

**Fitness
Leadership**

SINCE 1984

AFLCA

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ASSOCIATION



Learning Objectives

Resistance Training Leader



Resistance Training Leader - Learning Objectives

Chapter 1: Resistance Training Misinformation and Myths

Chapter Objectives:

1. List and dispel resistance training myths (Pages 12 – 17) including;
 - a. the adaptability of women to resistance training (Pages 13 & 16)
2. Describe different types of equipment that can be utilized for resistance training (Pages 17 – 25)
3. Identify the advantages and disadvantages of machines and free weights under the headings of capital cost, maintenance, flexibility of use, degree of muscle involvement, ease of learning, time efficiency, safety, and space requirements (Refer to the Glossary of Terms at the end of this document)

Chapter 2: The Musculoskeletal System and Muscular Force Production

Chapter Topic I: Movement terminology and muscles

Chapter Objectives:

1. Define the terms: agonist (prime mover - page 27), antagonist, synergist and stabilizer (Refer to the AFLCA Exercise Theory Manual to review these terms.)
2. Identify and review the movement vocabulary associated with resistance training (flexion, extension, rotation, circumduction, abduction, adduction, hyperextension, hyperflexion, dorsiflexion, plantar flexion, lateral flexion, eversion, inversion, pronation, supination, elevation, depression, protraction, retraction) (Pages 31 – 39)
3. Identify and review the names and locations of the major muscles of the body. See list below. (Pages 28 – 29. Also refer to the AFLCA Exercise Theory Manual.
4. Describe how muscles act as agonists, antagonists and synergists (quadriceps {rectus femoris, vastus medialis, vastus intermedialis, vastus lateralis}, hamstrings {biceps femoris, semitendinosus, semimembranosus}, abductors {gluteus minimus and gluteus medius}, gluteus maximus, iliopsoas, sartorius, biceps, triceps, trapezius, rhomboids, serratus anterior, latissimus dorsi, teres major, pectoralis major, pectoralis minor, deltoids, rotator cuff {supraspinatus, infraspinatus, teres minor, subscapularis}, gastrocnemius, soleus, tibialis anterior, adductors {adductor magnus, longus and brevis, pectineus and gracilis}, transverse abdominals, internal obliques, external obliques, rectus abdominus, erector spinae) Chapter 6 covers the muscles of the trunk, chapter 7 covers the muscles of the upper body, chapter 8 covers the muscles of the lower body.
5. Identify and review the involvement of muscles, tendons and ligaments (Refer to the AFLCA Exercise Theory Manual)

Chapter Topic II: Types of resistance and force production

Chapter Objectives:

1. Describe: isometric, concentric, and eccentric force production (contractions) (Pages 40 – 42) (Refer to the AFLCA Exercise Theory Manual)
2. Describe the causes of muscle soreness and the impact of concentric and eccentric contractions (Page 41)
3. Identify the impact of eccentric contractions and muscle soreness related to, unfamiliar exercises, and beginner exercise participants (Page 41)

4. Describe the terms dynamic constant resistance (isotonic), dynamic variable resistance, dynamic progressive resistance and isokinetic resistance (Pages 40 – 42)
5. State the principles underlying variable resistance machines (Pages 41 – 42)
6. State the effectiveness and non-effectiveness of isokinetic resistance training compared to other forms of resistance training (Page 42)
7. Identify the impact of muscle force-velocity relationships, muscle strength curves, and on strength performance (Pages 40 – 43)

Chapter 3: Benefits of Resistance Training

Chapter Topic I: Benefits of resistance training

Chapter Objectives:

1. List five important reasons to strength train (Pages 44 – 46)
2. Describe the health benefits associated with resistance training (Pages 46 – 48)
3. Indicate the response and adaptability of older adults to resistance training (Pages 43 and 47)

Chapter Topic II: The physiology of strength improvement

Chapter Objectives:

1. Describe the physiological changes that occur with strength training. (Pages 46 - 47)
 - Describe muscle hypertrophy (Refer to the Glossary of Terms at the end of this document. Also refer to the AFLCA Exercise Theory Manual.
 - Define a motor unit and describe the changes that occur with strength training (Refer to the Glossary of Terms at the end of this document)
2. Review the muscle structure and function of fibres, myofibrils, muscle cell and actin and myosin (Refer to the AFLCA Exercise Theory Manual)
3. Review aerobic vs anaerobic energy systems (Refer to the AFLCA Exercise Theory Manual)
4. Describe the energy sources and systems associated with resistance training (Refer to the Glossary of Terms at the end of this document)

Chapter 4: The 10-Step Any Exercise Drill – Exercise Analysis Made Easy

Chapter Objective:

1. Understand the application of the 10-step Any Exercise drill (Pages 50 – 61)

Chapter 5: Understanding the Trunk

Chapter Objectives:

1. State the key function(s) of each of the following muscles and identify exercises involving the muscles: (rectus femoris, hamstrings {biceps femoris, semitendinosus, semimembranosus}, iliopsoas, transverse abdominus, internal obliques, external obliques, rectus abdominus, erector spinae) (Pages 63 - 77)
2. Explain the importance of the trunk as the “power center” or core (Page 63)
3. Describe the four training suggestions for a healthy trunk (Pages 65 – 67)
4. Describe neutral spinal posture and why it is important (Pages 67 – 72)
5. Indicate how both sustained flexion and extension strains the supporting structures of the spine (Pages 71 – 72)

Chapter 6: Trunk Exercises

Chapter Objectives:

1. State the key techniques and precautions for trunk stability and mobility exercises (trunk flexion and extension) (Pages 78 – 116)
2. Identify specific safety considerations for the spine during trunk exercises (Pages 80 – 116)

Chapter 7: Upper Body Exercises

Chapter Objectives:

1. State the key function(s) of each of the following muscles and identify exercises involving the muscles: (biceps, triceps, trapezius, rhomboids, serratus anterior, latissimus dorsi, teres major, pectoralis major, pectoralis minor, deltoids, rotator cuff {supraspinatus, infraspinatus, teres minor, subscapularis} (Pages 117 – 165)
2. State the key techniques and precautions for a given upper body exercise (Pages 117 – 165)
3. Identify specific safety considerations for the shoulder joint during upper body exercises (Pages 117 – 165)

Chapter 8: Lower Body Exercises

Chapter Objectives:

1. State the key function(s) of each of the following muscles and identify exercises involving the muscles: (quadriceps {rectus femoris, vastus medialis, vastus intermedialis, vastus lateralis}, hamstrings {biceps femoris, semitendinosus, semimembranosus}, abductors {gluteus minimus, gluteus medius}, gluteus maximus, iliopsoas, gastrocnemius, soleus, tibialis anterior, adductors {adductor magnus, longus and brevis, pectineus and gracilis}, sartorius) (Pages 166 – 192)
2. State the key techniques and precautions for a given lower body exercise (Pages 166 – 192)
3. Identify specific safety considerations for the knee joint during lower body exercises (Pages 166 – 192)

Chapter 10: A Model for Resistance Training Program Design

Chapter Topic I: Resistance program design model

Chapter Objectives:

1. State the three steps for designing a resistance training program (Pages 227 – 228)
2. Identify and review the steps involved in program design and goal setting (Refer to the AFLCA Exercise Theory Manual)
3. Describe how to cross train within a resistance training program (Pages 228 – 229)

Chapter Topic II: Communication

Chapter Objectives:

1. Identify and review effective communication skills of active listening, questioning, feedback and self-disclosure (refer to the AFLCA Exercise Theory Manual)
2. Demonstrate effective communication skills of active listening, questioning, feedback and self-disclosure with a client during an orientation to a resistance program

Chapter 11: Resistance Training Guidelines

Chapter Topic I: Designing the program

Chapter Objectives:

1. Identify and review the definitions of: progressive overload, specificity, recovery/rest, and ceiling effect (refer to the AFLCA Exercise Theory Manual)
2. Define the terms isolated and compound (multi-joint) exercises and identify exercises that are examples of each (Refer to the Glossary of Terms at the end of this document)
3. State the importance of intensity for optimizing resistance training results (Pages 233 – 237)
 - Describe slow and fast twitch muscle fibre types and their relative percentages
4. Define and apply the workout terms reps, sets and loads for muscular endurance, muscular strength and muscle hypertrophy (Pages 237 – 240, 243) (Refer to AFLCA Exercise Theory Manual)
5. Discuss the variables: muscle activation, correct mechanics, frequency of resistance training workouts, number of exercises (including balance of opposing muscle groups), workout length, exercise order, rest between sets and workouts, increasing the resistance/load (Pages 240 – 244)

Chapter Topic II: Precautions during resistance training exercise

Chapter Objectives:

1. List seven reasons to control speed of movement (Pages 244 – 245)
2. State the importance of breathing during resistance training (Page 245)
3. Describe the importance of lifting technique and safety (Pages 245 – 246)

Chapter 12: High Intensity Strength Training Techniques

Chapter Objective:

1. List five ways to change variables for strength gains (Page 250)

GLOSSARY OF TERMS

Compound exercises – involve the coordinated movement of more than one joint and set of muscles. For example: bench press is a compound exercise involving the shoulder joint (including muscles: pectoralis major, anterior deltoid) and elbow joint (including muscles: triceps)

Energy systems used during resistance training

Resistance training exercises which work the muscles to the point of momentary failure indicates that the activity is quite intense. As well, sets of exercise with 8 – 20 reps, are completed in under 2 minutes. With these two statements considered, most resistance training exercises would be anaerobic in nature, relying on the ATP-CP system and the anaerobic (lactic acid) systems to varying degrees. Resistance training activities that emphasize maximal lifts in the 1 – 5 repetition range (as in power lifting) would rely heavily on the ATP-CP system to supply most of the energy needed.

Free weights and Machines (Also refer to pages 17 – 25 in Effective Strength Training)

Determining the advantages and disadvantages of each of these types of equipment involves examining aspects of capital cost and maintenance, flexibility of use, degree of muscle involved, ease of learning, time efficiency, safety, and space requirements.

	Machines	Free Weights
Capital cost & maintenance	More expensive. Higher maintenance costs	Less expensive. Low maintenance
Flexibility of use	Other than pulleys, most machines offer no choice of movement patterns. Machines do not fit every body size	Variety of movements possible
Degree of muscle involved	Balance and stabilizing not required, therefore can focus further on target muscles.	Require balance and stabilizing muscles to be involved
Ease of learning	Likely takes less time to learn how to use machines	Takes longer than machines to learn
Time efficiency	Better ease of changing weights with multistations	Changing weight plates takes time
Safety	If machines do not fit an individual or weight plates are too heavy	Dropping weights and stabilizing are areas to be aware of
Space Requirements	Requires more space than free weights	Requires little storage space

Hypertrophy- (Also refer to the AFLCA Exercise Theory Manual)

The increase in size of muscles as a result of resistance training. When resistance training is performed at an adequate intensity over a period of time the muscle fibres get thicker; more actin and myosin are laid down. Hypertrophy occurs as a result resistance training

that is quite intense, generally hypertrophy does not occur with light resistance training. It is suggested that adequate intensity causes microscopic tears to the myofibrils. When appropriate rest happens after workouts, the muscles repair and rebuild, which is sometimes referred to as the 'damage and repair' cycle. This cycle may stimulate the development of new actin and myosin filaments within the myofibril.

Isolated exercises – focus on one set of muscles (and usually one joint is moving). For example: biceps curl (elbow flexors: biceps, brachioradialis, brachialis), or leg curl (hamstrings).

Motor unit – is defined as a neuron (nerve cell), its nerve fibre and all the muscle fibres innervated by the neuron.

The nervous system sends its impulses from the neuron, along the nerve fibre, to the muscle fibres to cause them to contract. Within each motor unit the nerve fibre connects with varying numbers of muscle fibres. Certain muscles involved with fine motor control movements (eg. The muscles of the eyes) have motor units that innervate small numbers of muscle fibres. Each motor unit innervates either fast or slow twitch muscle fibres, never a blend. When stimulated by the nerve, all the muscle fibres within that motor unit contract as best they can, as long as the stimulus is strong enough to reach the motor unit's activation threshold. If not, no contraction occurs.

Over the first few weeks that a person begins resistance training, the person starts to see increases in their strength, even though their muscles have not increased in size. These preliminary strength increases are due to more motor units being recruited. Refer to the term hypertrophy above.

Source: AFLCA Strength and Conditioning Manual. Fitness Ontario Leadership Program: Strength Fitness. Ministry of Tourism and Recreation. September 1992