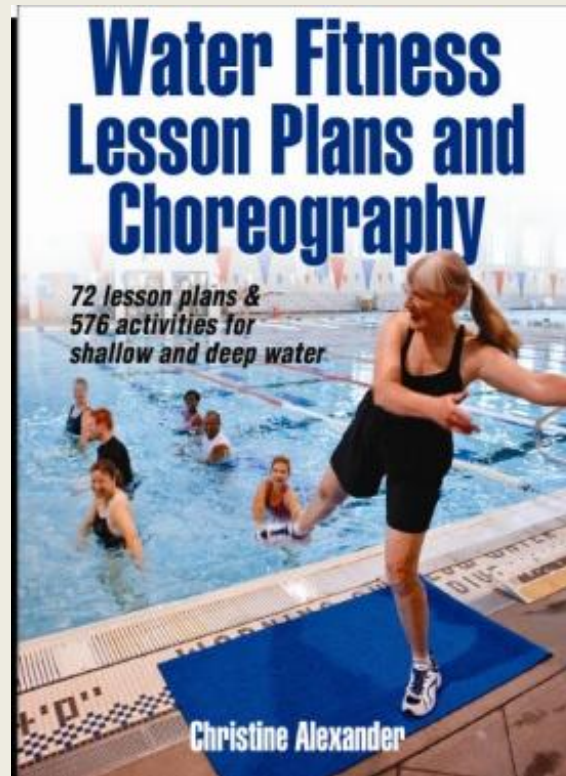


Strength Training in Water

by Christine Alexander

author of



ACSM recommends strength training 2X a week

Strength training in water is an option that requires an understanding of the properties of water

1. Archimedes Principle
2. Buoyancy
3. Viscosity
4. Inertia
5. Acceleration
6. Action/Reaction



Archimedes Principle – a body will float if it displaces water weighing more than its own weight.

Translation: Some things float in water, including this rubber ducky, and many of your clients and their limbs.

Buoyancy – a force acting in the opposite direction to gravity.

Translation: If you push the rubber ducky underwater, it will rise back to the surface of the water.



Viscosity – the friction between molecules of a liquid causing the molecules to tend to adhere to each other and to a submerged body.

Translation: The water has 12-14 times more resistance than air.

Inertia – an object will remain at rest or in motion with constant velocity unless acted upon by a net external force.

Translation: Stopping or changing direction requires more effort than continuing with the same movement.

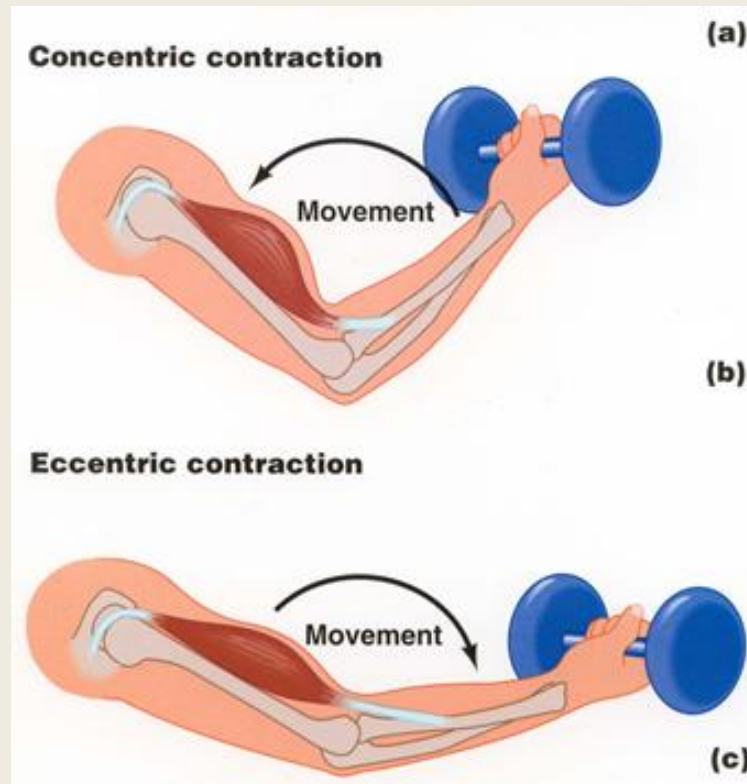


Acceleration – the rate at which a body changes speed is directly related to the force applied.

Translation: Pushing harder against the water increases the intensity.

Action/Reaction – for every action there is an equal and opposite reaction.

Translation: A forceful action in water will noticeably pull the body in the opposite direction.



Concentric contraction – the muscle shortens

Eccentric contraction – the muscle lengthens

All contractions in water are **concentric contractions**, because the resistance of the water is in all directions. If eccentric contractions are desired, equipment must be used.

Submerge the arms when performing upper body exercises.
Bend the knees to lower the body if necessary.

**Elbow flexion –
concentric biceps**



**Elbow extension –
concentric triceps**



**Shoulder flexion –
Concentric anterior deltoid**



**Shoulder extension –
concentric posterior deltoid /
latissimus dorsi**



**Shoulder abduction –
concentric deltoid**



**Shoulder adduction –
concentric latissimus dorsi**



**Transverse shoulder
abduction – concentric
posterior deltoid**



**Transverse shoulder
adduction – concentric
pectoralis / anterior deltoid**



**Knee flexion –
concentric hamstrings**



**Knee extension –
concentric quadriceps**



**Hip flexion –
concentric iliopsoas**



**Hip extension –
concentric gluteus maximus**



**Hip abduction –
concentric gluteus medius**



**Hip adduction –
concentric hip adductors**



Trunk rotation – concentric obliques



Trunk flexion – concentric obliques



Trunk flexion can be performed standing or suspended on a noodle



To increase intensity, take advantage of the properties of water: *Buoyancy*

Squats



Lunges



To increase intensity, take advantage of the properties of water: *Viscosity*

A hand closed in a fist or a hand sliced sideways through the water creates minimal resistance.

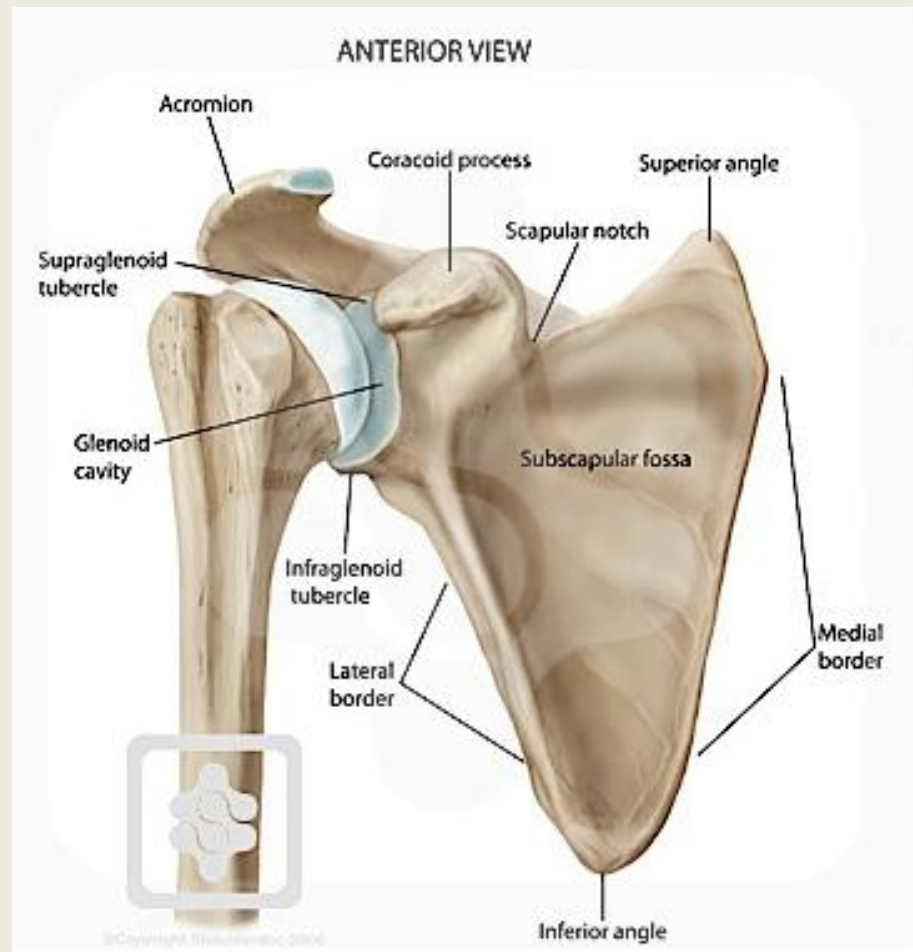
An open, cupped hand with fingers slightly spread is more effective at pulling water.



To increase intensity, take advantage of the properties of water:

- *Inertia* – Combine exercises, such as shoulder adduction & abduction with transverse shoulder adduction & abduction
- *Acceleration* – Push harder against the water
- *Action/Reaction* – Combine an exercise that pulls the body in one direction with travel in the opposite direction, such as transverse shoulder abduction while traveling backward.

The shoulder joint is a shallow ball & socket joint,
built for flexibility.



Things NOT to do:

Avoid wall hanging exercises.



Avoid suspending the body from equipment under the armpits or held in the hands.



Things NOT to do:

Transverse shoulder abduction with the thumbs down causes shoulder impingement.



Things NOT to do:

**Plunging the arms in & out of the water
may cause a shoulder injury.**



Weighted equipment

Wrist weights



Ankle weights



Weighted equipment

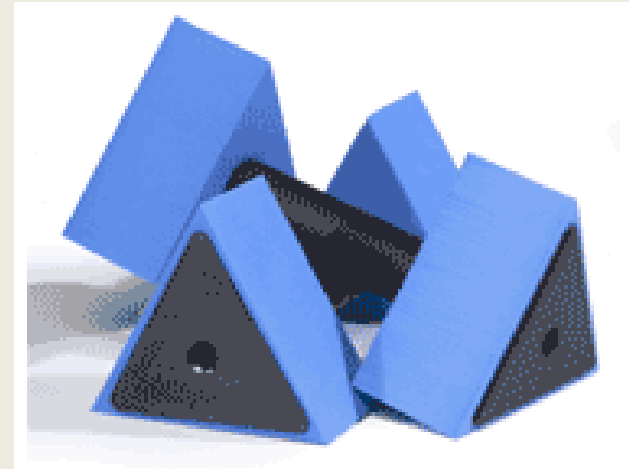
- Elbow flexion – concentric biceps
- Elbow extension – eccentric biceps
- Shoulder flexion – concentric anterior deltoid
- Shoulder extension – eccentric anterior deltoid
- Shoulder abduction – concentric deltoids
- Shoulder adduction – eccentric deltoids
- Transverse shoulder abduction & adduction – primarily isometric deltoids to hold the arm up at shoulder height
- Diagonal scapular retraction – concentric trapezius & rhomboids
- Diagonal scapular protraction – eccentric trapezius & rhomboids

Weighted equipment

- Knee flexion – concentric hamstrings
- Knee extension – eccentric hamstrings
- Hip flexion – concentric iliopsoas
- Hip extension – eccentric iliopsoas
- Hip abduction – concentric gluteus medius
- Hip adduction – eccentric gluteus medius

Buoyant equipment

Dumbbells, noodles, cuffs



Buoyant equipment

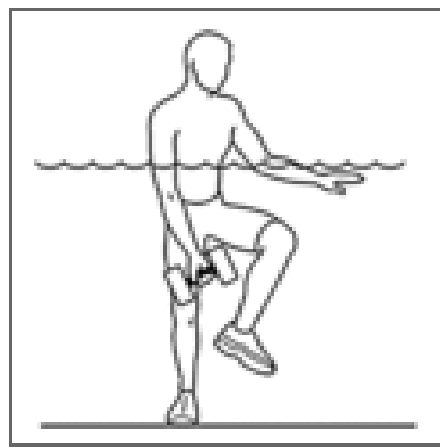
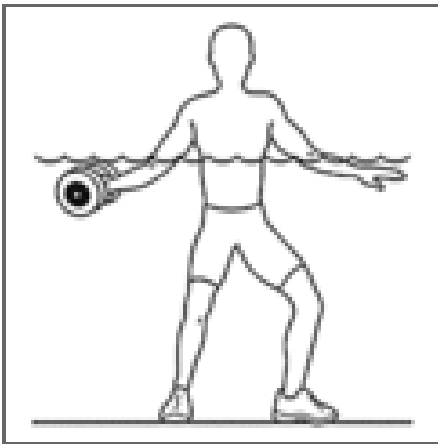
- Elbow extension – concentric triceps
- Elbow flexion – eccentric triceps
- Shoulder extension – concentric posterior deltoid / latissimus
- Shoulder flexion – eccentric posterior deltoid / latissimus
- Shoulder adduction – concentric latissimus
- Shoulder abduction – eccentric latissimus
- Transverse shoulder adduction & abduction – primarily isometric latissimus / lower trapezius to hold the buoyancy underwater
- Diagonal transverse shoulder adduction – concentric pectorals
- Diagonal transverse shoulder abduction – eccentric pectorals

Buoyant equipment

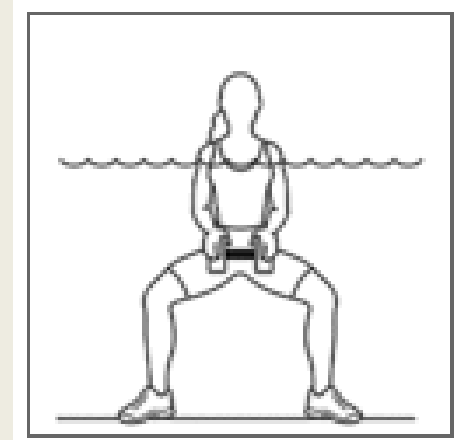
- Knee extension – concentric quadriceps
- Knee flexion – eccentric quadriceps
- Hip extension – concentric gluteus maximus
- Hip flexion – eccentric gluteus maximus
- Hip adduction – concentric adductors
- Hip abduction – eccentric adductors

Exercises to try

**Ankle touch – concentric
latissimus, eccentric latissimus**



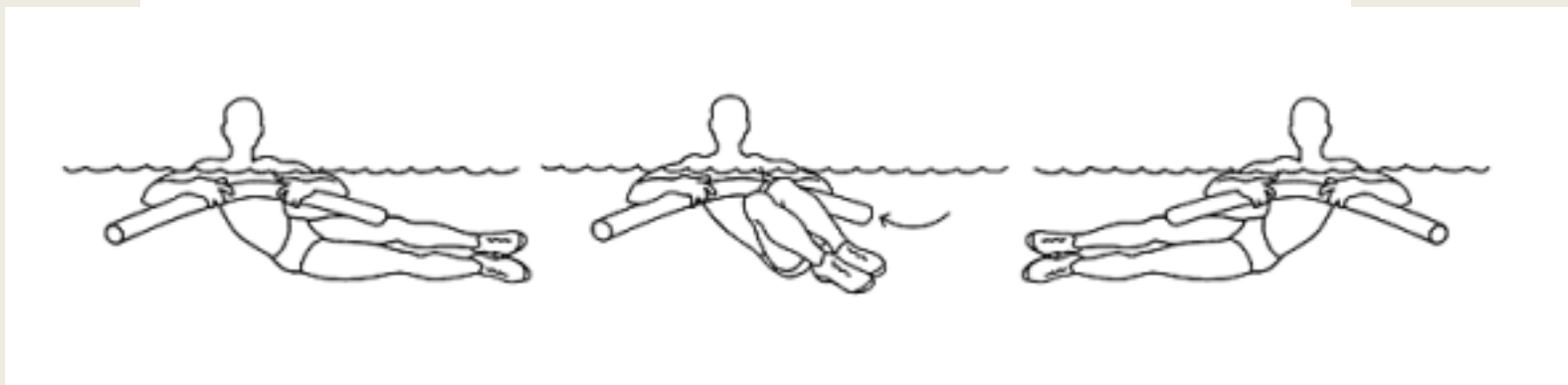
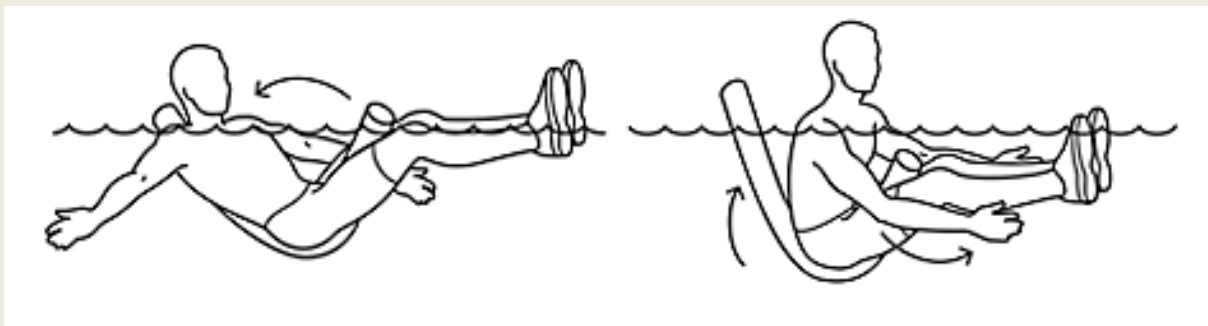
**Dumbbell squat – eccentric
quadriceps, concentric
quadriceps**



Exercises to try

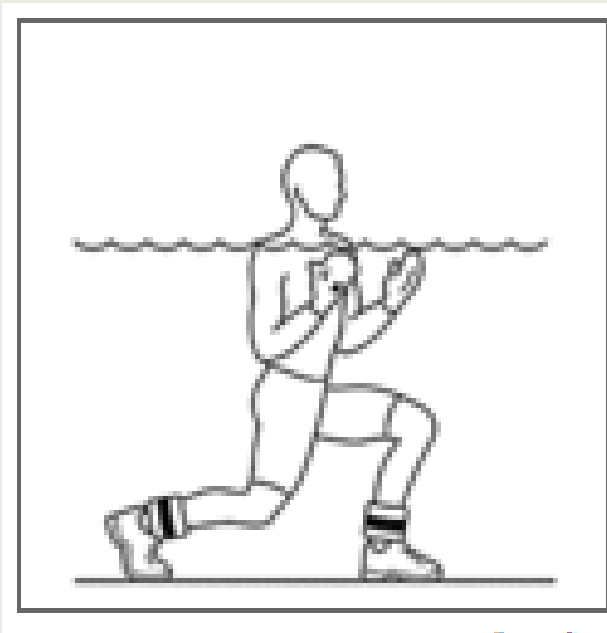
Crunch

Side to side extensions

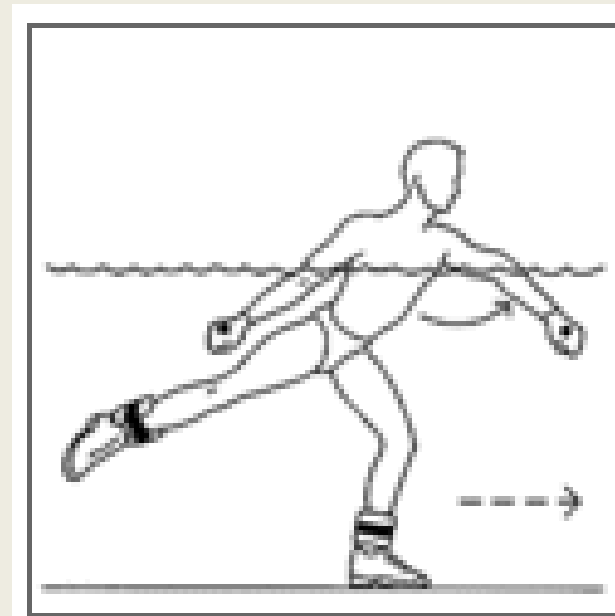


Exercises to try

Cuff lunges - eccentric quadriceps & gluteus maximus, concentric quadriceps & gluteus maximus



Cuff side kick – eccentric adductors, concentric adductors



Drag equipment

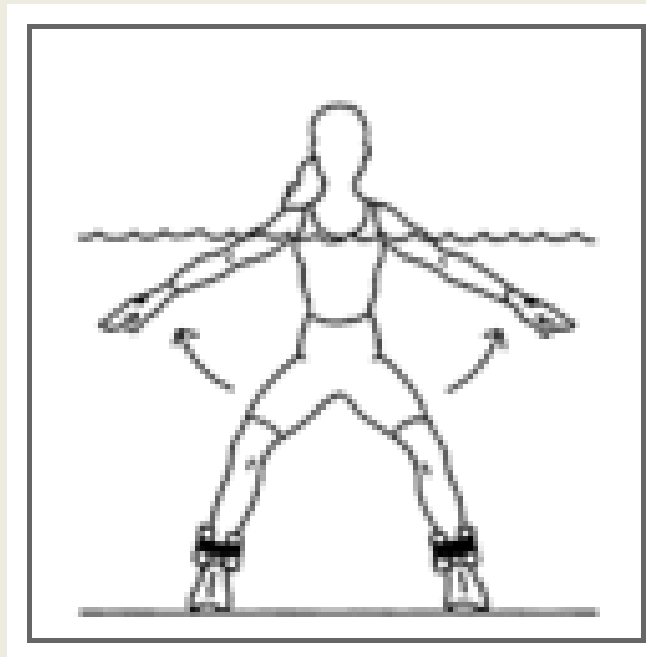
Webbed gloves, paddles, kickboards, bells, resistant arm trainers, leg fins



Drag equipment

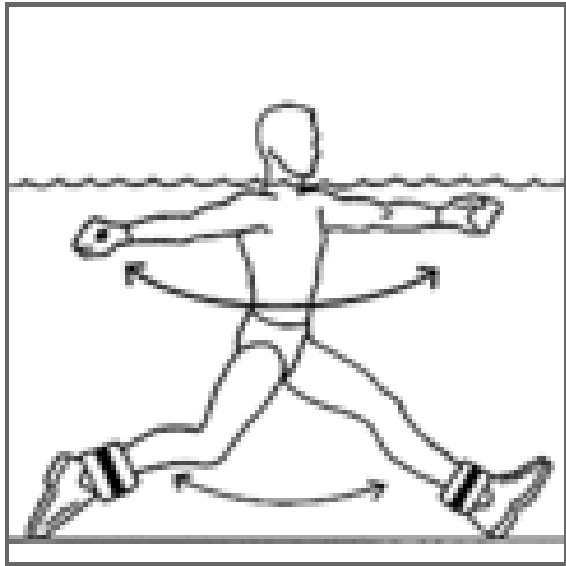
- Drag equipment elicits concentric contractions of the agonist muscles similar to submerged movement.
- Resistance is greater however, because of the increased surface area.
- Continuous movement with drag equipment creates turbulent water activity.
- The antagonist fires in an eccentric contraction to slow the movement and change direction.

When you abduct your shoulders with webbed gloves, your medial deltoids contract concentrically. But then your latissimus fires eccentrically to slow the movement and change directions to a shoulder adduction.

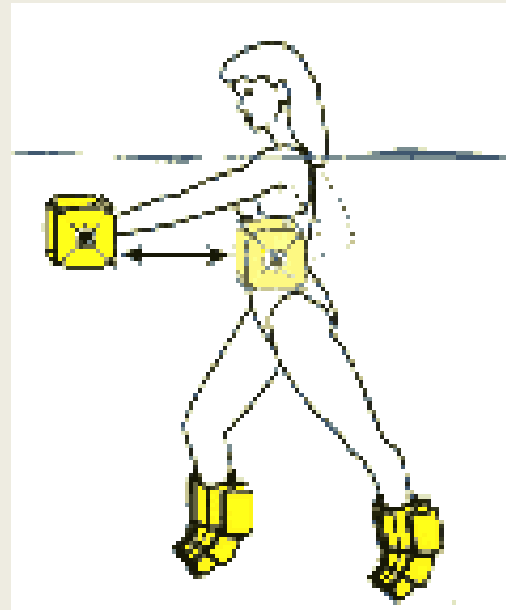


Exercises to try

Cross-country ski with power arms using webbed gloves



Chest press and standing row with resistance bells



Exercises to try

Paddles – free hold position



Paddles – hand brace position

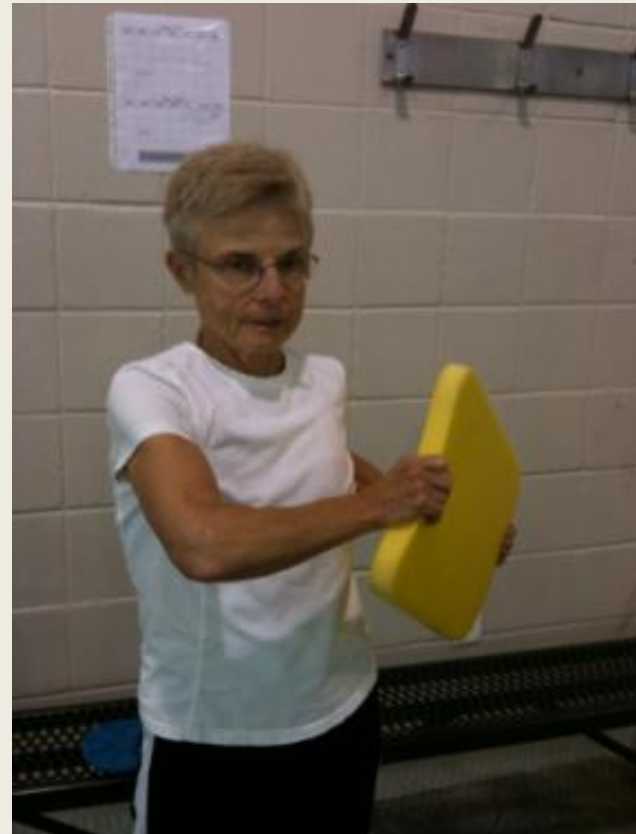


Exercises to try

Kickboard chest press



Kickboard row



Rubberized equipment

Select tubing made specifically for water as pool chemicals will quickly break down the rubber.



Rubberized equipment

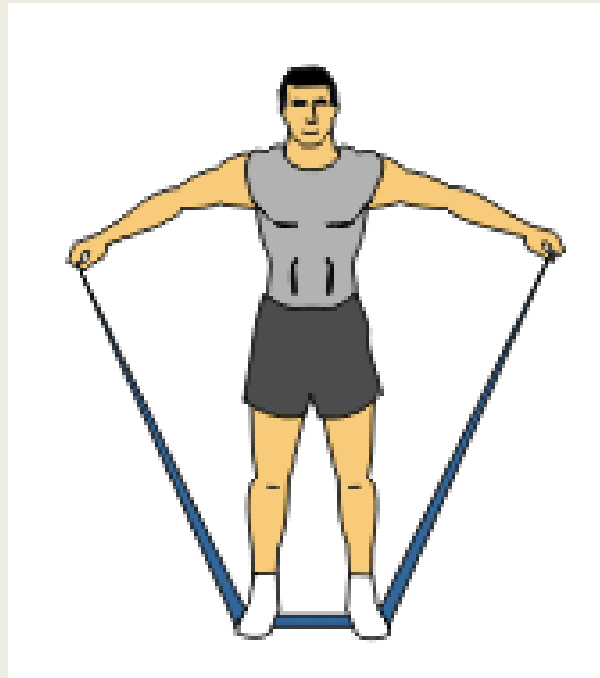
- Muscle action created by rubberized equipment is the same in water as on land.
- Any muscle action away from the anchored point is resisted and concentric.
- Any muscle action toward the anchored point is assisted and eccentric.

Exercises to try

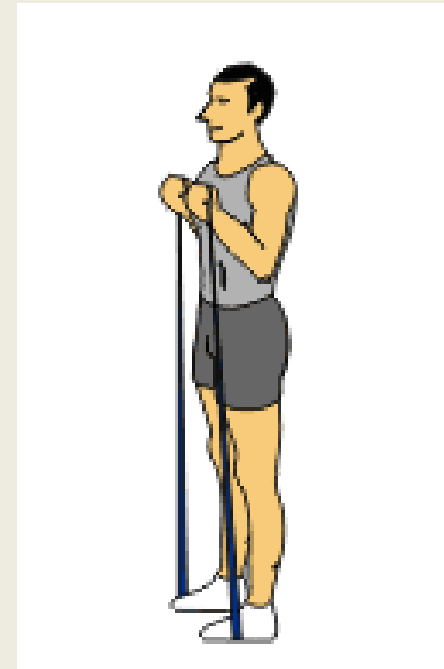
Row



Shoulder abduction



Elbow flexion



Stretch after strength training

Since buoyancy supports the joints, greater range of motion can be achieved in water than on land.



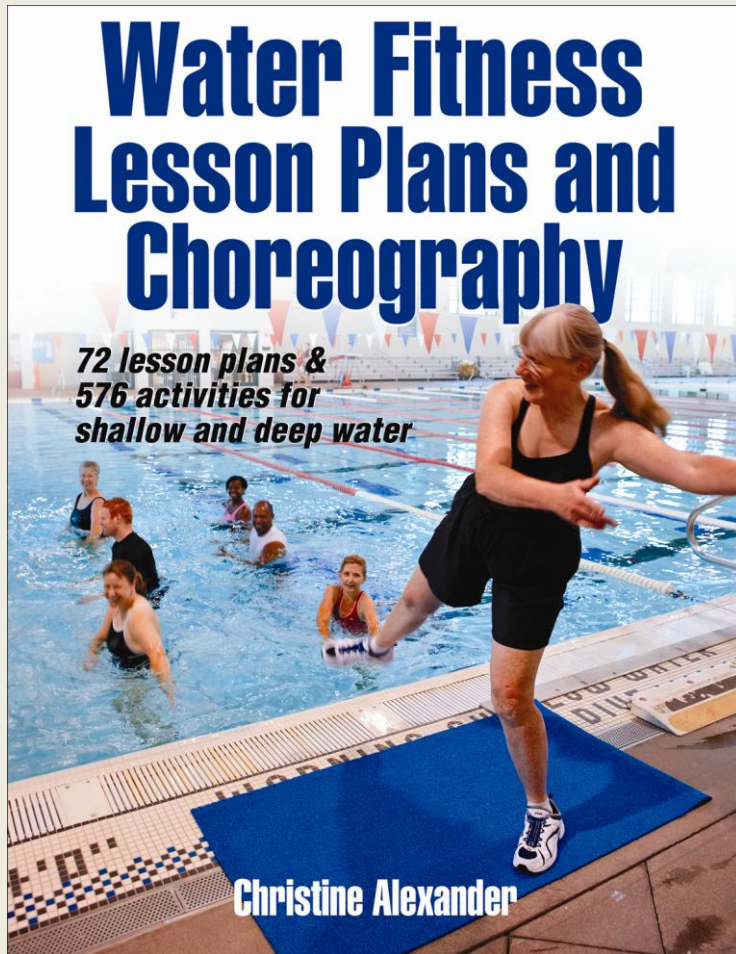
Become familiar with the aquatic environment and use appropriate equipment movements for an effective strength training workout, and your clients will keep coming back for more.



Bibliography

- ACSM (2007) *Physical Activity and Public Health Guidelines*. Retrieved April 28, 2011 from American College of Sports Medicine: www.acsm.org
- Adami, Mimi Rodriguez (2002) *Aqua Fitness*. New York, NY: DK Publishing
- AEA (2010) *Aquatic Fitness Professional Manual*. Champaign, IL: Human Kinetics
- Alexander, Christine (2011) *Water Fitness Lesson Plans and Choreography*. Champaign, IL: Human Kinetics
- Hydro-Fit *Choreography Library*. Retrieved April 28, 2011 from Hydro-Fit Aquatic Fitness & Therapy: www.hydrofit.com
- Ivens, Pauline, “Contraindications in Water Exercise.” MAAP Continuing Education Training, Dallas, TX, October 2, 2004

Save 30% on this book!



- Order from www.HumanKinetics.com
- Enter promo code **E6532** at checkout

Offer valid through June 30, 2011



This webinar was supported by PFP Media — Helping you prosper as a fitness professional.

Visit www.fit-pro.com to check out resources and sign up for our bimonthly E-newsletter, magazine or digital magazine for free! Enter promo code **HK2011**.



Functional Assessment and Exercise Prescription for the Athlete's Core

June 27, 2011

12:00pm – 1:00pm ET

(11:00am – 12:00pm CT)

Presenter: Jason Brumitt

www.HumanKinetics.com/upcoming-webinars