ATHLETICS OMNIBUS - STRENGTH TRAINING USING BODY WEIGHT

From the Athletics Omnibus of Richard Stander, South Africa

For the novice athlete to continuously improve to the next level of excellence, the basic ingredients of the training programme should be technique, endurance and speed training.

However, even the best technique, endurance or speed training methods in the world have a limited capacity to improve the performance of the athlete.

For an athlete to continuously improving to more advanced levels of excellence, irrespective the event, the basic ingredient of the training programme should be strength training.

1. THE VALUE OF TRAINING

1.1. Muscle enzymes (protein catalysts) increase
1.2. The number of units (mitochondria) in which energy conversion takes place increases
1.3. Storage of fuel for the production of energy increases
1.4. The capillary network increases
1.5. Muscular volume increases (hypertrophy)

The combination of effects increases strength, stability, endurance, and a capacity for rapid contractions in the muscles.

2. THE VALUE OF STRENGTH TRAINING

2.1. More strength improves the capacity to develop basic speed.
2.2. Ensure an effective application of technique.
2.3. The quality of a performance can be maintained over a longer period of time.
2.4. Early season strength training enables the athlete to do more intensive training later in the year.
2.5. There is less fluctuation in the athlete's performance level.
2.6. The performance of the athlete can be predicted with more accuracy.

3. TERMINOLOGY USED DURING STRENGTH TRAINING SESSIONS

3.1. MAXIMUM WEIGHT

Before a strength programme can be designed the athlete will have to know how many repetitions can be done in a given time. The maximum repetitions are measured at the end of each training cycle of 4 to 6 weeks of strength training.

3.2. EXERCISE

Exercise is the physical activity required to develop a specific muscle for a specific event. The type of event that an athlete prepares for (e.g. Shot Put) will determine what type of exercises will be done (e.g. maximum Strength).

3.3. RESISTANCE (INTENSITY)

The maximum weight an athlete can lift in a specific weight exercise will serve as a norm to determine the resistance that must be used. E.g. 90% of maximum repetitions of 10 will be 9 repetitions. 90% will be the resistance or intensity of the exercise.

3.4. REPETITIONS

Repetitions are the number of times an exercise is performed without a rest period. The number of repetitions an exercise is performed without a rest period will determine the type of strength that will be developed. E.g. strength endurance requires many repetitions at low intensity.

EXAMPLE:

3.4.1. 100% resistance = 10 repetition
3.4.2. 95% resistance = 9 repetitions
3.4.3. 90% resistance = 8 repetitions

3.4.4. 80% resistance = 7 repetitions
3.4.5. 70% resistance = 6 repetitions

3.5. SET

A specified number of repetitions comprises of one set. Three sets of 8 repetitions would be written: Hill running: 3 x 8 repetitions.

3.6. CIRCUIT

Three or more different types of exercises within one training session will define a circuit.

3.7. TRAINING SESSION

A training session will consist of all the exercises done in one continuous period of time on the same day.

4. THERE ARE 3 TYPES OF STRENGTH TRAINING

The three types of strength training will be used in different stages of the athlete's training programme.

4.1. Maximum strength consists of weight training with high resistance and low repetitions.
4.2. Elastic strength consists of weight training with medium resistance and medium repetitions. The repetitions are executed with fast movement of the limbs.
4.3. Strength endurance consists of weight training with light resistance and high repetitions.

5. STRENGTH CONDITIONING

The following laws must be taken in consideration when preparing a strength conditioning programme:

5.1. LAW OF OVERLOAD

When an athlete trains on a lighter level of intensity, the initial response of the body will be fatigue. When the training (loading) stops, there will be a process of recovery from fatigue and adaptation to the training load during the rest period. The body will overcompensate to prepare for the next training session.

Every new level of training load, followed by a correctly applied rest phase will lead to a higher level of fitness. The athlete in training needs more rest than non-athletes. The body repairs its own tissues, but it requires it's "off" time every day. The average athlete requires 8 - 10 hours of sleep each day to recuperate sufficiently for the next training session.

5.2. LAW OF REVERSIBILITY

The training ratio/quality (training with a higher load followed by a recovery phase) has a direct influence on the increase or decrease of the performance level of the athlete. The level of loading can be increased by means of:

5.2.1. the number of repetitions, (6 to 10 reps)
5.2.2. faster repetitions, (time of execution more or less)
5.2.3. shorter recovery (rest between reps or sets)

Once the body has adapted to a particular training load, adaptation ceases. If the rest periods are too long between repetitions, the athlete's fitness level will increase very slowly.

However if the training load is repeatedly too much or too closely spaced, the athlete will not recover sufficiently to cope with the next training load, causing overtraining and a subsequent decrease in performance. When decrease of performance takes place, the training load must be reduced.

An active rest phase is suggested. With young athletes this means a high intensity training session every 4th day rather than every second day. If the athlete does not respond to the increased active rest, the training load must be reduced, e.g. reduced number of repetitions, lighter weights, etc.

5.3. LAW OF SPECIFICITY

The training loads must be specific to the event the athlete is preparing for, to ensure an increase in the performance level. However, specific training will be of very little value, without a proper general training preparation period.

The greater the volume of general training, the greater the capacity will be for the athlete to cope with specific training.

This means a smaller risk factor of overtraining and the need for a longer rest period to recover from overtraining.

5.4. THE LAW OF REST

Rest is the most important cornerstone of three very basic rules:

5.4.1. Moderation must always be kept in mind during training to avoid serious injuries. The human body can take far more stress than we generally give it. However, it needs to adapt to heavier stresses gradually, by making use of sufficient rest periods.
5.4.2. Consistent training on a reasonable level should be done every day. If a few days of training are missed, the body loses its form. A day or two of extra-hard training does not make up for the loss, and will lead to injury and illness due to a lack of rest.
5.4.3. To rest is very important. More training load creates extra physical stress, which calls for more recovery time. The body makes its adaptation to stress when the body is at rest, rather than during stress. This is a part of the principle of overloading. Peak performance can only be achieved after a moderate, constant increase in training load, followed by sufficient rest.

5.5. PREPARING THE PROGRAMME THE 4 LAWS OF CONDITIONING

5.5.1. Use an over distance approach.
5.5.2. First use a quantity approach, then as the athlete become stronger, focus on quality strength training. Build a foundation of strength endurance and then develop maximum strength. This will prevent injury.
5.5.3. For the first month of training you will do no maximum strength exercises.
5.5.4. As you near a competition date, you will do less quantity strength training and more maximum strength training.
5.5.5. Workouts will generally be a hard day followed by an easy day, with a lightening up of work two days before competition.
5.5.6. Your schedule is flexible. You may change the daily routine because of weather, body condition, or emotional outlook.
5.5.7. You should completely recover from one workout to the next. If you are not completely recovered, do less work, or rest.
5.5.8. You should never train when you are ill or have an injury.
5.5.9. If your training schedule is limited, you may telescope this schedule into two-week periods instead of monthly periods.
5.5.10. Your workouts must be fun or rewarding, preferably both.

5.6. TABLE TO DEVELOP MAXIMUM STRENGTH AND STRENGTH ENDURANCE DURING 2-4 SETS OF EXERCISES IN ONE TRAINING SESSION

Type of strength exercise	Resistance (Weights exercises only)	Number of repetitions in an exercise	Duration of 1 exercise in sec.	Recovery between sets in sec.	Recovery between circuits in min.
Maximum	100%	10	5	30	3
Maximum	95%	9	5	30	3
Maximum	90%	8	5	30	3
Maximum	85%	7	5	30	3
Endurance	80%	6	5	30	3
Endurance	75%	5	5	30	3
Endurance	70%	4	5	30	3

5.7. TABLE TO DEVELOP ELASTIC STRENGTH

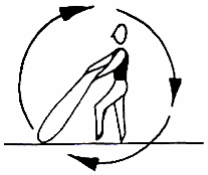
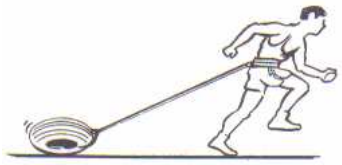
Type of strength exercise	Resistance (Weights exercises only)	Number of repetitions in an exercise	Duration of 1 exercise in sec.	Recovery between sets in sec.	Recovery between circuits in min.
Elastic	90%	8	5	30	3
Elastic	85%	7	5	30	3
Elastic	80%	6	5	30	3

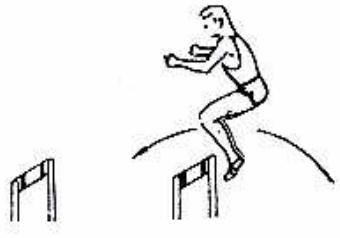
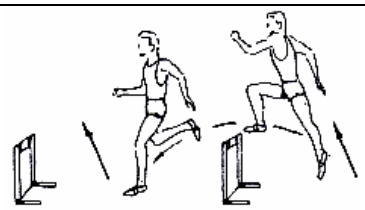
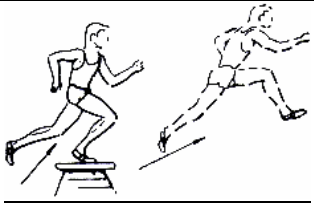
5.8. EXAMPLES OF STRENGTH TRAINING PROGRAMMES

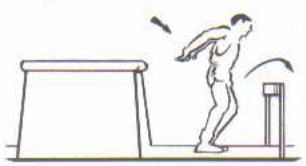
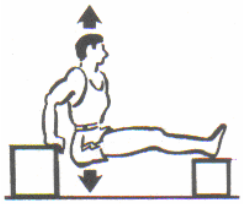
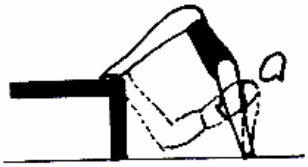
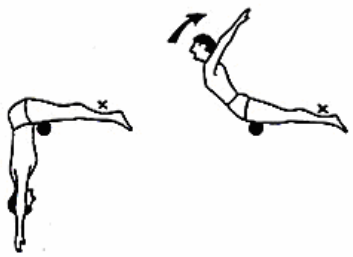
PREPARATION PHASE	**TWO WEEK CYCLE**													
CONDITIONING	M	T	W	T	F	S	S	M	T	W	T	F	S	S
Hill running	X		X					X		X				
Alternating 1 leg hops		X		X					X		X			
2 leg hurdle jumps		X		X					X		X			
2 leg depth jump														
1 leg hip raises	X		X					X		X				
Push ups		X		X					X		X			
Torso raises		X		X					X		X			
Hurdle sideways leg swings														
Dumbbell running		X		X					X		X			
Extended leg raises														
Pull-ups	X		X					X		X				
Rope climb														
Depth sitting	X		X					X		X				

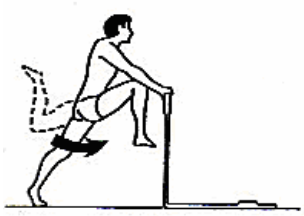
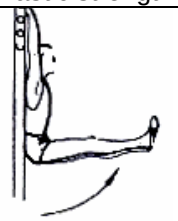
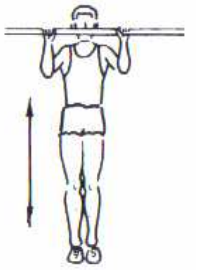
6. STRENGTH EXERCISES

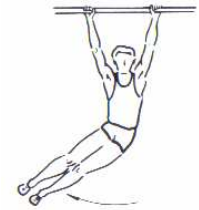
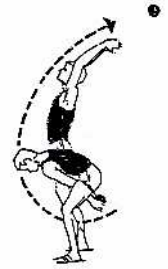
The following strength exercises can be done by athletes who do not have access to a weight training facility:

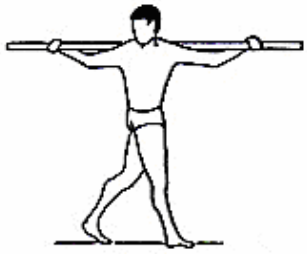
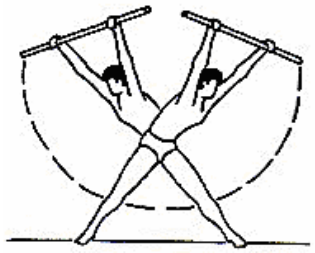
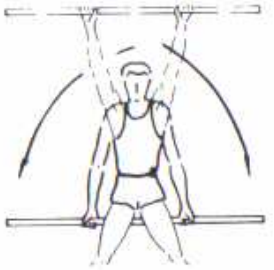
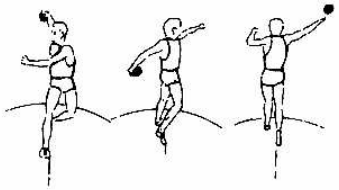
DESCRIPTION OF WEIGHT TRAINING USING BODY WEIGHT	**DESCRIPTION OF WEIGHT TRAINING USING BODY WEIGHT**	**TYPE OF EVENT**														
		Sprints	Distance races	Steeple chase	Hurdles	Cross Country	Road Running	Race Walking	Long Jump	Triple Jump	High Jump	Pole Vault	Shot Put	Discus Throw	Hammer Throw	Javelin Throw
SKIPPING: To encourage fast backward movement of the arms, do backward skipping. **Example:** 50 reps in 1 min. x 3 sets.	 Strength endurance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
HILL RUNNING: Running up a steep hill and walk back to recover. **Example:** 5 reps x 50m, walk back, x 3 sets.	 Strength endurance	X	X	X	X	X	X	X								
TYRE PULL: Pull a motor car tyre. The weight of the motor car tyre should not exceed 25% of the athlete's body weight. **Example:** 5 reps x 50m, walk back, x 3 sets.	 Strength endurance	X	X	X	X	X	X	X								

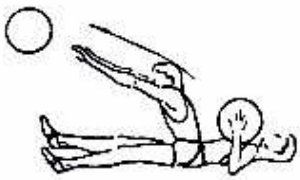
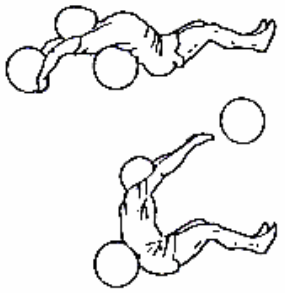
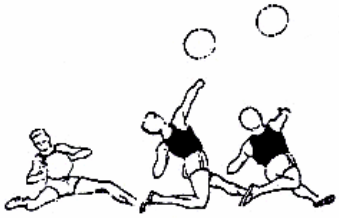
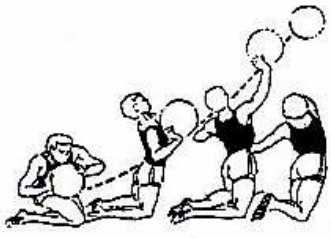
ALTERNATING 1 LEG HOPS: Jump 3 times on the take-off leg, land on the opposite leg, take one step and jump 3 times with the opposite leg. **Example:** 5 reps, walk back, x 3 sets.	 Elastic strength	X	X	X	X	X	X	X	X	X	X	X					
2 LEG HURDLE JUMPS: Place 5 low hurdles 1 m apart and bounce with both legs together over the hurdles while keeping the upper body and head upright. The head must remain still during bouncing to avoid loss of balance. **Example:** 5 reps, walk back, x 3 sets.	 Elastic strength	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1 LEG HURDLE JUMP: Place 5 low hurdles 2 m apart. Hop over 5 low hurdles changing legs for the take-off between the hurdles. **Example:** 5 reps, walk back, x 3 sets.	 Elastic strength	X	X	X	X				X	X	X	X					
BENCH STEP-UPS: Do alternate step-ups onto a small bench not more than 30 cm high. Ensure maximum extension of the ankle and leg before stepping down. **Example:** 10 reps, rest 1 min. x 3 sets.	 Elastic strength	X	X	X	X				X	X	X	X	X	X	X	X	X
BENCH PICK-UPS: Step onto a box not higher than 30 cm and push upwards vigorously with a good pick-up of the knee of the free leg. **Example:** 10 reps, rest 1 min. x 3 sets.	 Elastic strength	X	X	X	X				X	X	X	X	X	X	X	X	X
2 LEG BENCH HOP: Jump with both feet together on a box and stand upright on the box. Jump backwards off the box onto the ground. **Example:** 5 reps, rest 1 min. x 3 sets.	 Elastic strength	X	X	X	X				X	X	X	X	X	X	X	X	X
BENCH DRIVES: Take a 3-5 stride approach take-off, step onto a box not higher than 300 mm and push upwards vigorously with a good pick-up of the knee of the free leg. **Example:** 5 reps, rest 1 min. x 3 sets.	 Elastic strength								X	X	X	X					

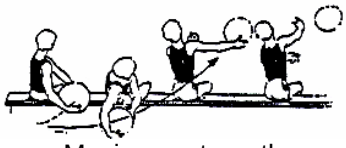
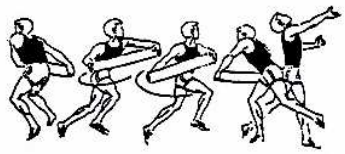
2 LEG DEPTH JUMP: Jump from a box not higher than 50 cm with both legs onto the floor with slightly bend knees and immediately over the hurdle. **Example:** 3 reps, rest 1 min. x 3 sets.	 Elastic strength	X	X	X	X				X	X	X	X	X	X	X	X		
2 LEG HIP RAISES: Lie on the back and take a high arched position, supported only by the head, shoulders and feet. Push the hips up as high as possible. **Example:** 10 reps, rest 1 min. x 3 sets.	 Strength endurance								X	X	X	X						
1 LEG HIP RAISES: Place the hands and feet on the ground with the body facing upwards. Lift the knee of the free leg and push the hips upward with support from the take-off leg. The foot on the ground must be well ahead of the knee. **Example:** 10 reps, rest 1 min. x 3 sets.	 Elastic strength	X	X	X	X				X	X	X	X						
DEPTH SITTING: Rest the feet on a block and the hand behind the back on another block while the buttocks hang in mid-air. Lower the buttocks down and up.		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PUSH-UPS: Lie on the ground with the hands below the shoulders. Push the body up with the hands while keeping the body straight. **Example:** 10 reps, rest 1 min. x 3 sets.	 Strength endurance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ELEVATED PUSH-UPS: Place the feet on a bench and the hands on the floor directly below the shoulders while keeping the body straight. Lift the buttocks high and drop them down as far as you can. **Example:** 10 reps, rest 1 min. x 3 sets.	 Strength endurance								X	X	X	X	X	X	X	X		
TORSO RAISES: Hang over a cross bar with the torso hanging down and the feet held still. Lift the torso up and down. **Example:** 5 reps, rest 1 min. x 3 sets.	 Elastic Strength	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

HURDLE DRIVE THROUGH: Place the hands on an object chest high and place the feet approximately 1 m away from the object. Swing the one leg up towards the torso with the leg in a bent position. Swing the leg back and upwards behind the back. Alternate the exercise with both legs. **Example:** 10 reps, rest 1 min. x 3 sets.	 Elastic Strength	X	X	X	X	X	X	X	X	X	X	X					
HURDLE SIDEWAYS LEG SWINGS: Place the hands on an object chest high and place the feet arm length away from the object. Swing the one leg from side to side with the leg in a straight position. Swing the leg back and upwards behind the back. Alternate the exercise with both legs. **Example:** 10 reps, rest 1 min. x 3 sets.	 Elastic strength	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
HIP DROPS: Place the feet one stride length apart, feet pointing forward. Push the hip forward and towards the ground until the leading leg is bent in a 90º angle. Alternate the exercise on both legs. **Example:** 10 reps, rest 1 min. x 3 sets.	 Strength endurance	X	X	X	X	X	X	X	X	X	X	X					
DUMBBELL RUNNING: Stand up straight. Hold a heavy object in both hands. Simulate running with the arms with the feet standing still. **Example:** 10 reps, rest 1 min. x 3 sets.	 Elastic strength	X	X	X	X	X	X	X	X	X	X	X					
EXTENDED LEG RAISES: Hang from a wall bar and raise both legs keeping them straight and keeping the back against the wall. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
PULL-UPS; Pull up the body as high as possible without moving the legs and with complete extension of the arms on lowering the body. Vary the hand grasp from under to over grasp. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

SIDEWAYS 2 LEG SWINGS; Hang on a bar and swing the feet sideways to strengthen the flexors. **Example:** 5 reps, rest 1 min. x 3 sets.	 Strength Endurance							X	X	X	X	X	X	X	X	X
SIDEWAYS 1 LEG SWINGS: Hang from a wall bar. Lift the knee of the free leg and pull it across to the opposite side. It is more effective when wearing weighted shoes. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum Strength							X	X	X	X	X	X	X	X	X
ROPE CLIMB: Climb a rope which is hanging from a tree or roof. Do not use the feet. **Example:** 1 rep, rest 1 min. x 3 sets.	 Maximum strength	X	X	X	X				X	X	X	X	X	X	X	X
BACKWARD STONE THROW: Hold a shot or big stone between both hands, bend down with the shot between the legs, bring the body upright and throw the Shot back, as far as possible. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength												X	X	X	X
STAR JUMP BACKWARD THROW: Hold a medicine ball in the hands, drop to a deep crouch position and then jump upwards arching the body. **Example:** 5 reps, rest 1 min. x 3 sets.	 Elastic strength								X	X	X	X	X	X	X	X
SQUAT JUMPS: Sit on the heels while holding a heavy object on the shoulders behind the head. Jump up in the air and go down sitting on the heels. **Example:** 5 reps, rest 1 min. x 3 sets.	 Elastic strength	X	X	X	X				X	X	X	X	X	X	X	X
JUMP AND ALTERNATE: Place the feet stride length apart while holding a weight such as a bag of sand on the shoulders behind the head. Jump into the air while striding in mid air. Land with alternating feet in front. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength												X	X	X	X

SIDEWAYS BAR SWING: Stand upright. Place a steel rod on the shoulders and hold the bar in position with the hands wide apart. Turn the body to the one side as far as possible, and swing to the opposite side. **Example:** 10 reps, rest 1 min. x 3 sets.	 Elastic strength												X	X	X	X
GOOD MORNING BAR SWING: Hold a steel rod in both hands above the head. Dip the upper body to the one side and swing the bar from one side to the other until the body is in an upright position and swing back. **Example:** 10 reps, rest 1 min. x 3 sets.	 Elastic strength												X	X	X	X
360º BAR SWING: Standing with the feet apart hold a steel bar in front of the body with the hands shoulder width. Swing the bar over the head until it touches the buttocks without changing the position of the hands. **Example:** 10 reps, rest 1 min. x 3 sets. the hands	 Strength Endurance								X	X	X	X	X	X	X	X
1 ARM STONE THROW; Standing with the feet well apart and with the body weight well supported on the rear leg. Hold a heavy ball in the hand with the palm facing upwards behind the shoulder. Throw the ball with the hand crossing over the shoulder higher than head height. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength															X
EXTENDED ARM STONE THROW: Stand with the feet apart and hold a shot or stone in the right hand. The weight of the shot will depend on the strength of the athlete. Throw the stone with a stretch arm, shoulder high, as far as possible. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength												X	X	X	

SIT DOWN 2 ARM BALL THROW: Lie on the back, with the feet astride and with a medicine ball or rock held on the chest. Lift the chest and push the ball in the upright position. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength	X	X	X	X				X	X	X	X	X	X	X	X
BACK ARC BALL THROW: Lie on the back with a medicine ball under the lower back. Arc well back, holding a medicine ball or rock between both hands, and throw the ball forward as far as possible. Straighten the back first and follow through with the arms. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength											X	X	X	X	X
SIT DOWN 1 ARM BALL THROW: Sit in a hurdle stride position with a medicine ball or rock held with both hands. Bring the hips in a square position to the delivery line, open the shoulders and push the medicine ball away at an angle of approximately 40º. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength												X	X	X	X
SIT DOWN BALL SWING: Sit down, hold a medicine ball or rock between the hands behind the back, and throw the ball forward as far as possible. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength												X	X	X	X
KNEES I ARM BALL THROW: Sit on the knees, holding a medicine ball or rock between the hands, next to the body but with the hips square to delivery. Sit upright, open the shoulders and push the medicine ball away, blocking with the free arm. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength												X	X	X	X

SIT DOWN BACKWARD 1 ARM THROW: Sit on a bench, lean back. Move the medicine ball or rock to the back with both hands and throw the ball forward as far as possible with one hand. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength											X	X	X	X
SIDEWAYS LOG THROW: Hold a log approximately 1 m long, turn once around to get momentum and throw the log as far as possible. **Example:** 5 reps, rest 1 min. x 3 sets.	 Maximum strength											X	X	X	X

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