Average
9 – 12 inches (23 – 30 cm)	14 – 16 inches (36 – 41cm)	Fair
8 inches (20 cm) or less	13 inches (33 cm) or less	Poor

Other flexibility exercises you can use are:

a. Shoulder Stretch
b. Butterfly Stretch
c. Straddle Stretch

Benefits of Exercise

The Benefits of Exercise

Regular exercise and physical activity are extremely important and beneficial for long-term health and well-being. Exercise makes the whole body more efficient. Before reading further on the *benefits of exercise* take 10 minutes of class time and have your students list as many of the benefits they can come up with. Point out to them that exercise is a major factor of total fitness, and plays a role not just in the physical, but also in the mental and spiritual aspects of life. Have students share their responses based on the suggestions listed below.

1. Increases muscle strength and endurance
2. Reduces stress and tension
3. Increases efficiency of heart and lungs
4. Improves mental alertness and concentration
5. Increases physical stamina
6. Helps relieve depression
7. Increases bone strength
8. Reduces excess fat, weight
9. Increases flexibility
10. Promotes restful sleep

No matter what age or shape, you should exercise daily. Not only does exercise tone your body, strengthen your muscles, keep bones strong, and improve your skin, it also has psychological benefits. Stretching exercises help you sleep better by relaxing tense muscles. It's a healthy outlet for mood swings, tension, anger, and frustration. Exercise gives you a sense of pride and accomplishment and positive self-esteem because you look and feel better about yourself. In fact, health professionals consider exercise an important part of a complete treatment for depression, whether the depression is mild or serious. During vigorous exercise, cells within your brain produce great amounts of endorphins. Endorphins interact with receptors in your brain that reduce your perception of pain. Endorphins also trigger a positive feeling in the body. For instance, the feeling that follows after a run or workout sometimes is described as "euphoric". That feeling, known as a "runner's high," can be followed by a positive and energizing outlook on life.

Exercise also promotes social benefits. Working out with a friend or a group makes the activity more enjoyable. Finding a buddy to exercise with motivates you and makes the workout more interesting. Find someone who is dependable and pleasant to work with. Strengthening bonds of friendship while working out develops a strong companionship. Helping one another through the difficult stages of an exercise program gives the support for each other's needs. When exercising for charity, you meet hundreds of individuals that share the same ambitions as you do. Joining a team sport is a great way to meet people and bond with them as team sports lead to great stories and social interaction. Signing up for a class is another great way to meet people. Find a class that you enjoy and share ideas about how to perform some of the exercises.

A recent Weight Watcher's Weekly report titled "Perks of Exercise", gives 6 reasons to get moving – right now! They are:

1. Better Mood – Feeling happier after a workout? Perhaps it's due to endorphins, those famous "runner's high" chemicals released by exercise, or the triumph of achievement or doing something good for the body. No matter, the feeling is real, and the buzz can last for hours.
2. Less Stress – A meditation in motion, easing your daily worries. Exercise shifts blood away from areas of the brain involved in ruminating, freeing you from replaying stressful thoughts over and over.
3. More Energy – As more oxygen and nutrients enter your tissues during exercise, the more the cardiovascular system enhances power to your heart and lungs giving you more get-up-and-go. Low-intensity exercise can help sedentary folk boost their energy by 20 percent and reduce fatigue by 65 percent.
4. Greater Brain Power – A workout, especially one that requires focus, such as tennis and dance, can trigger production of "growth factors," chemicals that create new brain cells and forge connections between existing ones. Memory, alertness, concentration, and clear thinking are improved.
5. Sounder Sleep – Burning physical energy during the day can help your body relax more at night.
6. Higher Self-Esteem – Exercising makes you and your health a priority, boosting body confidence and your libido, experts say.

Go to weightwatchers.com/weeklyupdates to read more on the research conducted on this topic.

Aerobic and Anaerobic

Aerobic Exercise

This expression, by itself, means **"with oxygen"**, but it comes alive when used as an adjective to identify exercise. Aerobic exercise is exercise that is energetic enough and vigorous, lasts long enough (20-30 minutes) and is done regularly enough (minimum of 3 times per week) to keep your heart and lungs in good conditions. Aerobic exercises burn fat faster than any other type of exercise. Aerobics is a type of physical exercise that integrates rhythmic aerobic exercise with stretching and strength training routines with the objective of improving all elements of fitness (flexibility, muscular strength, and cardio-vascular fitness). It is generally performed in groups with background music and this is directed by an instructor, although it can be practiced solo and without musical accompaniment.
Aerobics must be exercises that would pressure the body to elevate its oxygen intake; consequently, the exercises should be continuous and at the same time rhythmic to avoid declines and spines in the oxygen consumption. All the large muscle groups must be used, increasing the work performed by the heart and lungs.

Anaerobic Exercise

The term "anaerobic" means **"without air"** or **"without oxygen."** Anaerobic exercise uses muscles at high intensity and a high rate of work for a short period of time. It helps us increase our muscle strength and stay ready for quick bursts of speed. It also relies on energy sources that are stored in the muscles, and is not dependent on oxygen from breathing air. Think of “short” and “fast” when you think of anaerobic exercise. Examples of anaerobic exercise include heavy weight lifting, sprinting, or any rapid burst of hard exercise. These anaerobic exercises cannot last long because oxygen is not used for energy and a by-product, called lactic acid, is produced.

Lactic Acid contributes to muscle fatigue and must be burned up by the body during a recovery period before another anaerobic bout of exercise can be attempted. The recovery period also allows the muscles to use oxygen to replenish the energy used during the high intensity exercise.

As our bodies perform strenuous exercise, we begin to breathe faster as we attempt to shuttle more oxygen to our working muscles. The body prefers to generate most of its energy using aerobic methods. Some circumstances, however, like lifting heavy weights, require energy production faster than our bodies can adequately deliver oxygen. In those cases, the working muscles generate energy anaerobically.

This energy comes from glucose through a process called glycolysis, in which glucose is broken down or metabolized into a substance called pyruvate through a series of steps. When the body has plenty of oxygen, pyruvate is shuttled to an aerobic pathway to be further broken down for more energy. But when oxygen is limited, the body temporarily converts pyruvate into a substance called lactate, which allows glucose breakdown and thus energy production to continue. The working muscle cells can continue this type of anaerobic energy production at high rates for one to three minutes, during which time lactate can accumulate to high levels.

A side effect of high lactate levels is an increase in the acidity of the muscle cells, along with disruptions of other metabolites. The same metabolic pathways that permit the breakdown of glucose to energy perform poorly in this acidic environment. On the surface, it seems counterproductive that a working muscle would produce something that would slow its capacity for more work. In reality, this is a natural defense mechanism for the body; it prevents permanent damage during extreme exertion by slowing the key systems needed to maintain muscle contraction. Once the body slows down, oxygen becomes available and lactate reverts back to pyruvate, allowing continued aerobic metabolism and energy for the body's recovery from the strenuous event.

Contrary to popular opinion, lactate or, as it is often called, lactic acid buildup is not responsible for the muscle soreness felt in the days following strenuous exercise. Rather, the production of lactate and other metabolites during extreme exertion results in the burning sensation often felt in active muscles, though which exact metabolites are involved remains unclear. This often-painful sensation also gets us to stop overworking the body, thus forcing a recovery period in which the body clears the lactate and other metabolites.

Adding Anaerobic Training To Your Program

Anaerobic interval training is primarily reserved for those who are very fit and desire to increase speed, endure lactate buildup, and enhance overall aerobic power. Before you train anaerobically, always do a considerable aerobic warm up first, and stretch before and after vigorous activity.

Interval training is a great way to incorporate anaerobic exercise. It can be done with many types of exercise. An interval is done by increasing your pace for a short period of time (for example, between 10 to 60 seconds) then having a slow recovery period that is at least 3 times as long as the interval. The following is a caveat when incorporating anaerobic training:

- If you are new to exercise, do not immediately start with high intensity activity like anaerobic exercise. Beginners should start with low-intensity aerobic exercise for several weeks to build a base level of fitness.
- Always check with your doctor before adding anaerobic exercise to your fitness program
- Anaerobic exercise is nor recommended if you are pregnant
- Always warm up before starting any anaerobic exercise, and cool down for 5-10 minutes after your workout session

Benefits of Aerobic and Anaerobic Exercise

Aerobic Benefits

Aerobic exercising uses large muscle groups in any activity while maintaining an elevated heart rate for a continuous time period either in a rhythmic or non-rhythmic nature. It is a type of exercise that overloads the heart and lungs and causes them to work harder than at rest. Aerobics helps to maximize an athlete's VO2 max, or maximal oxygen uptake. VO2 max refers to maximum amount of oxygen that an individual can utilize during intense or maximal exercise. Listed below are some important benefits of aerobic exercise:

1. The heart operates more efficiently and becomes stronger.
2. It helps to control your weight.
3. Decreases the risk in developing diabetes, heart disease and obesity.
4. There is an augmentation in good cholesterol and reduction in bad cholesterol.
5. It augments endorphins.
6. It helps to reduce and regulate the body fat.
7. Increases the body muscle strength and elasticity.
8. Increases the quality of sleep that refreshes you early next morning.
9. Helps reduce blood pressure.
10. Helps decrease chronic diseases like heart disease and hypertension.
11. It intensifies the resistance of fatigue and gives you more vigor and energy.
12. Recovers your mood and decreases the depression, stress and anxiety.

In general, aerobics burn your fat. Aerobics provides a long, healthier life and happiness. They increase a positive attitude and modify your perception of life.

- Adapted from: www.Aerobic.org 2007-2012

Moderate aerobic activity should be performed at least 150 minutes per week or 75 minutes per week for vigorous aerobic activity. To effectively lose or maintain weight, some individuals may need 300 minutes of moderate activity per week. Moderate exercises may include brisk walking, swimming, and mowing the lawn. Vigorous exercises may include running and aerobic dancing. In setting your goal aim for 30 minutes of physical activity per week.

The chart below shows an estimated number of calories burned while doing various exercises for one hour.

Activity (1-hour duration)	Weight of person and calories burned		
Activity (30-minute duration) half the calories burned	160 pounds (73 kilograms)	200 pounds (91 kilograms)	240 pounds (109 kilograms)
Aerobics, high impact	533	664	796
Aerobics, low impact	365	455	545
Aerobics, water	402	501	600
Backpacking	511	637	763
Basketball game	584	728	872
Bicycling, < 10 mph, leisure	292	364	436
Bowling	219	273	327
Canoeing	256	319	382
Dancing, ballroom	219	273	327
Football, touch or flag	584	728	872
Golfing, carrying clubs	314	391	469
Hiking	438	546	654
Ice skating	511	637	763
Racquetball	511	637	763
Resistance (weight) training	365	455	545
Rollerblading	548	683	818

Chart continued…

Activity (1-hour duration)	Weight of person and calories burned		
Activity (30-minute duration) half the calories burned	160 pounds (73 kilograms)	200 pounds (91 kilograms)	240 pounds (109 kilograms)
Rope jumping	861	1,074	1,286
Rowing, stationary	438	546	654
Running, 5 mph	606	755	905
Running, 8 mph	861	1,074	1,286
Skiing, cross-country	496	619	741
Skiing, downhill	314	391	469
Skiing, water	438	546	654
Softball or baseball	365	455	545
Stair treadmill	657	819	981
Swimming, laps	423	528	632
Tae kwon do	752	937	1,123
Tai chi	219	273	327
Tennis, singles	584	728	872
Volleyball	292	364	436
Walking, 2 mph	204	255	305
Walking, 3.5 mph	314	391	469

Adapted from: Ainsworth BE, et al. 2011 compendium of physical activities:
A second update of codes and MET values.
Medicine & Science in Sports & Exercise. 2011;43:1575.

Anaerobic Benefits

Anaerobic exercise uses your muscles at a high intensity for a short period of time. A workout plan for maximum fat loss isn't complete without anaerobic exercise. It can help:

1. Develop stronger muscles.
2. Improve your VO2 max (the highest amount of oxygen one can consume during exercise) and thus improve your cardio-respiratory fitness.
3. Increase your capacity to withstand the buildup of waste substances (such as lactic acid) and remove them from the body. This means your endurance and ability to fight fatigue will improve.
4. Speed up metabolism.
5. Strengthen bones.
6. Harden joints.
7. Increase your energy.
8. Increase sports performance.
9. Lower blood sugar.
10. Recapture your youth.
11. Improve your appearance.
12. Give you some control of your life.

- Adapted from: http://mens-total-fitness.com
May 2, 2011

Fitness experts agree that heavy weight lifting, all types of sprints (running, biking, etc.), jumping rope, hill climbing, interval training, isometrics, or any rapid burst of hard exercise for as little as 30 minutes two or three times a week is sufficient. Weight lifting has the greatest benefit to burn more fat even at rest. Muscles burn more calories per unit volume than any other tissue in your body. The lean muscle mass you build during weight lifting will help you attain your weight loss goals even as you sleep. The more lean muscle you build, the easier it becomes to keep fat off and lose even more. The best workout plans will incorporate regular aerobic exercise with anaerobic 2-4 times per week for maximum fat loss.

Overall, anaerobic exercise burns fewer calories than does aerobic exercise and may be somewhat less beneficial for cardiovascular fitness. However, it is better at building strength and muscle mass and still benefits the heart and lungs.

Fitness Ratings of Physical Activities:

D= Low, C = Moderate, B = High, A = Very High

Activity	Cardiorespiratory Endurance	Muscular Strength	Muscular Endurance	Flexibility
Aerobic dancing	B-A	C	C	B
Ballet	B	C	C	A
Baseball/Softball	D	D	D	C
Basketball	B-A	D	C	C
Bicycling (at 10 mph)	B-A	C	B-A	D
Bowling	D	D	D	C
Calisthenics	B	B-A	B-A	B-A
Canoeing	C-B	B	B	C
Football	C-B	C	C	C
Golf	D	D	D	C
Gymnastics	D	A	B	A
Handball/Squash	B	C	B	C
Hiking (uphill)	B	D	C	C
Hockey	C-B	C	C	C
Jogging/Running	B-A	D	B	C
Judo/Karate	D	C	D	B
Jumping Rope	B-A	D	B	C
Racquetball	B-A	D	B	C

Rowing	B-A	B	B	C
Skating (ice, roller)	C-B	D	C-B	C
Skiing (cross-country)	A	C	B-A	C
Skiing (downhill)	B	C	C-B	C
Soccer	B	C	C	C
Swimming	A	C	B	C
Tennis/Badminton	C-B	D	C-B	C
Volleyball	C	D	C	C
Walking (brisk)	B	D	B	C
Weight training	D-C	A	B	C
Wrestling	B-A	C	B	B
Activity **Rating Scale:**	**Cardiorespiratory Endurance** **D = Low**	**Muscular Strength** **C = Moderate**	**Muscular Endurance** **B = High**	**Flexibility** **A = Very High**

Weight training is considered an anaerobic exercise. There are three types of weight training programs:

1. Isometric – this exercise involves muscular strength with little or no movement of the body part. To build strength you use muscle tension. An example of this would be pushing against a wall or putting the palms of your hands together in front of you and pushing.
2. Isotonic - repeated movements with or without weights develop isotonic muscular strength and flexibility. Examples of this are bending and straightening your arms in pull-ups, push-ups, lifting weights and sit-ups.
3. Isokinetic – muscular strength, endurance, and flexibility are involved. With this type of exercise, resistance is moved through an entire range of motion such as pushing or pulling against a hydraulic lever of certain exercise equipment used in gymnasiums, fitness and physical therapy centers.

Exercise Terminology

Name _____

Date _____

Activity Worksheet

aerobic exercise
anaerobic exercise
endorphins
isometric exercise
lactic acid
isokinetic exercise
isotonic exercise
glycolysis

Listed above are some of the important terms in this section. Choose the term from the list that best matches each phrase below.

1. natural painkillers produced in the brain

2. type of exercise that involves the use of special machines and may be used by physical therapists

3. type of exercise in which the demand for oxygen exceeds the supply of oxygen

4. pushing your palms together is an example of this type of exercise

5. some exercises require faster energy production than what the body can produce. For this reason a process called _____breaks down glucose to supply this energy

6. a continuous physical activity that raises the breathing and heart rate

7. type of exercise that uses repetition of bending and straightening muscles with or without weights

8. a by-product that contributes to fatigue and must be burned up by the body

The Right Fitness Plan

Finding Your Exercise Program

Do you hate to exercise? Are you short on time and motivation? Can it be that you are so out of shape you are not sure where to start? What you need to focus on are exercises that are appropriate to your personality, lifestyle, and fitness level. Understand, if you seldom engage in physical activity, plan a program that is not overly vigorous at first. As always, it makes good sense to seek medical advice from a physician or other health-care professionals to make sure your new activities will not put you at any risk. In finding a program for yourself, you need to consider what you hope to accomplish and what you enjoy doing.

Setting Your Goals

There are several factors that must be considered when choosing your exercise program. If you want to obtain total fitness, enhance your stamina, increase muscular strength, or even improve endurance, the goals you set for yourself can help determine the best exercise program. Your goals must be realistic ones and should maintain your desired level of fitness. There are a variety of exercises and they have their benefits. For example, if you want to improve cardiorespiratory endurance you may want to design a program of aerobic exercise. Jogging, jumping rope, and swimming are some exercises in that category. Every exercise program should include some consistent aerobic activity.
For strengthening muscles your program should include anaerobic exercises. Examples of this type of exercise are lifting weights, sprinting, pull-ups, and push-ups. Improving muscular strength is an important ingredient in your exercise program. As you begin to plan your exercise program, remember that it should be fun, an activity or sport you enjoy and look forward to, and if possible combine your exercises with social activities like walking or cycling with friends.

Principles of An Exercise Program

There are three basic principles that govern the world of exercise. Knowing and understanding them can help you improve your health and set up various components of your exercise workout. These principles are:

1. Overload
2. Progression
3. Specificity

Overload simply states that a greater than normal stress or load on the body is required in your training to improve your performance. In other words, to improve fitness, strength, flexibility, or endurance you need to increase the workload. You can't keep doing the same weights, sets, or reps; you need to increase, otherwise your body will adapt and it will become too easy and eventually you will plateau. In order to push the body to the next level the body must be overloaded to a new, higher level of work. Overload builds strength and contributes to overall fitness.

Progression

Progression, like overload, is an important principle in exercise. It is a gradual increase in overload for achieving higher levels of fitness. When you improve in various aspects of your program, you can change the number of repetitions, weight, intensity, speed, duration exercises and more. In essence, once you have mastered something in your exercise program, you need to do something to it to make it harder. Try new variations of the exercises in your program such as changing your position to make moves somewhat different, like elevating your feet during push-ups or changing your chest press by going to an incline bench. Change the type of resistance if you gravitate to machines, try free weights or cable machines. If you always do free weights, try some of your exercises on machines. Movements will always feel different when you change the resistance. Remember, start out with a little and gradually add as you improve.

Specificity

Specificity demands specific kinds of exercise to develop certain parts of the body. It means that the activity should be relevant and appropriate to the sport for which the individual is training in order to produce the desired result. For example, if the chosen sport is volleyball and your vertical jump is weak, then a specific weight program is needed to increase your leg strength. As your jumping ability improves your hitting skill will increase and your overall game will improve. On the other hand, if a soccer player wants to improve specifically in cardiorespiratory fitness, then he would need to target an aerobic activity such as running or swimming to meet the cardiorespiratory goal. To become better at a particular exercise or skill, you must frequently perform that exercise or skill.

Cross Training

Whatever activity you involve yourself in, you probably will find yourself engaging in a variety of physical activities. When you perform various exercises as part of your fitness routine, it allows you to work different muscle groups in your body to gain balanced strength. Most sports require cross training. Jumping rope, swimming, jogging, and cycling are good cross training activities for athletes. Boxers, as an example, use various exercises to get themselves into top physical shape. They jog, weight lift, and jump rope. Cross training improves your fitness and enhances your sport.

Components of an Exercise Session

In the last section, you read about the three principles of an exercise program. Following are the three components of an exercise session. They are:

1. the warm-up
2. the workout
3. the cool down

The Warm-up

The warm-up procedure is an important part of any exercise program. It will help avoid unnecessary injuries by improving elasticity of muscles and tendons. As it prepares the muscular system for the upcoming strenuous physical activity, it also ensures that the cardiovascular system is given time to adjust to the body's increased demands for blood and oxygen. A warm-up should include very light stretching of major muscle groups, followed by some activity to raise your body temperature, like fast walking or jogging. Warming up allows your pulse rate to increase gradually. Only after your body is warm do you stretch slowly and thoroughly. The warm-up should last anywhere from eight to fifteen minutes. Using this procedure before any activity will prepare the body mentally and physically.

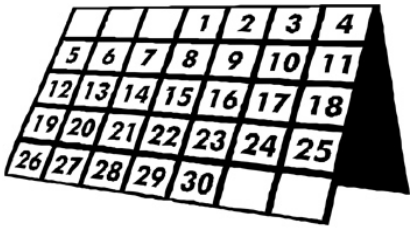
The Work Out

Every exercise program should be so structured that the individual is able to perform the activity at its highest level. The program should be centered around the F.I.T. formula. The letters in this acronym represent:

1. Frequency of exercise – how often you do the activity each week.
2. Intensity of exercise – how hard you work at the activity during a session.
3. Time of exercise – how much time you devote to a session.

Frequency

To be physically fit and to stay that way, you should exercise frequently. Three to five times per week is a good guide. However, studies have shown that exercising moderately, four times a week, is very effective in increasing cardiorespiratory endurance and weight loss. Do not work out more than five times per week if you exercise vigorously. This may lead to injuries. If you are not suffering from any injury, avoid being a weekend athlete. Your workout schedule should allow no more than three days between sessions. With long lapses, the results in your fitness level may slowly drop, the likelihood of injury can be more significant, and atrophy may occur. Lastly, your motivation level diminishes.



Intensity

To improve physical fitness, your muscles and cardiorespiratory system must work at a level of intensity that permits you to achieve overload. In all workouts you must start slowly and build endurance. Doing too much too soon is harmful because it can cause chronically sore muscles and sleeplessness. In weight training, start with lighter weights and gradually build to heavier ones. In an aerobic program you should work toward your target heart range. Give yourself about six months to reach it if you are out of shape. Target heart range is 60 to 85 percent of your maximum heart rate and the rate at which your heart should beat for optimal exercise benefits. Your maximum heart rate is your heart's top speed, or your heart rate when you have exercised to the point of exhaustion. For teenagers, this rate is about 200 beats per minute. You should not try to work out at your maximum heart rate, since exercise at that intensity puts a strain on your heart. The target heart rate is lower than your maximum heart rate and is the exact heart rate you need to maintain during aerobic exercise in order to benefit from the workout. Finding your target heart rate will help you monitor your workout intensity during exercise. Here is the formula you need to figure your target heart rate: 220 – (subtract) your age = your maximum heart rate (danger zone). Take 80% of your maximum = your higher limit. Take 60% of your maximum = your lower limit. Here is an example of a formula for a15 year old:

220 – 15 = 205 (your maximum heart rate or danger zone)
Take 80% of 205 (.80 x 205) = 164 (your higher limit)
Take 60% of 205 (.60 x 205) = 123 (your lower limit)

The above example shows that the 15 year old should stay between 123 and 164 beats per minute while working out or by using a quicker measurement, between 12 and 16 beats per six seconds. Checking your pulse rate is a good monitor of your level of intensity. A person of average fitness has a resting heart rate of between 72 and 84 beats a minute. That rate can decrease by five to ten beats per minute after four weeks of an exercise program. A teen at the top of his or her form may have a resting rate as low as 40 beats per minute. To take your pulse rate follow these instructions:

- Place the tips of your index, second and third fingers on the palm side of your other wrist below the base of the thumb. Or, place the tips of your index and second fingers on your lower neck on either side of your windpipe.
- Press lightly with your fingers until you feel the blood pulsing beneath your fingers. You may need to move your fingers around slightly, up or down until you feel the pulsing.
- Use a watch with a second hand, or look at a clock with a second hand.
- Count the beats you feel for 10 seconds. Multiply this number by six to get your heart rate (pulse) per minute.

Time

To achieve maximum benefits from your exercise you should work out between 15 to 60 minutes per session. The goal in aerobic is to spend 20 to 30 minutes at your target heart range. This varies with the type of exercise you are doing. In weight training, perform exercises slowly taking at least two seconds each time you lower a weight. Between each set you should rest at least one to two minutes. Work on a variety of exercises to strengthen your muscles in the full range of motion. An exercise set consists of six to fifteen repetitions. Always remember to start out slowly when working out.

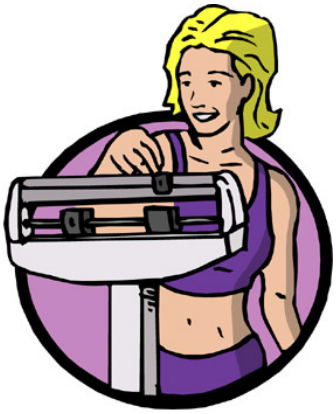
The Cool-Down

After a strenuous workout, a cool-down session is in order. A cool-down is participating in an activity to gradually decrease the heart rate and recover. This cool-down period should last at least 2-5 minutes to help you get oxygen to the muscles and get rid of a waste product such as lactic acid. Cooling-down helps provide time for the muscles to release the build-up of lactic acid slowly. Stretching and movement of the muscle groups prevent stiffness and injury. Just as you gradually increase activity, you need to return gradually to a less active state. The reason for this is that strenuous or prolonged activity causes increased blood flow to the muscles. When you stop suddenly, the blood pools or collects in those muscles resulting in less blood flow to the brain, which can lead to dizziness or fainting. Like warm-ups, the cool–down period is an important part of any exercise program.

Check Your Progress

Your fitness will start to improve gradually. It is important to be realistic about your progress. You should keep a record of your progress the day you begin your program. In about three to four weeks retest your fitness. At the end of 12 weeks and every 6 weeks after that, compare your figures. You will notice a significant difference in appearance, energy, weight loss, resting heart rate, and in muscle strength.

Pedometers 10,000 Steps And Up



As an added twist to your activity, have your students purchase pedometers to record their steps in a given day. First, allow them to establish a baseline. They should record the number of steps they take while engaging in their regular daily routines or activities, independent of structured exercise. Second, after establishing their baseline, encourage them to increase their steps gradually until they reach 10,000 steps or more per day. Studies show that 10,000 steps or more a day improved greater leg strength, reduced blood pressure, and decreased body fat. Lastly, have the students record their progress on their " Recording Progress" sheet listed on the next page.

Recording Progress

Name _____ Date _____
Activity Worksheet

Directions: Record your workout schedule for six weeks. Record the time spent per session and label the letter "M" for moderate or "V" for vigorous workout. If you are using a pedometer, record your steps.

Week	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Week 1							
Week 2							
Week 3							
Week 4							
Week 5							
Week 6							

Reviewing The Facts

Name _____

Date _____

Activity Worksheet

1. What are the three parts of an exercise program?

2. Why do some athletes engage in cross-training?

3. What do the warm-up and cool-down session have in common?

4. What do the letters in the F.I.T. formula stand for?

5. How is the resting heart rate an indicator of your fitness?

6. What should you consider in selecting exercises for your fitness program?

Classroom Activities

Activity #1

Have students take their resting heart rate in class and record this number on a sheet of paper. Have students create a contract to increase their aerobic activity level of cardiovascular fitness. Students should keep a diary of their activity level and determine their resting heart rate each day. After six weeks, students will graph their resting heart rate. If the number decreased, it can be assumed that their level of cardiovascular fitness improved over the six-week period.

Activity #2

Have students list a number of fitness activities that they like well enough to do throughout life. Ask them to develop a second list of activities they would like to try. Allow them to determine what resources would be needed to try these activities. Challenge students to try several of the new activities throughout the course and to share their reactions with the class.

Activity #3

Make a sport or exercise collage with pictures, words, colors, etc. that you feel represents your likes and dislikes. Pictures could be of activities, sports etc. (no inappropriate pictures or offensive language may be used).

Activity #4

Create a journal about a physical fitness program that appeals to you. Then draw a chart with three columns. In the first column, write the different activities that your program might involve. In the second column, list any obstacles or disadvantages that each activity might present- for example, lack of time. Then, in the third column, record what steps you might take to overcome these obstacles.

Myths About Exercise

Myths
A myth is a belief or opinion based on false reasoning. There are many fitness myths that are fading fast, but many misconceptions still exist. It is possible that you are following a few without knowing it. Here are several myths that are still popular, with explanations of why they are false:

1. **Myth -** If I eat more protein, I can build big muscles.
   - **Explanation:** Consuming too much protein runs the risk of creating nutrient imbalance, kidney strain, or dehydration. Also, excess protein results in extra calories that are either burned or stored. You should incorporate a healthy eating plan, as well as a workout that combines cardio exercise as well as consistent weight training. Building muscle mass involves two facts: Using enough weight to challenge muscles beyond their normal levels of resistance and eating more calories than you burn. According to the American Dietetic Association, muscles work on calories, so you need all three types of nutrients; carbohydrates, protein, and fat.

2. **Myth -** Exercise takes too much time.
   - **Explanation:** Regular exercise does not have to take more than 25 to 40 minutes, three times a week.

3. **Myth -** "No pain, no gain"! The belief that exercising to the point of feeling pain is the only way to improve your abilities.
   - **Explanation:** Pain is a danger signal - a signal that you are causing harm. Sharp or sudden pain should be a signal to you to stop immediately.

4. **Myth -** If I'm not sore the next day, I didn't work out hard enough.
   - **Explanation:** Some people use muscle soreness as a gauge of how good their workout is. Tiny tears in the muscle fibers cause muscle soreness and, while some soreness is expected, being sore for days after your workout most likely means you overdid it. If you're sore after every workout, you're not allowing your body time to recover. To prevent soreness, you should warm up before your workout and cool-down after. If you experience soreness, rest for a day or so and then do the same exercises that caused you to be sore in the first place, but lower the intensity.

5. **Myth -** All exercises give you the same benefits.
   - **Explanation:** All physical activities can give you enjoyment, but only frequent, continuous activity helps the heart and lungs, and burns off fat and calories.

6. **Myth -** If women lift weights, they will develop large muscles.
   - **Explanation:** Women actually have less muscle tissue and more fat tissue than men. They also have a balance of hormones that is different from men and that prevents the development of large muscle mass.

7. **Myth -** I need exercises to work my "lower abs" and reduce my pot belly.
   - **Explanation:** First, there is no such thing as "lower abs." The six-pack that is mentioned here is actually one long muscle, called the rectus abdominis. This muscle extends from below your chest to your pelvis. To work your abs, you should do exercises to target all four muscles; the rectus abdominis, internal and external obliques and the transverse abdominis. Second, doing crunches will not help you get a six-pack if you have a layer of fat over your abdominal area. In order to see the muscles, you must reduce your body fat.

8. **Myth –** You have to be an athlete to exercise.
   - **Explanation:** Most aerobic activities like walking, jogging, biking, or swimming, do not require any special athletic abilities. Many people who find school sports to be difficult have discovered that these other activities are easy to do and more enjoyable.

9. **Myth –** Drinking fluids before exercising can cause stomach cramps.
   - **Explanation:** Plain water will not cause cramps. Without adequate water, you can become dehydrated, which can lead to muscle cramps and other more serious problems.

10. **Myth –** Sit-ups and other abdominal exercises will decrease fat in the stomach area.
    - **Explanation:** You cannot "spot reduce," or lose fat just in one area.

11. **Myth –** Strong muscles and a beautiful body indicate you are in good health.
    - **Explanation:** It is important to care for your body and look great, but health goes far beyond nice looking muscles and a great body shape. There are people who look great but have cancer and other diseases. Judging yourself or other individuals upon how much or how many exercises one does is ludicrous. Physical strength is only one parameter of health and not an important one.

12. **Myth –** You can't be fit and fat.
    - **Explanation: "**The notion that all fat people are sedentary and unfit and are at high risk of disease is not true." Overweight and obese individuals who are fit do not have elevated mortality rates based on a study by Steven Blair of the Cooper Clinic in Dallas, Texas. Getting fat or thin people to move more can make a huge difference.

13. **Myth –** Being thin is a sign of fitness.
    - **Explanation:** Thin people who do not exercise are likely to have poor heart, lung, and muscular fitness. Cardiovascular fitness, not appearance, is an indication of overall fitness.

Fitness Myths

Name _____

Date _____

Activity Worksheet

Using the websites listed below, have the class research and find five fitness myths that were not mentioned on pages 77-78. Then have students discuss their findings and see if they can suggest plausible strategies for their school and community.

1. http://www.cnn.com/2011/HEALTH/06/24/exercise.myths.trainers/index.html
2. http://www.huffingtonpost.com/estelle-underwood/exercise-mythsb1411355.html
3. http://www.washingtonpost.com/national/health-science/consumer-reports-myths-about-exercise-can-hamper-efforts-to-shape-up/2012/04/16/gIQAr4SsLT_story.html
4. http://www.webwire.com/ViewPressRel.asp?aId=155529
5. http://www.fitsugar.com/Biggest-Strength-Training-Myths-22723268
6. http://newsolio.com/fitness-tips-facts-behind-the-myths-about-physical-exercise,2412
7. http://abcnews.go.com/Health/WellnessNews/story?id=6797940&page=1
8. http://health.yahoo.net/experts/menshealth/5-biggest-exercise-myths

Word Search

Name _____

Date _____

Activity Worksheet: Exercise and Fitness Word Search

On this page is your word search puzzle. Find and circle the words on the left within the puzzle. Hidden words may lie across, down, diagonally, or backwards, but always in a straight line. Words often overlap, and letters may be used in more than one word. As you find and circle a word, cross it off the list.

AEROBICS
ANAEROBIC
BALLISTIC
BODYCOMPOSITION
BODYMASSINDEX
CARDIORESPIRATORY
CARDIOVASCULAR
COOLDOWN
DYNAMIC
ENDORPHINS
ENDURANCE
FLEXIBILITY
FREQUENCY
INTENSITY
ISOKINETIC
ISOMETRIC
ISOTONIC
LIPID
MUSCULARSTRENGTH
OVERLOAD
PHYSICALFITNESS
PROGRESSION
RESTINGHEARTRATE
SKINFOLDCALIPER
SPECIFICITY
STATICACTIVE
STATICPASSIVE
TIME
WARMUP
WORKOUT

T S T A T I C A C T I V E U F Z Q B M R
Y T S K I N F O L D C A L I P E R J L A
H A C E T B A X N I C I T S I L L A B L
P T V A N S P E C I F I C I T Y N M O U
D I M E R T T B W A C F A Y C N O N D C
A C Y U E D I N T E N S I T Y O I D Y S
E P C P S N I F L E X I B I L I T Y M A
R A N I T C D O L C I N O T O S I P A V
O S E S I Y U O R A Y A T Z N S S K S O
B S U O N S M L R E C D E T D E O I S I
I I Q M G N O O A P S I A H E R P C I D
C V E E H Q W K V R H P S Y I G M I N R
S E R T E H A O I E S I I Y H O O M D A
C D F R A T R O D N R T N R H R C A E C
V I E I R E M D Y L E L R S A P Y N X C
Z P N C T E U F Q B O T O E T T D Y X H
C I B I R W P R C W P O I A N U O D S Y
U L M D A N A E R O B I C C D G B R Z C
S E X T T K W H W O R K O U T W T T Y H
H L E R E N D U R A N C E O L H B H J C

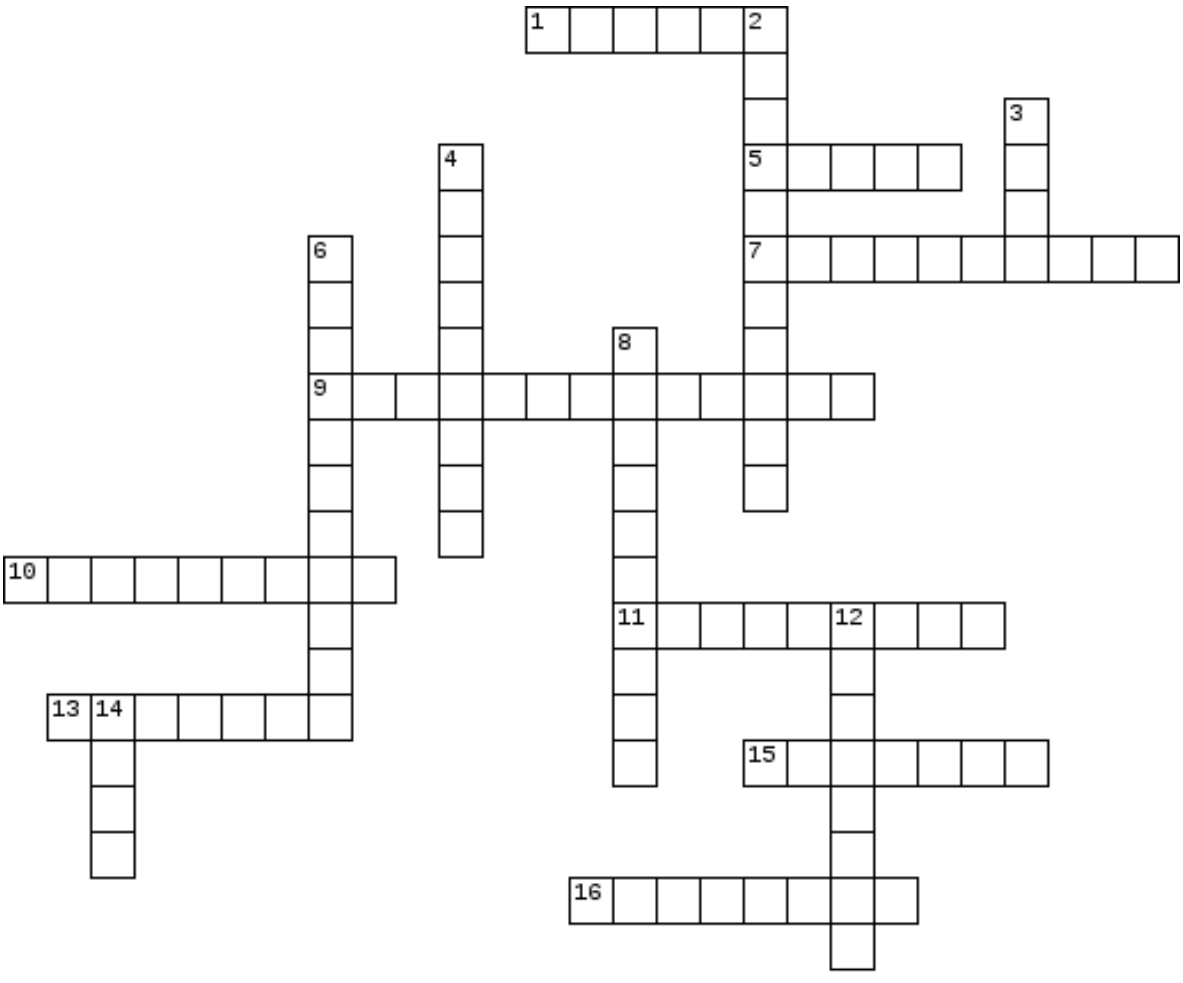
Fitness Crossword Puzzle

Name _____

Date _____

Activity Worksheet

The words in this puzzle are all common to an aerobic and anaerobic fitness workout.
Use the clues listed on page 82 under "ACROSS" and "DOWN" to fill in the crossword puzzle on this page. Below the clue section is a list of terms that can be used to complete the puzzle. Choose the correct word(s) that best fit(s) the definition. For a more challenging task, have students complete this assignment without the terms.



Across Clues	*Down Clues*
1. a procedure to prepare your muscles for activity 5. to obtain total fitness, stamina, and become competitive 7. produced in the brain to reduce your perception of pain 9. engaging in a variety of physical activities as part of your routine 10. "how often should I workout" points to this F.I.T. component 11. an exercise causing muscles to be used at a high intensity for a short period of time 13. muscle that decreases in size and strength 15. term which means "with oxygen" 16. maximal oxygen uptake	2. starting with a little and adding to it regularly to improve perform 3. a belief or opinion based on false reasoning 4. a component of F.I.T. indicating how hard you work out to increase a faster heart rate 6. training that is relevant and appropriate to develop certain parts of the body 8. a by-product that contributes to muscle fatigue 12. a greater than normal amount of stress placed on the body to improve performance 14. "how long should I workout" represents this F.I.T. component

1. aerobic
2. lactic acid
3. VO Two max (VO2)
4. endorphins
5. myth
6. atrophy
7. intensity
8. anaerobic
9. frequency
10. warm-up
11. overload
12. progression
13. specificity
14. time
15. goals
16. cross training

FATIGUE AND SLEEP

Fatigue

What is fatigue? It is the feeling of extreme tiredness or weakness that can make it difficult for you to perform ordinary tasks. It is the lack of energy and motivation that can be physical, mental or both. Fatigue is not the same as drowsiness, but the desire to sleep may accompany fatigue. Fatigue affects everyone differently. It may also come along with pain and sometimes can make you feel that you have very little control of your life. There are different types of fatigue.

1. emotional fatigue,
2. fatigue due to illness
3. physical fatigue.

It is common to feel tired when your emotions are working overtime. **Emotional fatigue** can leave you drained. Tension, stress, frustration, fear and even boredom can cause you to become emotionally tired. These conditions can surface at the workplace, while alone, at school or at home. The same is true when there is a major life change, when overextending yourself, or even when trying to hide your emotions from others. The best cure in this situation is to change the activity that you are doing. Do some fun activities, take a walk, take on fewer responsibilities or break away from the monotony of them. Have something to look forward to that will lift your spirit.

Fatigue due to illness is imminent when your body is under attack. Fighting a sickness like colds, the flu, or a more serious illness like a sore throat can result in an overwhelming feeling of fatigue. One well-known viral infection that may produce severe sore throat is infectious Mononucleosis. This infection can promote extreme exhaustion. When you are sick, your body is telling you it needs rest to repair itself. It is important to learn to listen and understand your body and give it what it needs to recover.

After participating in a physically demanding activity, you may encounter **physical fatigue**. Your muscles become exhausted from the workout you performed. Waste like carbon dioxide and lactic acid are produced and often cramping or stiffness occurs and the muscles may stop responding. Physical fatigue may also result from inadequate sleep. Our muscles need sufficient rest to keep functioning properly. The best cure for physical fatigue is giving the body proper rest.

Sleep

When we ask the question what is sleep we find that it is an essential, biologically motivated behavior. It is the deep relaxation of the body and mind during which the eyes are usually closed and there is little conscious thought or movement. Your muscles relax, breathing and heart rate decreases, and your body temperature drops slightly. About one third of your life is spent sleeping, approximately twenty-three years. Not everyone needs the same amount of sleep. Infants and small children need more hours because of their rapid growth. Some adults can manage with as little as five hours of sleep, while others may need eight or nine. Scientists believe that it is not how long a person sleeps but the quality of sleep that is significant.

For many people, the sleep period occurs at night. Your temperature, mood, and alertness tend to rise and fall at roughly the same time every day. These changes are part of a circadian rhythm. A circadian rhythm is roughly a 24-hour cycle in the physiological processes (behavior patterns) of living things, including humans. During the most active period of circadian rhythm, your mind is alert and physical dexterity is at its maximum. During sleep the circadian rhythm is least active. As you sleep, your body and brain undergo changes that make up a sleep cycle. Scientists, through research, found two different types of sleep cycles. These are nonrapid eye movement sleep (NREM) and rapid eye movement sleep (REM). In NREM sleep your eyes move very little and your body gradually reaches its state of deepest relaxation. There are four stages in NREM. Stage one consists of a gradual period of falling asleep. Stage two, three, and four, your sleep becomes deeper and your muscles more relaxed. In these stages of deep sleep the body is restored and energy is renewed. Individuals who exercise regularly spend more time in the third and fourth stages of NREM than those who do not exercise.

After stage four there are two characteristics of REM sleep 1. rapid flickering of your eyes behind closed eyelids and 2. a high level of brain activity. The eyes dart back and forth and much of the dreaming takes place during REM. The body is almost in a paralyzed state while breathing and heartbeat are irregular. It is important to experience all stages of sleep, but most importantly the REM stage. Through dreaming your body releases anxiety and stress that you have in your conscious and subconscious. Loss of stage three, four, and REM state result in feelings of fatigue and frustration the following day. Sleep deprivation decreases alertness, causes emotion and mood swings, physical pain, such as headaches, and results in loss of energy and motivation. Sleep is an important part to one's fitness.

Sleep is beneficial for everyone that breathes. It is a necessary part of your physical existence. Sleep is a key part of a healthy lifestyle, and can benefit your heart, weight, mind, level of fitness, and more. Your time asleep is your body's recovery period. Sleep helps your body to release tension and replaces and repairs damaged tissues. During sleep much of your body's growth takes place. In 2004, researches at the University of Chicago discovered that not enough sleep could increase hunger. To see this report, click on the link below.
http://www.cbc.ca/news/health/story/2010/12/02/f-sleep-tips.html

Insomnia

Insomnia is the inability to fall asleep or stay asleep. Worry, stress, depression, pain, discomfort, or changes in your sleep routine can trigger this condition. Everyone has some experience in this area, but if it is a persistent problem you need to find the cause. For teenagers, sleep seems to be one of the first things they try to do without. But, usually, having sleep as a top priority, concentration skills improve, energy levels heighten, coping ability may increase, and overall attitude about life elevates. If you are

bothered by insomnia, getting more exercise during your waking hours may ease the problem. Avoid spicy foods or foods that contain caffeine, such as chocolate and cola drinks. Incorporate a relaxing activity before going to bed like listening to soothing music or reading a book.

Sleep apnea

Sleep apnea is a common disorder in which you have one or more pauses in breathing or shallow breaths while you sleep. Breathing pauses can last from a few seconds to minutes. They often occur 5 to 30 times or more an hour or 300 to 500 times a night without the individual being aware of it. Normal breathing then starts again, sometimes with a loud snort or choking sound. Sleep apnea usually is a chronic ongoing condition that disrupts your sleep. You often move out of deep sleep and into light sleep when your breathing pauses or becomes shallow. This results in poor sleep quality that makes you tired during the day. Sleep apnea is one of the leading causes of excessive daytime sleepiness. We learned earlier in "The Benefits of Exercise" that exercise promotes restful sleep. There are also some studies suggesting that fitness can reduce this common sleep disorder. Being fit on a whole may help a sleep apnea sufferer since breathing capabilities will expand with a healthier body.

Narcolepsy

Narcolepsy is a sleep disorder that causes excessive sleepiness and frequent daytime sleep attacks, even if there is a full night's sleep. Symptoms of narcolepsy usually first occur during ages 15 to 30. Those who are affected experience a recurrent uncontrollable desire to sleep and a loss of muscle tone. They can fall asleep suddenly even while talking or driving. Researches believe that there is a possibility that narcolepsy is an autoimmune disorder which means the body's immune system mistakenly attacks healthy tissue.

Self-Evaluation: Sleep

Name _____

Date _____

Activity Worksheet: Self-Evaluation /Research
Integrating Faith and Learning

Read each passage on the topic of sleep both in Ellen White's Gospel Workers p. 422 paragraph 3, and in Psalm 127:2. Then based on what you have read, write your responses to the questions below.

1.What experiences have you had as it relates to lack of sleep?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

2. What does it mean to "burn the candle at both ends?"

3. In the mid-nineteenth century Ellen G. White advocated many health reform principles. In reference to sleep, compare her findings then, to the findings of today's health care reports.

Thinking Critically

Name _____

Date _____

Activity Worksheet

Answer the following questions in the space provided. For additional space use another sheet of paper.

1. Explain what physical fatigue is and how a person may deal with it.

2. What happens when people do not get enough sleep?

3. Explain why it is important for your body to experience REM stage of sleep?

4. What would you suggest to someone who falls asleep quickly, but frequently wakes up after an hour or two, and then have difficulty falling asleep again?

5. Explain how you might help someone who is experiencing emotional fatigue.

6. Describe how sleep apnea is a leading cause of daytime sleepiness.

7. Research sleep apnea and its treatments and present your findings below.

Unscramble the Puzzle

Name _____

Date _____

Activity Worksheet

Fatigue and Sleep

Unscramble the letters to form words that have reference to fatigue and sleep.
Write the correct word(s) in the box provided. Then on a separate sheet of paper describe or define those terms.

nluemnooiocss

liiteomneftoa uag

roepsnalyc

inaomsin

ed aotr eipmvmenye

tgafieu

e panepalse

yhpaeulsa icgfit

esepl

tyoiedaonmv mreenep n

tessinae lgflui

rihyairnctadm ch

Lifetime Activities for Fitness

Lifetime Sports

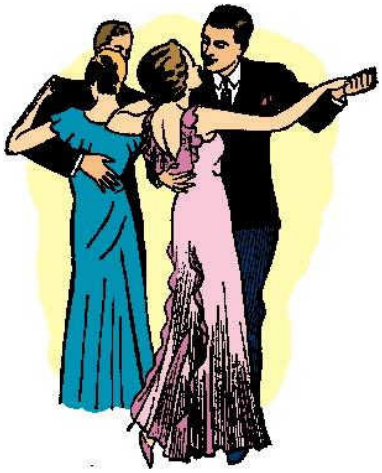
People of all ages, both male and female, benefit from regular physical activity. Significant health benefits can be procured by including a moderate amount of physical activity in your daily routine. With just 30 minutes of brisk walking or 15 minutes of running, or 45 minutes of playing softball, on three or more days a week, health and quality of life improves. Maintaining a regular regimen of activity that is of longer duration or more vigorous intensity is likely to produce greater benefit.

Lifetime sports are those activities that you can participate in throughout your life. Sports activities, from bowling to golf to swimming, are lifetime fitness activities. Keep in mind that team activities (sports like volleyball, basketball, soccer etc.) are often difficult to continue because you need to find a recreational league you can join. Having great skills in any sport does nothing for your health unless you can participate in the sport consistently. Sports, though, are not the only activities that are to be considered. Fitness activities is the other category that plays a valuable role in our lives. Fitness activities generally fall into two categories: moderate activities and vigorous activities. Moderate activities include line or ballroom dancing, canoeing, biking on level ground, sports in which you throw and catch like baseball, downhill skiing, golf, and walking. These activities, though they may be vigorous, are usually not sustained long enough to provide conditioning benefits. Coordination, flexibility, and muscle tone are improved but must be combined with activities that require intense heart and lung efficiency. Vigorous activities include fast dancing, heavy gardening, jumping rope, hiking uphill, running, swimming and sports that require lots of running such as basketball. High-level conditioning must be done for at least 20 minutes and three times a week, minimum. They promote fitness and contribute to weight control.

Lifetime fitness activities help protect against chronic diseases, especially those that affect the cardiovascular system. In fact, as the amount of physical activity increases, the risk of death from a cardiovascular event decreases, notes Wener W.K. Hoeger and Sharon A. Hoeger, authors of Lifetime Physical Fitness and Wellness. Vigorous activity exercise provides the best benefit.

Participating in lifetime physical activities frequently is a must in order to be effective. For kids and teens, this means one hour or more of physical activity daily. Children need to learn about lifetime fitness activities to gain health benefits from them, that is why the "push" in school physical education programs is so important. The idea is to equip the youth with enough skills and ideas to inspire an active lifestyle beyond the classroom and school years. In elementary school, the focus is on basic movement skills such as throwing and dodging. High school programs should allow students to choose the activities they like best so they can refine their skills and pursue such activities for a lifetime, according to the National Association for Sport and PE. The stairway to lifetime curriculum model encourages youths to take more and more responsibility for their own levels of activity, wellness and fitness as they age.

For adults, that means a minimum of two hours and 30 minutes of moderate-intensity exercise such as gardening or playing doubles tennis or 75 minutes of vigorous intensity exercise like karate, soccer or swimming each week. You should include muscle-strengthening activities such as yoga, calisthenics or weight training twice a week, according to the Physical Activity Guidelines for Americans.



Building Your Workout Routine

Choose A Target Fitness Component On Which To Focus In Your Fitness Plan

It is important to know how to design your own personalized fitness plan so you can consider your strengths and weaknesses. Fitness encompasses the five components that were discussed at the beginning of this unit:

1. cardiorespiratory endurance
2. muscular strength
3. muscular endurance
4. flexibility
5. body composition

Some individuals might want to include all the components in their fitness plan, but it is advisable that you focus on only one component at a time to ensure maximum fitness. Start with the component of fitness in which you experience the most difficulty. Each of the five components is interrelated; so working on one component improves all the others.

Set The Goals For Your Fitness Plan

- Be precise: Avoid vague goals like "exercise more". Instead say "exercise three times a week, Sunday, Tuesday, Thursday." The clearer your fitness plan the more likely you are to follow it.

- Set attainable goals: Make sure that the goals you incorporate in your fitness program is within your physical ability.

- Be realistic: Being overly ambitious when creating your fitness plan may cause you to make impractical and hasty decisions. For example, it is not healthy to plan on losing 10 pounds in just a week if you weigh only 110 pounds. Don't be "over the top" with planning! Just remain calm.

- Decide on the time frame: Allow enough time to achieve the goals you set in your fitness program. This is the advantage of creating your own fitness plan. You understand what you can achieve in a week, and there is no one setting goals that will push you over your limit.

Put Your Fitness Plan Into Action

- Select the things you need: Dumb bells, running shoes, whatever you incorporated in the plan. This will avoid wasting time.

- Eliminate distractions: If you have junk food in the refrigerator and you are trying to lose weight, it is best to replace the junk with healthier foods and snacks.

- Control related habits: Instead of plopping on the couch while watching TV, try putting an exercise apparatus in front of the TV so you can exercise while watching.

- Prepare for any challenges to your fitness program: Think of circumstances and people that might derail your ability to follow your fitness plan. Put strategies in place to cope with each situation. Severe weather conditions outside may prevent you from going out. Have a setup indoors so that you can still exercise. Be as flexible as possible.

Make A Personal Contract

A serious and realistic statement should be made to help you stay focused on achieving your fitness goals. Include information such as:

a. the start date for your fitness program

b. the end date for achieving your goals.

Put Your Fitness Plan Into Action

- Involve others around you: A very good source of motivation is working in groups.

- Reward yourself: Sticking to your fitness program is an accomplishment. Rewarding yourself reinforces the efforts you put in and also keeps you motivated to keep on going. Avoid rewarding yourself with food because it can be a major setback.

Staying Motivated

Be aware that creating your own fitness plan does not guarantee that you will never encounter any challenges. Here are some challenges you may face:

- Social influences: Some people that you interact with might simply not be supportive. It is not necessary to ditch them, just work with the people who are willing to support your plan. If possible, have them design their own. This way each can support the other.

- Boredom: At times we all get bored of doing monotonous activities. Dealing with it is quite simple, just switch up the activities in your fitness program. For instance, if you want to attain muscular endurance, and you are bored of lifting weights every day in the gym, go outside and ride your bike. You still achieve the same results stipulated in your fitness plan.

- Wrong choice of technique: As time progresses you might realize that the methods you are using to reach your goals are not working for you. For instance, if you keep falling behind on your running schedule, it may be that running isn't the best tool for you to use. Why not try aerobics instead? That may solve the problem.

- Stress: If things seem stressful look for the causes and work on them. Consider stress management yoga.

Coping With Relapse

It is normal to have setbacks while implementing your fitness plan. Use the following steps to recover from your malady and keep it moving.

- Forgive yourself: Don't be hard on yourself for not following your fitness plan. It's a waste of time when you do and it may cause more stress. It is not the end of the world and blaming yourself can cause you to abandon all the progress you had made in the past.

- Appreciate your progress: It takes sacrifice, will-power and determination to design a fitness plan, and even attempt to follow it. This is an achievement worth some acknowledgment.

- Move on: You must learn from the mistakes you made and try not to repeat them in the future.

The key to maintaining a fitness plan is patience. Creating a long-term plan takes time, not only to put into practice, but to become comfortable with. Eventually, you will be glad that you designed a program that is specific to your needs.

Here is an example of a three-day fitness plan:

MONDAY Physioball Type: Balance	TUESDAY	WEDNESDAY Type: Strengthening Lunges	THURSDAY	FRIDAY Type: Aerobic Archery, nonhunting.
Using a ball for muscle movement; used for core strengthening, muscle building, flexibility and yoga.		Doing lunges using own body weight, free weights, or assisted bar with light to moderate effort. Activity targets lower body, especially buttocks and upper leg.		Shooting arrows with a bow and walking back and forth from the target.
Time: 18 minutes without stopping Intensity: moderate		Time: 33 minutes without stopping Intensity: moderate		Time: 29 minutes without stopping Intensity: moderate

Here is an example of a four-day fitness plan:

SUNDAY Aerobics Low impact	MONDAY Flexibility Low impact Back stretch	TUESDAY	WEDNESDAY Aerobic High impact Bicycling, fast pace	THURSDAY Strengthening Low impact
Doing a series of low impact rhythmic movements at a moderate pace set to music w/o instructor	Stretching the back, neck, and shoulder muscles. Perform stretch with slow and easy movements without causing pain.		Riding vigorously at 14 to 16 mph on paved road	Doing bench press with free weighs or weigh machine with easy to moderate effort. Exercise targets the chest, arms, and other supporting muscles.
Time: 20 minutes without stopping Intensity: moderate	Time: 40 minutes without stopping Intensity: light		Time: 10 minutes without stopping Intensity: high	Time: 33 minutes without stopping Intensity: moderate

Caution: Always check with your health care professional before beginning any activity plan or increasing your activity. It is important to ask him or her what your target heart rate is to help determine what exercise intensity is appropriate for you.

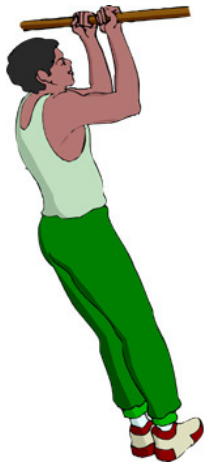
Circuit Training Routines

Circuit Training

Circuit training is a short burst of resistance exercise using moderate weights and frequent repetitions, followed quickly by another burst of exercise targeting a different muscle group. Circuit training is becoming very popular among fitness enthusiasts. It targets every muscle in the body, it can be performed just about anywhere, it can be used with or without machinery, and it saves time. The "circuit" is composed of multiple exercises. You perform each exercise for a set period of time or a stated number of repetitions. When you complete one exercise, you move directly to the next with no rest. Here is an example:

- 3 minutes of cardio
- 3 minutes of upper body strength training
- 3 minutes of cardio
- 3 minutes of lower body strength training
- 3 minutes of abdominal work

As indicated above, movement is from exercise to exercise without resting or stopping in between exercises. A circuit training workout consists of various 30 to 90 second stations that alternate between cardiovascular and resistant training exercises. After completing the workout, (typically 6-8 exercises), you have completed a circuit. Now, you start again from the beginning. After completing two circuits, you have done a full strength training and cardio workout, in thirty minutes. In most cases, performing a circuit 3 to 4 times is common depending on how much time you have and the degree of difficulty. As you move quickly from exercise to exercise, your heart pumps faster and you build endurance and stamina.



Circuit training exercises are designed to target fat throughout the body while providing aerobic workouts, endurance training, and strength. In the circuit training routine, different exercises are designed to work muscles in different parts of the body. The circuit works the upper body, core area, lower body, and the body as a whole.

Upper body exercises may include press-ups, bench dips, pull-ups, medicine ball chest passes, bench-lifts, and inclined press-ups. **Core or trunk** exercises might include sit-ups, abdominal crunches, and back extension chest raises. **Low body** exercises might consist of squat jumps, compass jumps, astride jumps, step-ups, shuttle runs, hopping shuttles, or bench squats. For the **total body** exercises, you may include burpees, treadmills, squat thrusts, and skipping, to name a few. The circuit training workouts combine at least one or two exercises for each of the four body areas. For example, an entire circuit might consist of pull-ups, sit-ups, back extensions chest raises, astride jumps, bench squats, and skipping for a well-rounded workout.

Listed below are circuit training workouts you can use with your students. The circuit workouts can be adjusted to fit your class goals using their favorite activities.

Caution: Always warm up before the workout and cool down afterwards.

20 Minutes Circuit Workout

(* Choose light weights for max reps)

1. Bench press* or pushups – max in 1:00
2. Squats – max in 1:00
3. Pull-ups or pull-downs – 1:00
4. Bike or jog – 3:00
5. Military press* - 1:00
6. Lunges – 1:00 each leg
7. Bicep curls – 1:00
8. Bike or jog – 3:00
9. Triceps extensions – 1:00
10. Leg ext – 1:00 (require leg machines – or repeat squats with weights)
11. Leg curls – 1:00 (require leg machines – or repeat lunges with weights)
12. Sit-ups – 2:00
13. Crunches – 2:00
14. Stretch – 1:00

The above workout is organized with upper body, lower body and cardiovascular exercises.

6 Exercises

1. Treadmills
2. Press ups
3. Squat jumps (forward astride)
4. Sit-ups (bent knees feet on the ground)
5. Squat thrusts
6. Bench dips

8 Exercises

1. Treadmills
2. Press ups
3. Squat jumps (forward astride)
4. Sit-ups (bent knees feet on the ground)
5. Squat thrusts
6. Bench dips
7. Shuttle runs
8. Back extension chest raise

- 20 to 30 seconds work on each exercise with a 30 second recovery
- 3 to 5 sets with a 3-minute recovery between each set.

10 Exercises

1. Squats – 30 seconds
2. Stationary bike, or jogging in place or a treadmill – 30 seconds
3. Lunges – 30 seconds
4. Cycling or jogging – 30 seconds
5. Chest presses on a weight bench or sturdy table 30 – seconds
6. Cycling or jogging – 30 seconds
7. Bent-over rows on a weight bench or sturdy table 30 – seconds
8. Cycling or jogging 30 – seconds
9. Shoulder presses (push your arms straight overhead with palms facing out) – 30 seconds
10. Cycling or jogging - 30 seconds

Circuit Workout for Women

Exercise	Repetitions
Ball Squat	15
Incline Push Up	15
Ball Dumbbell Row Level 1	15
Crunches	15
Shoulder Overhead Presses	15
Forward Lunges	15
Plank	10 to 30 seconds or as long as you can hold

Adapted from: http://www.home-weight-training-for-women.com/circuit-training-exercises.html
2012

How To Use The Above Week's Workout

- Perform the circuit training exercises one after another with as little rest as possible. Once you've finished the first round, rest 60 to 90 seconds or a bit longer if you need it. Then do one more round if you can still manage it.
- Do this workout 2 to 3 times per week.
- A swiss ball (physioball) is necessary.

Attention: When you click on each of the exercises in the table above, you'll be taken to a new page. There you'll find complete instructions together with a short but helpful video.

Circuit 1 for Women

Exercises/Duration	Example
Squats Place an exercise ball behind the back and against the wall with feet hip-width apart, abs in and torso straight. Bend your knees and lower down until knees are at 90 degrees (don't go down as low if you have knee problems). Repeat for 30-60 seconds and hold weights for added intensity.	
Jumping Rope (with or without a rope) 30 seconds to 1 minute	Jump with both feet together, jumping only an inch or so off the floor.
Lunges Stand in split stance, right foot in front. Bend the knees and lower body into lunge position, keeping the right knee behind the toe, torso upright and abs in. 30 seconds, then switch legs for 30 seconds and hold weights for added intensity.	
Jog or Walk Up to 5 minutes	Either outside or inside, walk or jog for 1-2 minutes at a brisk pace. Increase speed and work as hard as you can for 2 minutes. Recover for 1 minute.
Push Ups - On Knees or Toes 30 seconds to 1 minute	
Squats with Front Kick Stand with feet together. Bring the right knee up and extend the leg in a front kick (don't lock the knee!). Lower down into a low squat (knees behind toes) and then kick with the left leg. Repeat (right kick, squat, left kick) for 1-3 minutes.	

Adapted from: http://exercise.about.com/cs/exerciseworkouts/l/blbegcircuit.htm
2012

Circuit 2 for Women

Exercises/Duration	Example
Squat/Lateral Raise Stand with feet hip-width apart, abs in and torso straight. Slowly bend knees into a squat, keeping knees behind toes. At the same time, raise arms up to shoulder level. Lower arms and stand up. Repeat for 30-60 seconds.	
Side-to-Side jump 20-30 seconds	Place a pillow, phone book or step on the floor and stand to one side. Jump from side to side over the object, landing with knees bent and abs in.
Plank with Leg Extension In plank position on the ball as shown or on the floor, slowly lift one leg while keeping hips and shoulders square, abs in. Switch legs, alternating for 20-60 seconds. Modify by staying on the knees.	
Jumping Rope (with or without a rope) 30 seconds to 1 minute	Jump on one foot for half the time and switch legs for the remainder, jumping only an inch or so off the floor.
Lunge with Biceps Curls In split stance, slowly lower into lunge (front and back legs at 90 degrees), and curl forearms towards shoulders. 20-30 seconds on each leg.	
Back Extensions Lie face down on a ball (shown) or floor with the legs extended and hands behind the head or under the chin. Roll down over the ball and then squeeze the lower back to lift the chest off the ball in a straight line. Lower and repeat for 30-60 seconds.	

Adapted from: http://exercise.about.com/cs/exerciseworkouts/l/blbegcircuit.htm
2012

Circuit  Training

Classroom Activity

Research the following sites to view other circuit training sample workouts. See if there are suggestions provided that can be added to your circuit workout. Create a workout for yourself and share it with others in your class.

1. http://www.freedieting.com/circuit_training.htm
2. http://www.thestretchinghandbook.com/archives/circuit-training-routines.php
3. http://www.netfit.co.uk/wkmen.htm
4. http://www.exercise4weightloss.com/interval-training-workouts.html#example1
5. http://www.exercise4weightloss.com/interval-training-workouts.html#example1
6. http://weighttraining.about.com/od/succeedingwithweights/a/circuit_fit.htm
7. http://www.gymjunkies.com/home-workout-for-beginner/
8. http://www.wellsphere.com/wellpage/circuit-training-workout-plan

The Ministry of Healing

Name _____

Date _____

Activity Worksheet: Integrating Faith and Learning

After completing this unit, read E. G. White's passage in The Ministry of Healing pages 238 – 240, referencing how exercise, rather than medicine can have a greater impact on health.

_____

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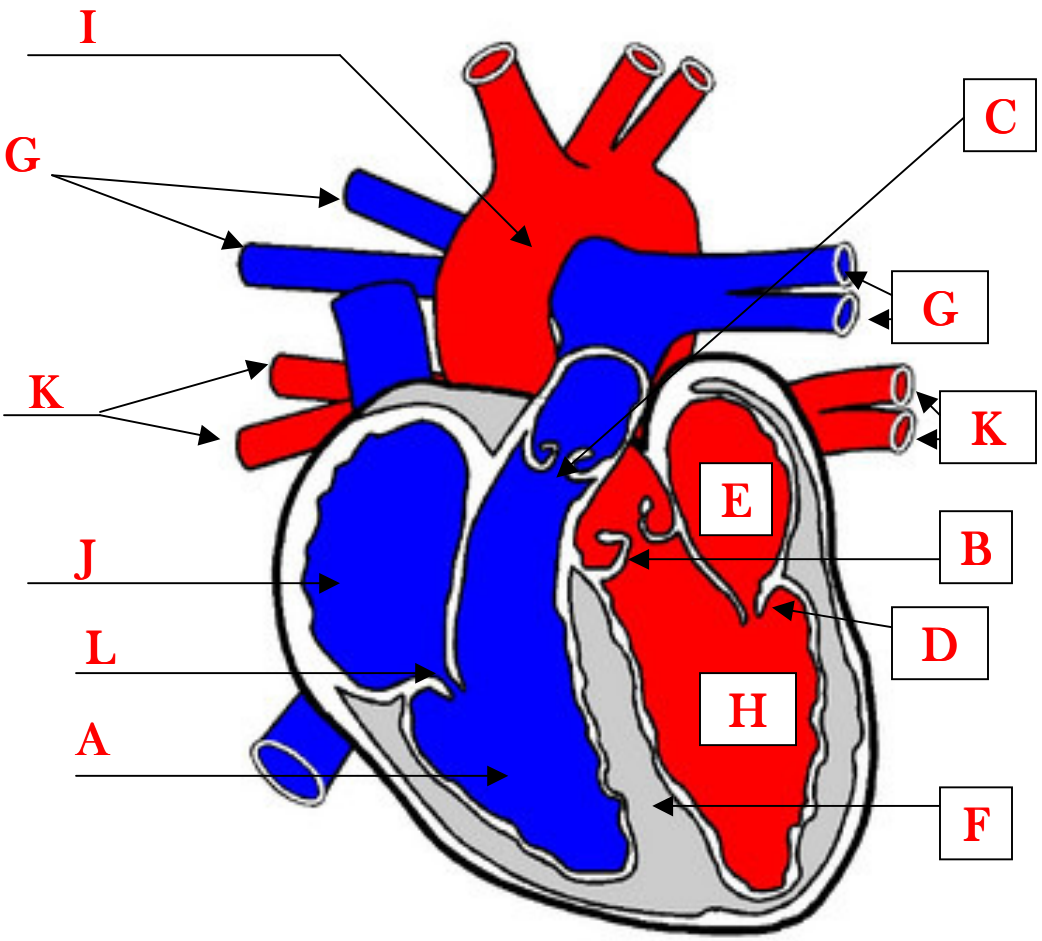
Key: Label Your Heart

Activity Worksheet: p. 4

Match each vocabulary term on the right with the model description on the left.
Write the **boldface** letter of the correct description on the line provided.
Some letters may be used more than once.

For further information have your students check the website listed below after completion of this activity on the heart.
http://www.wisc-online.com/objects/ViewObject.aspx?ID=AP12504



a. right ventricle
b. aortic valve
c. pulmonary semilunar
d. bicuspid valve
e. left atrium
f. septum
g. pulmonary arteries
h. left ventricle
i. aorta
j. right atrium
k. pulmonary veins
l. tricuspid valve

Key: The Heart / Quiz

Activity Worksheet: pp. 5, 6

Write the letter of the correct answer on the line provided.

C 1. How many chambers does the human heart contain?

a. 2 **c.** 4
b. 3 **d.** 5

C 2. The right ventricle of the heart receives blood from the right atrium and pumps it to the:

a. coronary artery **c.** pulmonary artery
b. vena cava **d.** aorta

B 3. What is the organ that pumps blood throughout the human body?

a. the lungs **c.** the kidneys
b. the heart **d.** blood vessels and capillaries

B 4. What happens to the heart when muscles work harder?

a. the heart pumps blood slowly so the muscles can relax
b. the heart pumps blood faster so the muscles get more oxygen
c. the heart slows down
d. the heart gets tired

A 5. The upper chamber of the heart is called:

a. atrium **c.** ventricle
b. palladium **d.** vena cava

D 6. Blood returning from the lungs enters the heart through the:

a. pulmonary semilunar valve **c.** right ventricle **e.** vena cava
b. mitral valve **d.** left atrium

C 7. Which of the following structures keep blood flowing in one direction acting as a trap door?

a. chambers **c.** valves
b. cutaneous membrane **d.** capillaries

D 8. What causes veins to constrict?

a. semilunar valves **c.** capillaries
b. muscle contractions **d.** sympathetic nerves

B 9. Which blood vessel takes blood to the lungs?

a. capillary **c.** venule
b. artery **d.** vein

B 10. The term pulmonary refers to:

a. kidney **c.** heart
b. lungs **d.** muscles

B 11. Cardiorespiratory endurance is the body's ability to use and excrete:

a. oxygen, waste and nutrients **c.** waste, nutrients and oxygen
b. nutrients, oxygen and waste **d.** all of the above

D 12. When at rest the heart pumps about this many liters per minute:

a. 25 liters **c.** 10 liters
b. 15 liters **d.** 5 liters

A 13. What thick muscular wall chamber forces blood to the aortic valve?

a. left ventricle **c.** right atrium
b. right ventricle **d.** left atrium

B 14. Name the largest artery in the body:

a. vena cava **c.** pulmonary vein
b. aorta **d.** aortic valve

C 15. This thick wall structure separates the right and left sides of the heart:

a. tricuspid **c.** septum
b. ventricle **d.** aorta

A 16. When the body is exercising at its maximum capacity, the oxygen uptake is known as?

a. VO 2 max **c.** O2 max
b. V max **d.** O2V max

D 17. Oxygen uptake depends on two things:

a. how fast the heart rate is and how well the muscles contract during exercise.
b. how well the lungs ventilate oxygen to the blood and the consistency of the stroke volume.
c. the heart rate and speed the heart can pump blood to the muscles.
d. how well the respiratory system can ventilate the lungs to supply enough oxygen to feed the blood and how fast the heart can pump oxygenated blood to the muscles.

Key: Recalling Some Facts

Activity Worksheet: pp. 10, 11

1. What are the three types of muscles? striated (skeletal), smooth, cardiac
2. The term muscle, musculus or mus in Latin means? mouse
3. Muscles that bend or contract are known as? flexors
4. Name the fiber responsible for power, speed, and quickness. fast or type II
5. Name a type of muscle that is conscious controlled. striated (skeletal)
6. What is the most important muscle in the body? the heart
7. The thick strands of connective tissue attached to the bones are called? tendons
8. How many muscles are there in the body? 600
9. What are muscles made of? fibers
10. How many times a day does the heart rhythmically contract? 100,000
11. Give two examples of smooth muscles. esophagus, bladder, intestines, walls of blood vessels, bronchi of the lungs
12. What muscle fiber is responsible for endurance? slow or type I
13. Name two methods used to measure strength. Manuel muscle-testing method
14. Which score in the manual muscle-testing method means the muscle is functioning normally? 5/5
15. A handheld dynamometer measures this type of strength? grip strength

Key: Flex Appeal

Activity Worksheet: pp. 40, 41

1. Gummerson defines flexibility as "the absolute _____range__ of _____movement__ in a ____joint____ or series of _____joints_____ that is attainable in a ____momentary_____ effort with the help of a _____partner_____ or a piece of ____equipment_____."

2. One benefit of flexibility is that it provides _____anti-aging____.

3. One type of flexibility that involves motion is called _____dynamic_____.

4. List the four advantages of this flexibility:
   _____increases core temperature_____
   _____elongates the muscle_____
   _____stimulates the nervous system_____
   _____decreases the chance of injury_____

5. Static flexibility does not involve the use of motion.

6. The two classifications of this flexibility term are _static active_____ and _static passive_____.

7. The picture on the right shows a man holding his leg out in front. The hamstring (muscle being stretched), is known as the_antagonist_while the quadriceps and hip flexors (muscles holding the leg up), are known as the _____agonists_____.

8. Holding this same extended position using body weight or some other external force like a chair under the stretched leg is known as _____static passive_____.

9. Stretching the muscles by repetitive bouncing as a way to force it beyond its normal range of motion is known as __ballistic_stretching___.

10. This technique of flexibility develops strength in the tensed muscles and best of all decreases the amount of pain usually associated with stretching. Resistance can be applied manually by one's own limbs, a partner, or by an apparatus. This is called ___isometric stretching_____.

11. This type of stretching is the fastest and most effective way known to increase muscle flexibility. It combines two techniques to achieve a specific maximum flexibility component. This is called _____assisted stretching_____.

12. List three steps to the above process:
    a. _____lengthening the muscle with assisted stretching_____.

    b. _____activating the target muscle with an isometric contraction_____.

    c. _____stretching the target muscle to a new range of motion_____.

13. What assisted stretching style uses the contract-relax and antagonist-contract technique?
    ____PNF - preprioceptive neuromuscular facilitation_____.

Key: Target Questions On BMI

Activity Worksheet: p. 51

1. What does the term "body composition" refer to?
   The amount of relative fat to muscle you have in your body.

2. What does "fat-free mass" refer to?
   Bone, lean muscle, water, and connective tissue. These are vital.

3. In what ways is body fat important to good health?
   1. It helps protect our internal organs
   2. Provides energy and regulate hormones that perform various functions in body regulation
   3. Helps cushion and insulate the body

4. What are some ways in which body fat can be measured?
   1. hydrostatic weighing (underwater weighing)
   2. BIA (bioelectric impedance analysis)
   3. anthropometric
   4. DEXA Scan
   5. skinfold caliper

5. Why is having too much fat, or too little fat, a potentially serious health problem?
   Excess fat has been linked to health problems such as cancer, arthritis, asthma, diabetes, heart and liver diseases. Excess fat also strains the muscular system, and stresses the cardiovascular system.

   Too little can deplete the body of energy reserves to aid the body with the calories and nutrients for health and growth. This may lead to fatigue and the inability to fight off illness.

6. Explain the procedure in hydrostatic weighing.
   The procedure is to first determine the dry weight of the subject. The subject, in minimal clothing, then sits on a specialized seat, expels all the air from the lungs, and is lowered into the tank until all body parts are emerged. The person must remain motionless underwater while the underwater weight is recorded.

Key: BMI Quiz

Activity Worksheet: p. 52

1. What do the initials BMI represent?
   Body Mass Index

2. How is BMI measured?
   BMI is measured by dividing a person's current weight by their height, squared.

3. Within what values is an adult considered underweight?
   If your BMI is 18.5 or below, you are considered to be underweight.

4. A BMI in the 95th percentile in girls or boys is considered to be?
   Greater or equal to the 95th – percentile is considered obese.

5. What values will indicate that an adult male is overweight?
   If your BMI is between 25 and 29.9, you are considered to be overweight.

6. What values will indicate that an adult is obese?
   If your BMI values are between 30 and over, you are considered to be obese.

7. Into what category would an 11year old girl with a BMI (kg/m^2) of 17 fall?
   She would be considered in the median – 50th percentile.

8. Why is it important to regularly check your BMI?
   It indicates whether you are at a healthy weight or if you need to gain or lose weight for better health.

9. Name the statistician who developed the BMI formula.
   Adolphe Quetelet, a Belgium statistican.

10. Explain the difference in calculating BMI for adults and children.
    Adults use height and weight whereas children take into account age and gender.

Key: Exercise Terminology

Activity Worksheet: p. 68

aerobic exercise - 6

anaerobic exercise - 3

endorphins - 1

isometric exercise - 4

lactic acid - 8

isokinetic exercise - 2

isotonic exercise - 7

glycolysis - 5

Listed above are some of the important terms in this section. Choose the term from the list that best matches each phrase below.

1. natural painkillers produced in the brain
2. type of exercise that involves the use of special machines and may be used by physical therapist
3. type of exercise in which the demand for oxygen exceeds the supply of oxygen
4. pushing your palms together is an example of this type of exercise
5. some exercises require faster energy production than what the body can produce. For this reason a process called _____breaks down glucose to supply this energy
6. a continuous physical activity that raises the breathing and heart rate
7. type of exercise that uses repetition of bending and straightening muscles with or without weights
8. a by-product that contributes to fatigue and must be burned up by the body

Key: Reviewing the Facts

Activity Worksheet: p. 75

1. What are the three parts of an exercise program?
   overload, progression, specificity

2. Why do some athletes engage in cross-training?
   It allows them to work different muscle groups in their body to gain balanced strength.

3. What do the warm-up and cool-down sessions have in common?
   Just as the body needs to be readied for increased activity, it needs to be returned gradually to a less active state.

4. What do the letters in the F.I.T. formula stand for?
   frequency, intensity, time

5. How is the resting heart rate an indicator of your fitness?
   A person of average fitness may have a heart rate between 72 and 84 beats per minute.
   After 4 weeks of an exercise program the rate can decrease by 5 to 10 beats per minute.

6. What should you consider in selecting exercises for your fitness program?
   Exercises that is appropriate to your personality, lifestyle, and fitness level. Also a program that is not overly vigorous when first starting out.

Key: Word Search

Activity Worksheet: p. 80

On this page is your word search puzzle. Find and circle the words on the left within the puzzle. Hidden words may lie across, down, diagonally, or backwards, but always in a straight line. Words often overlap, and letters may be used in more than one word. As you find and circle a word, cross it off the list.

AEROBICS
ANAEROBIC
BALLISTIC
BODYCOMPOSITION
BODYMASSINDEX
CARDIORESPIRATORY
CARDIOVASCULAR
COOLDOWN
DYNAMIC
ENDORPHINS
ENDURANCE
FLEXIBILITY
FREQUENCY
INTENSITY
ISOKINETIC
ISOMETRIC
ISOTONIC
LIPID
MUSCULARSTRENGTH
OVERLOAD
PHYSICALFITNESS
PROGRESSION
RESTINGHEARTRATE
SKINFOLDCALIPER
SPECIFICITY
STATICACTIVE
STATICPASSIVE
TIME
WARMUP
WORKOUT

T S T A T I C A C T I V E U F Z Q B M R
Y T S K I N F O L D C A L I P E R J L A
H A C E T B A X N I C I T S I L L A B L
P T V A N S P E C I F I C I T Y N M O U
D I M E R T T B W A C F A Y C N O N D C
A C Y U E D I N T E N S I T Y O I D Y S
E P C P S N I F L E X I B I L I T Y M A
R A N I T C D O L C I N O T O S I P A V
O S E S I Y U O R A Y A T Z N S S K S O
B S U O N S M L R E C D E T D E O I S I
I I Q M G N O O A P S I A H E R P C I D
C V E E H Q W K V R H P S Y I G M I N R
S E R T E H A O I E S I I Y H O O M D A
C D F R A T R O D N R T N R H R C A E C
V I E I R E M D Y L E L R S A P Y N X C
Z P N C T E U F Q B O T O E T T D Y X H
C I B I R W P R C W P O I A N U O D S Y
U L M D A N A E R O B I C C D G B R Z C
S E X T T K W H W O R K O U T W T T Y H
H L E R E N D U R A N C E O L H B H J C

Key: Fitness Crossword Puzzle

Activity Worksheet: p. 81

The words in this puzzle are all common to an aerobic and anaerobic fitness workout.
Use the clues listed on page 87 under "ACROSS" and "DOWN" to fill in the crossword puzzle on this page. Below the clue section is a list of terms that can be used to complete the puzzle. Choose the correct word(s) that best fit(s) the definition. For a more challenging task, have students complete this assignment without the terms.

Across

1. Warm up
5. Goals
7. Endorphins
9. Cross training
10. Frequency
11. Anaerobic
13. Atrophy
15. Aerobic
16. VO two max (VO2 max)

Down

2. Progression
3. Myth
4. Intensity
6. Specificity
8. Lactic acid
12. Overload
14. Time

Key: Self-Evaluation: Sleep

Activity Worksheet: pp. 86, 87
Integrating Faith and Learning

Read each passage on the topic of sleep both in Ellen White's Gospel Workers p. 422 paragraph 3, and in Psalm 127:2. Then based on what you have read, write your responses to the questions below.

1.What experiences have you had as it relates to lack of sleep?

Answers may vary._____

_____

_____

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_____

_____

2. What does it mean to “burn the candle at both ends?”

Working or enjoying oneself late into the night only to begin again early the next day.

To work very hard and long during the day and stay up very late at night.

3. In the mid-nineteenth century Ellen G. White advocated many health reform principles. In reference to sleep, compare her findings then, to the findings of today’s health care reports.

Answers may vary.

Key: Thinking Critically

Activity Worksheet: pp. 88, 89

Answer the following questions in the space provided. For additional space use another sheet of paper.

1. Explain what physical fatigue is and how a person may deal with it.
   Following a demanding period of physical activity the muscles become exhausted. Waste like carbon dioxide and lactic acid are produced which causes the muscles to stop responding. The muscles can start to cramp up and stiffness may occur. Inadequate sleep or diet may also be a contributor to this condition. The best cure for physical fatigue is giving the body proper rest and nourishment.

2. What happens when people do not get enough sleep?
   Lack of sleep causes decreased alertness, extreme emotion and mood swings, decreased energy and motivation, lack of coordination, impulsiveness and headache pain.

3. Explain why it is important for your body to experience REM stage of sleep?
   In this stage of sleep (dreaming), your body releases anxiety and stress that you have in your conscious and subconscious. Loss of the REM stage results in feeling of fatigue and frustration the following day.

4. What would you suggest to someone who falls asleep quickly, but frequently wakes up after an hour or two, and then have difficulty falling asleep again?
   Have them keep a sleep diary and waking diary documenting your regular bedtimes, awakening times, total sleep time at night, the number of times you take naps and their duration, and how you feel throughout a 24-hour period in regard to being sleepy and rested. A good sleep diary can often allow the individual to heal themselves by discovering, obvious components that may disrupt their sleep/wake schedule. Just in case the problem persists, then a visit to the sleep clinic with a sleep expert who takes a full history, sleep and waking history and performs a full physical examination.
5. Explain how you might help someone who is experiencing emotional fatigue.
   The best cure for emotional fatigue is to speak with them to change their routine or activity. Work on a project or go for walks. Try exercising with friends or co-workers. Consult a professional if depression starts to become evident.

6. Describe how sleep apnea is a leading cause of daytime sleepiness.
   This disorder in which breathing stops for short periods during sleep and then resumes suddenly may happen 300 to 500 times a night without the person knowing. This may lead to extreme tiredness for that individual the next day.

7. Research sleep apnea and its treatments and present your findings below.

   Answers may vary.

Key: Unscramble The Puzzle

Activity Worksheet: p. 90

Fatigue and Sleep

Unscramble the letters to form words that have reference to fatigue and sleep.
Write the correct word(s) in the box provided. Then on a separate sheet of paper describe or define those terms.

nluemnooiocss	mononucleosis
liiteomneftoa uag	emotional fatigue
roepsnalyc	narcolepsy
inaomsin	insomnia
ed aotr eipmvmenye	rapid eye movement
tgafieu	fatigue
e panepalse	sleep apnea
yhpaeulsa icgfit	physical fatigue
esepl	sleep
tyoiedaonmv mreenep n	nonrapid eye movement
tessinae lgflui	illness fatigue
rihyairnctadm ch	circadian rhythm

Website Works Cited

Cardiovascular

http://www.sciencedaily.com/releases/2008/04/080422103857.htm
http://www.1vy-rose.co.uk/humanbody/blood/heart_functions.php

Muscular Structure, Strength, Endurance

http://www.chacha.com/topic/muscle
http://sportsmedicine.about.com/od/anatomyandphysiology/a/MuscleFiberType.htm
http://www.nsbri.org/humanphysspace/focus2/spaceflight-exercise.html
http://highered.mcgraw-hill.com/sites/dl/free/0072844221/123981/laba4_7.pdf

Flexibility

http://www2.gsu.edu/~wwwfit/flexibility.html
http://www.exrx.net/exinfo/stretching.html
http://www.sport-fitness-advisor.com/flexibilitytraining.html
http://people.bath.ac.uk/masrjb/stretch/stretching_4htm
http://www.sharpman.com/what_13_pnf_stretching.htm
http://www.tothenextlevel.org/docs/coaches_corner/physiology/flexibility/default.asp

Body Composition

http://nutrition.uvm.edu/bodycomp/bia/bia-toc.html
http://www.topendsports.com/testing/tests/underwater.htm
http://www.builtlean.com2010/07/13/5-ways-to-measure-body-fat-percentage/

Aerobic and Anaerobic

www.aerobic.org
www.uihealthcare.com/topics/exercisefitness/exer3098.html2005
www.scientificamerican.com/article.cfm?id=why-does-lactic-acid-buil
www.menstotalfitness.com/thehealthbenefits

Fitness

http://www.fitness.gov/council_pubs.htm
https://www.presidentschallenge.org/challenge/physical/index.shtml
www.exrx.net/testing/youthnorms.html
www.topendsports.com/testing/sportsspecific.htm

Sleep

www.nhibi.nih.gov/health-topics/topics/sleepapnea
www.ncbi.nlm.nih.gov/pubmedhealth/pmh0001805/

Circuit Training

http://www.webmd.com/fitness-exercise/guide/take-shortcut-fitness-circuit-training
http://www.military.com/military-fitness/workouts/circuit-training
http://brianmac.co.uk/circuit.htm
http://www.webmd.com/fitness-exercise/guide/take-shortcut-fitness-circuit-training?page=2

Benefits of Exercise

http://www.nutristrategy.com/health.htm
www.cdc.gov (Vol 46, No 6;1)

Other Works Cited

Gabbert, Cheryl. How Your Heart Works During Exercise: Ed Updated Dec. 8, 2010

Saar, Natalie. Why Is Muscular Endurance Important In Sports?

Frederick, G. Baseball Part 1 Dynamic Flexibility, Strength and Conditioning Journal, 23 (1); 2001 p. 21-30

Wener W. K. Hoeger, Sharon A. Hoeger. "Lifetime Physical Fitness and Wellness" 2008

National Association for Sport and PE: "Physical Education for Lifetime Fitness": 2011