



# Wellness 3B: Curriculum On Physical Training





# AGENDA

B1. Ways to Train

B2. Aerobic Capacity

B3. Fitness for the Heart

B4. Fitness for the Upper Body

B5. Abdominal Fitness

B6. Strength & Power

B7. Endurance

B8. Balance



# WAYS TO TRAIN

Objectives:

Cadets will be able to

- Understand the difference between Skill Related Fitness and Fitness abilities
- Identify the 5 elements of Skill Related Fitness
- Define the Principle of Specificity
- Give examples of how to train to build muscular strength vs muscular endurance
- Explain flexibility's role in Range of Motion

Essential Question:

How to train to be the best version of one's self, through utilization of the principle of specificity, skill related fitness and fitness abilities.



# SKILLS

- **Skill related fitness** refers to a group of basic abilities that helps you perform well in sports and activities requiring certain physical skills.
- **Skill** is being able to do a task through knowledge and practice.
- **Physical/motor skills** are skills that refer to muscles and nerves working together to complete a series of movements that together are applied to fitness and recreational movement



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# ABILITIES & SPECIFICITY

**Fitness abilities** are the natural talents and abilities based on genetics or strict conditioning; good balance can translate to gymnastics; foot speed can translate to running because of heredity and body composition.

**Personal Determinants** such as heredity, age, gender, disability or other factors can affect the way some people condition or plan out their fitness.

**Principle of Specificity** is to choose a sport or activity that aligns with a person's skill-related fitness abilities (example: Flexible & agile – gymnastics).





# TRAIN FOR DESIRED FITNESS

## Muscular Strength

Develop a plan that includes gradual increase in amounts of resistance or weight and repetitions after the ability to complete it becomes relatively easy

Workout options: Lifting Weights, Resistance bands, Climbing stairs, Cycling, Rowing, Push Ups, Sit Ups, Squats, Yoga/ Pilates, the one you most enjoy

Dietary Needs: Drink lots of water, red meats, fish, seafood, beans, whole grains, nuts, oatmeal, green vegetables, brown rice, salad, fruit



# TRAIN FOR DESIRED FITNESS

**Muscular Endurance** – the ability to use your muscles many times without tiring

Helps lose fat/weight/improve body composition

Workout options: Running, Swimming, Cycling, Rowing, Lifting Weights, Resistance bands

Dietary Needs: Nothing specific





# CARDIOVASCULAR ENDURANCE & AEROBIC EXERCISE

**Cardiovascular Endurance**, the ability exercise your entire body for a long time without stopping.

Aerobic exercises will increase energy, stamina, control blood pressure and cholesterol, and burns more calories.

- Engaging in activities that target large muscle groupings, especially the legs, are continuous or follow a rhythm, and challenge your heart and lungs
- Bigger, Faster Stronger (BFS) Approach- to push further, farther, longer, faster, heavier each time you have a workout



# FLEXIBILITY & RANGE OF MOTION

- **Flexibility**, the ability to use your joints through a full range of motion without injury.
  - Factors to take into consideration : genetics, body build, gender, age and routine stretching
- **Range of motion (ROM)**, the amount of movement in a specific joint that is considered to be healthy (neither too little nor too much).



## Range of Joint Motion Evaluation Chart

NAME OF PATIENT				CLIENT IDENTIFICATION NUMBER	
<p><b>INSTRUCTIONS:</b> For each affected joint, please indicate the existing limitation of motion by drawing a line(s) on the figures below, showing the maximum possible range of motion or by notating the chart in degrees. Provide a complete description of all affected joints in your narrative summary. If range of motion was normal for all joints, please comment in your narrative summary. If joints which do not appear on this chart are affected, please indicate the degree of limited motion in your narrative.</p>					
<b>1. Back</b>			<b>2. Lateral (flexion)</b>		
	Extension 25°	Flexion 90°		Left 25°	Right 25°
	Degrees	Degrees		Degrees	Degrees
<b>3. Neck</b>			<b>4. Neck (lateral bending)</b>		
	Extension 80°	Flexion 50°		Left 45°	Right 45°
	Degrees	Degrees		Degrees	Degrees
<b>5. Neck (rotation)</b>			<b>6. Hip (backward extension)</b>		
	Left 80°	Right 80°		Left 30°	Right 30°
	Degrees	Degrees		Degrees	Degrees
<b>7. Hip (flexion)</b>			<b>8. Hip (adduction)</b>		
	Left			Left 20°	Right 20°
	Knee Flexed 100°	Knee Extended 100°		Degrees	Degrees
	Degrees	Degrees			
	Right				
Knee Flexed 100°	Knee Extended 100°	Degrees	Degrees		
Degrees	Degrees				
<b>9. Hip (abduction)</b>			<b>10. Knee (flexion)</b>		
	Left 40°	Right 40°		Left 150°	Right 150°
	Degrees	Degrees		Degrees	Degrees

Student  
Activity:

See Handout



# CHECK ON UNDERSTANDING



1. Skill related fitness is just one skill related to a sport or activity. ( T/F)
2. If a person has asthma that is considered a fitness ability. ( Yes/ No)
3. To build muscular strength what is recommended that you do for your diet?



# AEROBIC CAPACITY

Objectives:

Cadets will be able to

- Explain Aerobic Capacity's role in the VO<sub>2</sub>Max test
- Understand how Aerobic Capacity is measured in multiple models, methods and clinical tests.

Essential Question:

How is aerobic capacity measured and why.



# AEROBIC CAPACITY & MEASURING IT

**Aerobic Capacity** is the ability of the cardiorespiratory system to provide oxygen during hard exercises over a specific amount of time

**VO<sub>2</sub>Max** is the maximum amount of oxygen the body can utilize during a specified period of usually intense exercise. Includes the athlete's body weight.

**Maximal oxygen uptake test** is a reliable assessment for determining cardiovascular fitness, completed through running on a treadmill while connected to a gas meter; as difficulty increases it measures the amounts of oxygen used.

**Graded Exercise Test** is administered by a health professional, where the individual being tested is closely monitored through Blood pressure cuffs, speed and treadmill grade difficulty while the individual keeps going until completely exhausted.





# CHECK ON UNDERSTANDING

1. There is no difference between  $VO_2$ MAX and Aerobic capacity. T/F
2. What does  $VO_2$ Max stand for? Define it.
3. What is the purpose of the gas meter in the Maximal Oxygen Uptake test?





# FITNESS FOR THE HEART

Objectives:

Cadets will be able to

- Understand and define the anatomy of the blood vessels of the heart
- Explain the difference between low-density lipoprotein and high-density lipoprotein
- Define the clinical definition of a heart attack
- Calculate their own Target Heart Rate and Target Ceiling Heart rate using the Heart Rate Reserve equation method.

Essential Question:

How to exercise the heart to its threshold, and ceiling of capabilities for the individual.



# Heart Constructs

**homeostasis** - the stability and balance of all systems within the human body.

**arteries** carry oxygenated blood from the heart to all parts of the body

**veins** carry de-oxygenated blood or waste filled blood to the heart





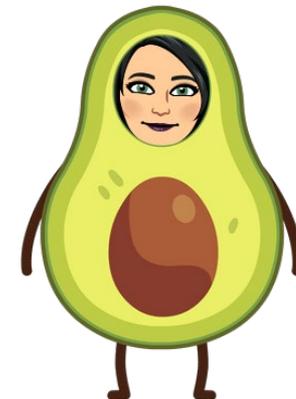
# Heart Health Components

**cholesterol** - a substance found in meat, dairy, and eggs that collects and forms a waxy and fatty texture that sticks to the interior walls of blood vessels and arteries

**low-density lipoprotein (LDL)** - “bad cholesterol” it carries the cholesterol to your body that contributes to atherosclerosis

**atherosclerosis** fat build up in blood vessels, constricts blood flow in the arteries

**High-density lipoprotein (HDL)** is nicknamed “good cholesterol”. It carries the excess cholesterol out of the bloodstream to the liver so the body can eliminate or excrete it from the body.





# Heart Attack



**Heart attacks** occur when there is a significant restraint or reduction of blood supply causing areas of muscles in the heart to die.

**Technical Term: Myocardial Infarction**



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# Heart Rate Target Zones

- **Maximum heartrate** is 220 minus the individual's age
- **Resting Heartrate** is the rate your heart beats normally when your body is at rest
- **Heartrate Reserve** is Max HR minus Resting HR
- **Threshold Heartrate** is the percentage of heart rate an individual can sustain during exercise over a long period

*Example: 16-year-old*

MAX heart rate  $220 - 16 = 204$

Threshold Calculation

204

-67 (resting heart rate)

-----  
= 137 HRR

x.60

-----  
82

+ 67 (resting heart rate)

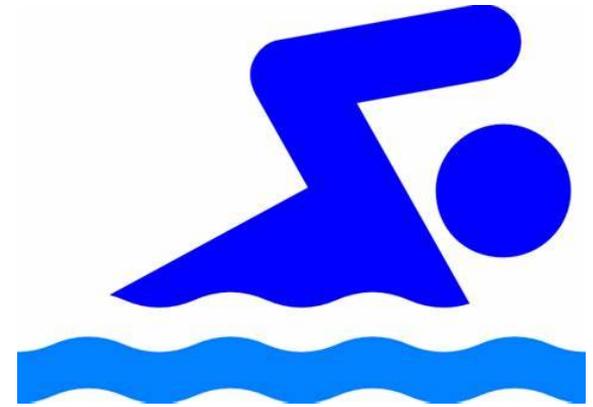
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149 (threshold HR)



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# Heart Fitness Exercises

- Running
- Swimming
- Cardio Kickboxing
- Zumba
- Dancing
- Cycling
- Any activity that raises the heart rate for the duration of the time period





# CHECK ON UNDERSTANDING

## Check on Understanding:

1. Define cholesterol. Explain the different types of cholesterol and their role.
2. To improve or maintain heart fitness one should exercise below the threshold and the target ceiling. (T/F)
3. What are examples of heart fitness exercises?





# FITNESS FOR THE UPPER BODY

Objectives:

Cadets will be able to

- Identify the major upper body muscle groups
- Explain the difference between isotonic and isometric contraction
- Give examples of exercise for isotonic and isometric
- List multiple exercises per upper body muscle group

Essential Question:

How to exercise the upper body for the best-rounded fitness



# Upper Body Anatomy

“**Upper body**” is commonly referred to for a portion of muscles above the naval, to the top of the shoulders and extending through the arms to the hands.

This grouping is made up of the major muscle groups:

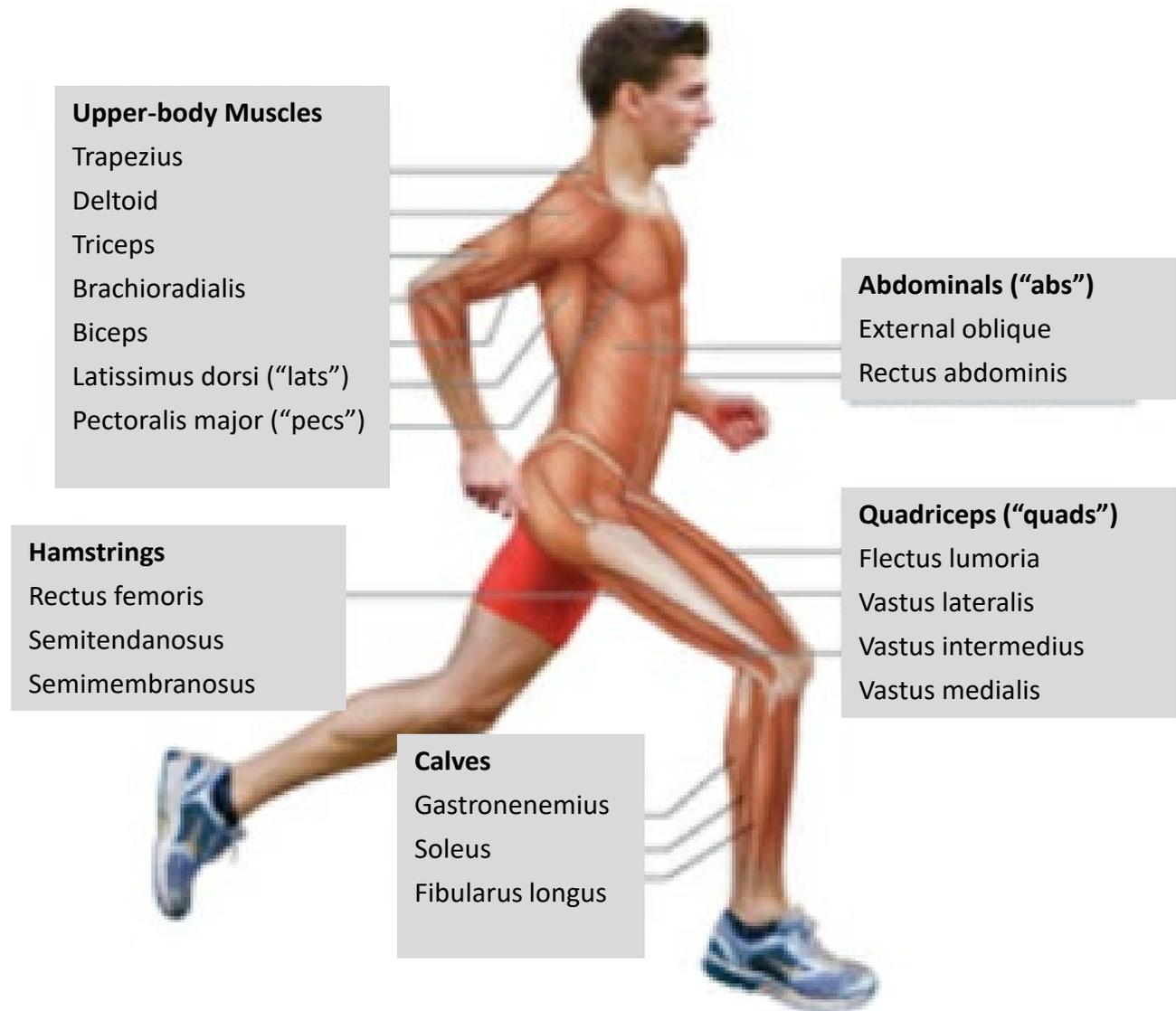
- trapezius (traps)
- deltoid
- triceps
- brachioradialis
- biceps
- latissimus dorsi (lats)
- pectoralis major (pecs)



**GYM:TIME**



# Major Muscle Groups





# Strengthening Muscles

**Hypertrophy:** to build or grow muscle endurance, strength, or size of the muscle.

**Concentric Contractions** - shortening of the muscle.

**Eccentric contractions** - lengthening of the muscle

**Isotonic contractions** – muscles pull on bones to result in a body movement

**Isotonic exercise** is where the muscle must contract to move body parts, like lifting weights.





# Strengthening Muscles

**Isometric contraction** also known as a *static* contraction is when a muscle is activated in opposite directions with equal force but does not shorten or lengthen.

**Isometric exercises** is when the body does not move during the exercise. An example of this would be holding a plank, flexed arm hangs etc.

**Isokenetic exercise** uses a constant speed no matter how much effort you expend. Specialized machines control the pace of an exercise by fluctuating resistance throughout your range of motion. Your speed remains consistent despite how much force you exert.





# Upper Body Exercises

- If you want to build upper body strength:
  - Pull Ups
  - Bicep Curls
  - Tricep Extensions
  - Push Ups

## AT HOME UPPER BODY WORKOUT

GET HEALTHY 10



INCHWORM 4-5 REPS



16 WALKING PUSH UP



1:00 PLANK JACKS



12 REPS OVERHEAD PULL



1:00 PLANK TO UPRIGHT ROW



12-15 UPRIGHT ROW



1:00 PUNCHING



10/SIDE SIDE PLANK WITH  
ARM EXTENSION



1:00 SIDE TO SIDE SQUAT &  
SWING



10/SIDE TRICEP SIDE PUSH-UP



1:00 SQUAT BICEP CURL



8 REPS SHOULDER T



1:00 ARMY CRAWL PLANK



# CHECK ON UNDERSTANDING

## Check on Understanding:

1. There are only 8 muscles in the upper body. (T/F)
2. Increase in muscle size is \_\_\_\_\_.
3. What is the best type of exercises, isotonic, isometric, isokinetic? Explain your answer as to why you feel that way, use deductive reasoning.





# ABDOMINAL FITNESS

Objectives:

Cadets will be able to

- Identify the Abdominal muscle groups
- Explain the difference between ptosis, lordosis, and kyphosis
- Give examples of exercise for isotonic and isometric for the core

Essential Question:

How to exercise the abdominal muscles for the best-rounded fitness and posture



# Abdominal Anatomy

## MAJOR MUSCLE GROUPS

**Core / “abs” / trunk** (even though the muscles are not only in the trunk area)

**Oblique’s** are the major (belly) core muscles (love handles)

**Transversus Abdominis** - the area below the navel to the pelvic area

**Rectus Abdominis** - the “six pack area” center body front.

## MINOR MUSCLES GROUPS

**Gluteus Maximus** - the butt muscles

**Latimissmus Dorsi** - the middle back big flat muscle that wraps towards the front of the body

**Trapezius** the upper back muscle that leads from middle spine up towards the neck





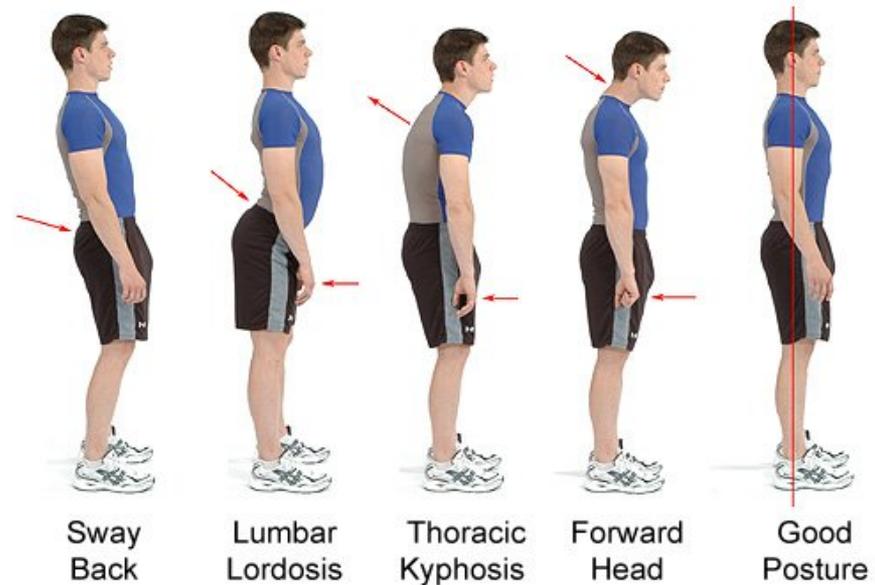
# Weak Core Health Conditions

Having a weak core puts unneeded stresses on the short back muscles and causes poor posture that cause health issues such as:

**ptosis** the abdomen to protrude causing a round belly look

**lordosis** excessive back arch

**kyphosis** rounded back or swayback also nicknamed *hunchback* or *humpback*



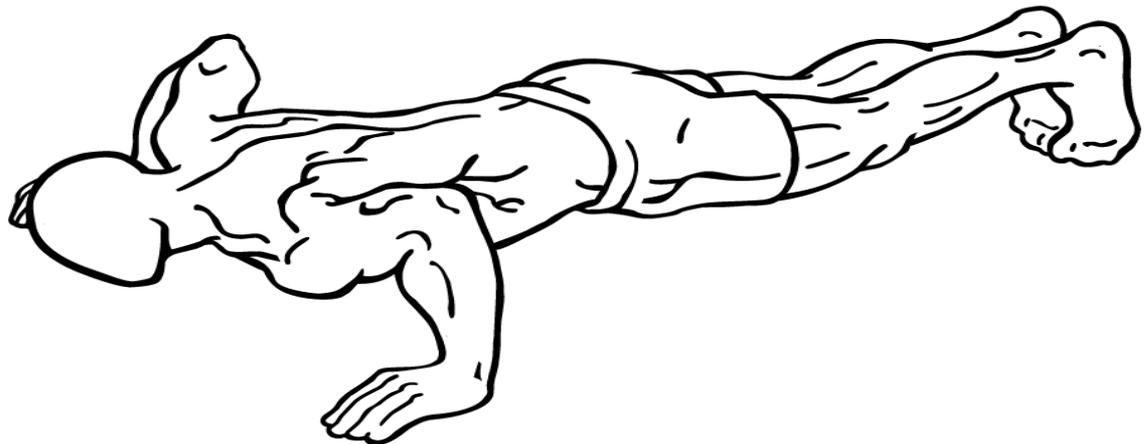


# Strengthening the Core

**Calisthenics-** Exercises completed through using all or part of the body weight to create resistance

**Exercises for core strength:**

- Curl Ups
- Trunk Lift
- Side Plank
- Reverse Curl
- Bridging
- Supine Leg lifts (on back)
- Push Ups
- Prone Arm lift (face down/ belly down)
- Stride Jump
- Side Leg Lift
- Knee to Nose (mountain climber)





# CHECK ON UNDERSTANDING

## Check on Understanding:

1. Are the abdominal muscles only in the trunk or belly area of the human body?  
( T/F)
2. Other than aiding in body posture what else do the abdominal muscles support?
3. Three “sis” suffix conditions listed due to poor abdominal strength. Name and explain them in your own words or define.





# STRENGTH & POWER

Objectives:

Cadets will be able to

- Explain the difference between Power and Strength
- Define Max weight or 1RM
- Calculate muscular power through the equation provided
- Define the difference of Aerobic power and Anaerobic Power.

Essential Question:

How to calculate muscular strength and power of the body.

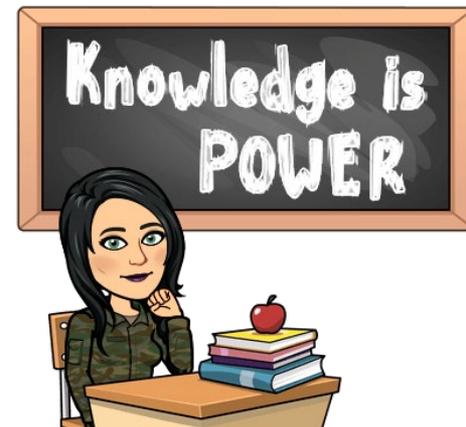


# Strength vs Power

**Strength** is the max amount of force muscles can exert.

- A measure for strength is shown as 1RM, or **1-repetition maximum**; it's the max amount of weight a person can lift or press once, being unable to lift or press it again.

**Power** is the capacity to use strength and speed quickly





# Types of Strength

**Static Strength**, is completed through exercises that involve no movement; also known as isometric exercises. (ex: flexed arm hang)

**Dynamic Strength** is completed through exercises that involve joint movement, also known or referred to as isokinetic exercises. (ex: weightlifting)





# Muscular Power

**Muscular power** is defined and found through an equation which is

$$Power = \frac{Force \times Distance}{Time}$$

**Speed** is found through the equation

$$Speed = \frac{Strength + Distance}{Time} .$$

THINKING...





# Aerobic vs Anaerobic

**Aerobic Power** is an indicator of cardiovascular fitness and development in the weight bearing endurance sports such as cross country running and Nordic skiing. It is the oxygen intake per unit of body weight.

**Anaerobic Power** is energy that is stored in muscles and that can be accessed without the use of oxygen. Tennis, basketball, racquetball, soccer, volleyball, football and other start-and-stop sports are anaerobic because of the high heart rates, short durations and longer recovery periods you experience when you play them.



# CHECK ON UNDERSTANDING

## Check on Understanding:

1. What is strength?
2. Dynamic Strength is completed by using isokinetic exercises or isometric exercises?
3. What type of power does not involve uptake of oxygen?





# ENDURANCE

Objectives:

Cadets will be able to

- Define muscular endurance
- Explain the difference between slow-twitch, fast-twitch, and intermediate- twitch
- Give examples of abilities/activities for each type of muscular fiber

Essential Question:

How to identify muscle fiber types for the best fitness.



# MUSCULAR ENDURANCE

**Muscular endurance** is the ability of a muscle or group of muscles to resist fatigue, or to sustain repeated contractions for an extended time period and not tire.

- This type of endurance does not rely on oxygen or respiratory system, but on muscle fibers.





# MUSCULAR ENDURANCE



- There are three primary muscle fiber types:
- **Slow-Twitch (Type II)** muscle fibers that help long endurance
- **Fast-Twitch/(Type I)** muscle fibers that facilitate powerful movements while having least endurance, used in strength activities – explosive, short term or highly intensive exercises
- **Intermediate-twitch** fibers mirror both characteristics of slow and fast twitch fibers.
- Based on body make up and heredity, genetics determines if a person has more slow, fast or intermediate fibers.





# CHECK ON UNDERSTANDING

## Check on Understanding:

1. What is the definition of muscular endurance?
2. A high jumper is an example of what type of muscle fiber? Type I or Type II? Explain why?
3. Fast-twitch fibers is a perfect example of what would be expected to be found in long distance runners. True or False?





# BALANCE

Objectives:

Cadets will be able to

- Define Muscular Balance
- Define Balancing Energy
- Calculate caloric burn using METs Equation

Essential Question:

How to calculate individual caloric burn using METs equation for a full 24-hour day



# BALANCE

**Muscular Balance** is defined as an ability to remain in an upright position while standing or moving. It is a component of skill-related fitness.

- **excellent** balance-related skills: bicycling, dance, gymnastics, skating/ice skating, hockey, skiing and tai chi
- **good** balance-related skills: baseball, basketball, bowling, extreme sports, football, and martial arts
- **fair** balance-related skills: tennis, golf, soccer, softball, and volleyball
- **poor** balance-related skills: jogging and swimming

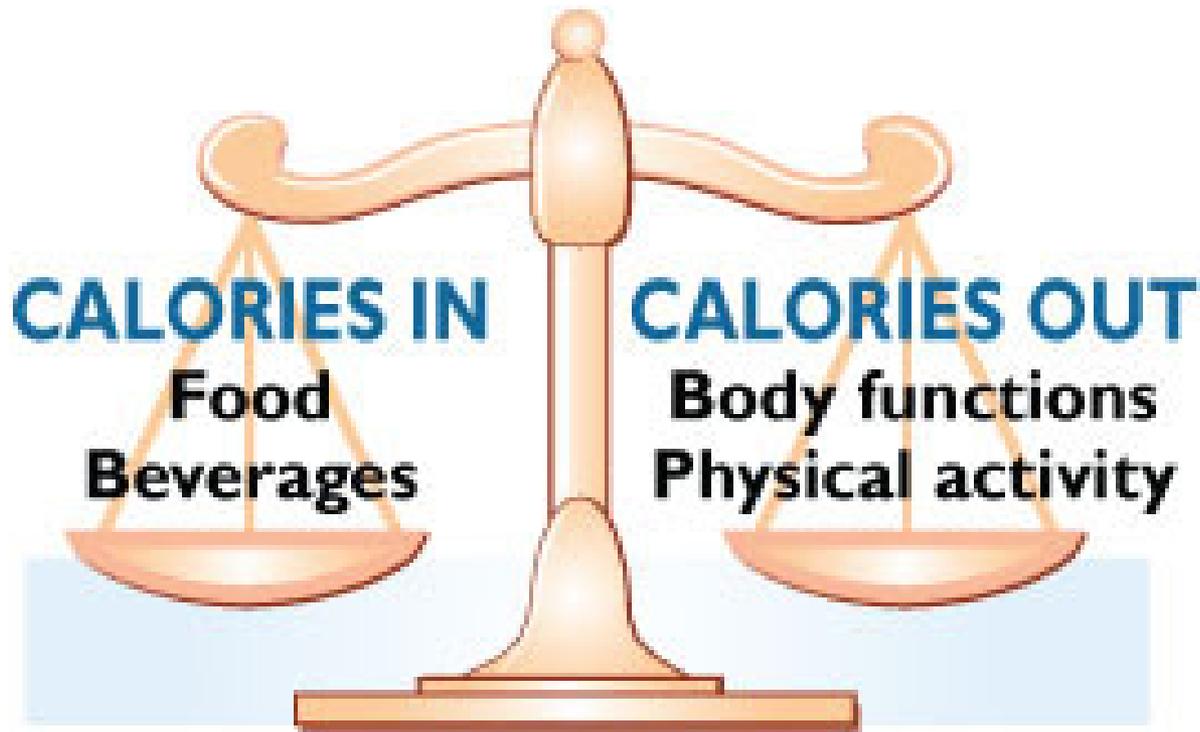




# BALANCING ENERGY

**Balancing energy** is balancing intake with output, such as food intake with energy output through exercises and activities.

- Input vs Output





# MEASURING/ CALCULATING CALORIC BURN

**Metabolic Equivalent (METS)** is a unit that measures the metabolic cost (oxygen consumption) of any physical activity or exercise.

- Its mathematical definition is 3.5ml of O<sub>2</sub> multiplied by kg multiplied by min. *METS = 3.5ml x kg x mins.*
- For example, a 155-pound person is (rounded) 70kgs, (lbs to kg is # lbs divided by 2.2), who spends 8 hours resting (8 x 60= 480 minutes) utilizes roughly 588 calories. (resting is 1 met)

- $$\frac{(1 \text{ met} \times 3.5 \text{ ml} \times 70)}{200} \times 480 = 588 \text{ calories.}$$



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# MEASURING/ CALCULATING CALORIC BURN CONTINUED

**TABLE 20.2 Selected Activities and Their Respective MET Values**

Activity	MET Value	Activity	MET Value
<b>REST AND SELF-CARE ACTIVITIES</b>			
Rest (supine)	1.0	Showering	2.0
Sitting	1.5	General grooming, standing	2.0
Eating	1.5	Dressing or undressing, standing	2.5
Bathing	1.5		
<b>HOME ACTIVITY</b>			
Knitting or hand sewing, light effort	1.3	Vacuuming (general, moderate effort)	3.3
Washing dishes	1.8	Making beds, changing linens	3.3
Ironing	1.8	Cleaning (scrubbing floor, washing car, washing windows)	3.5
Laundry, folding or hanging clothes	2.0-2.3	Sweeping, moderate effort	3.8
Cooking or food preparation	2.0-3.5	Moving furniture, carrying boxes	5.8
Machine sewing	2.8	Scrubbing floors on hands and knees, vigorous effort	6.5
<b>OCCUPATIONAL</b>			
Sitting tasks, office work, working at a computer	1.5	Construction (outside)	4.0
Driving a delivery truck, taxi, school bus, etc.	2.0	Hotel housekeeper	4.0
Cook, chef	2.5	Yard work	4.0
Standing tasks, light to moderate effort	3.0-4.5	Manual or unskilled labor	2.8-6.5
Custodial work	2.5-4.0	Farming, light to vigorous effort	2.0-7.8
Carpentry (general, light to moderate effort)	2.5-4.3	Fire fighter on the job	6.8-9.0
<b>PHYSICAL CONDITIONING</b>			
<b>Walking</b>			
2.5 mph, level	3.0	4.5 mph, level	7.0
3.5 mph, level	4.3	5.0 mph, level	8.3
4.0 mph, level	5.0	5.0 mph, 3% grade	9.8
<b>Jogging or running on level surface</b>			
4.0 mph	6.0	10.0 mph	14.5
6.0 mph	9.8	12.0 mph	19.0
8.0 mph	11.8	14.0 mph	23.0
<b>Swimming</b>			
Freestyle, vigorous effort	9.8	Breaststroke, recreational/training and competition	5.3/10.3
Freestyle, slow to moderate	5.8	Sidestroke, general	7.0

(continued)



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# MEASURING/ CALCULATING CALORIC BURN CONTINUED

TABLE 20.2 (continued)

Activity	MET Value	Activity	MET Value
<b>PHYSICAL CONDITIONING</b>			
Backstroke, recreational/training and competition	4.8/9.5		
<b>Cycling</b>			
Leisure, 5.5 mph	3.5	Leisure, 14.0-15.9 mph (vigorous effort)	10.0
Leisure, 10.0-11.9 mph (slow, light effort)	6.8	Racing, 16.0-19.0 mph (vigorous effort)	12.0
Leisure, 12.0-13.9 mph (moderate effort)	8.0	Racing, >20 mph (vigorous effort)	15.8
<b>RECREATIONAL ACTIVITIES</b>			
Aerobic dance	5.0-7.3	General resistance training	3.5-6.0
Video game activities	2.3-6.0	Rowing machines	4.8-12.0
Stationary cycle ergometer	3.5-14.0	Water aerobics	5.3
Circuit training	4.3-8.0	Video exercise workouts, light to vigorous	2.3-6.0
<b>SPORT ACTIVITIES</b>			
Archery	4.3	Rock or mountain climbing	5.0-8.0
Badminton	5.5-7.0	Roller skating	7.0
Basketball	6.0-9.3	Rugby	6.3-8.3
Bowling/Lawn bowling	3.0-3.8	Skateboarding	5.0-6.0
Football, flag or touch	4.0-8.0	Soccer	7.0-10.0
Golf	4.8	Softball	5.0-6.0
Handball	12.0	Squash	7.3-12.0
Hockey, field	7.8	Table tennis (ping pong)	4.0
Hockey, ice	8.0-10.0	Tennis, singles	7.3-8.0
Horseback riding	5.8-7.3	Tennis, doubles	4.5-6.0
Lacrosse	8.0	Volleyball	3.0-4.0
Orienteering	9.0	Volleyball, competitive	8.0
Racquetball	7.0-10.0	Volleyball, competitive beach	6.0

Data from Ainsworth et al. Healthy Lifestyles Research Center, College of Nursing and Health Innovation, Arizona State University. Retrieved 7/21/2011 from <http://sites.google.com/site/compendiumofphysicalactivities>



# CHECK ON UNDERSTANDING

## Check on Understanding:

1. Balance definition only refers to muscular. (T/F)
2. What does METS stand for and define it.
3. Calculate this person's metabolic output in calories burned (round kg and all answers to closest whole)
  - a. Patient is 175 lbs.
  - b. Averages 8 hours of sleep
  - c. Does a moderate gym routine for 2 hours
    - a. Treadmill at 3.5 mph for 1 hour
    - b. Swims slow moderate front crawl/freestyle for 1 hour
  - d. Does office work for 8 hours
  - e. Showers for 30 minute
  - f. Grooms for 30 minutes
  - g. Eats for 15 minutes 4 times a day
  - h. Relaxes at home for 4 hours before bed.

