OCR
RECOGNISING ACHIEVEMENT

**CIRCUIT TRAINING EXEMPLAR LOG BOOK**

The log book is excellently presented and contains most of the information identified as being required.

It may be beneficial if the log were to have a contents page which identified where each section of information is in the log.

There is no requirement for the candidate to include theoretical justification to support their information.

Candidates should ensure that they clearly indicate that each of their circuits complies with the rubric.

Information should be given on how the circuits were constructed. i.e. the reasons for the exercises being in a particular order, how the number of repetitions was decided, the time intervals decided either exercise or rest, how weights to be lifted were decided.

Candidates are also required to include evaluative comments in their record of implementation. This should indicate their feelings on the session, their reasons for progressing the circuit etc.

An actual risk assessment for the facility/circuits they are using should be included as should an authentication statement from a qualified instructor.

# Goals of the Exercise Programme:

This circuit-training programme has been designed for a 13-week time scale. In each week there will be 2 to 3 training sessions. The programme consists of two separate exercise circuits. The first is a body weight circuit and the second is a free weight and resistance machine circuit. Both circuits are aimed at toning all muscle groups and improving muscular endurance of core and Lower body muscle groups. This programme is part of my training for long distance running (i.e. half marathons) and a continuation of my netball training.

**Short Tem:**
These are goals that should be possible in each session. They are important to achieve because I am using this programme not only to improve health-related fitness but also as a form of enjoyment and as a relief from work.

- To begin to feel more positive about yourself (Endorphins are naturally occurring chemicals that are released when you exercise. These can help to make you feel good about yourself).
- Helping to relieve Stress.

**Long Term:**
These are goals, which will be focused on for the whole of the 13-week programme.

- To improve **muscular endurance** of lower body muscle groups. Muscular endurance is the ability of a muscle or group of muscles to sustain repeated contractions. This will be achieved by using lower weights for more repetitions (i.e. Hip Adduction for 2 sets of 18 repetitions). This will focus on the lower body muscle groups, as these are the muscle groups that have the most strain put on them in long distance running and Netball.

- Improving body shape and muscle tone. This will focus on mainly the core muscle groups (such as Rectus Abdominus, Internal/External Obliques and Erector Spinae Group), as this is my target area to increase muscle tone.

- To improve muscular strength of upper body muscle groups. Muscular strength is the ability of your body's muscle to generate force in a short period of time. My upper body strength is a lot weaker than the rest of my body and therefore I would like to focus and improve this area. I can tell this from playing Netball. The strength of my passes can often affect my play and it is one of my weaknesses. Therefore by increasing muscular strength in my upper body I should improve this. Increased muscular strength will help to improve power (which is a combination of speed and strength). Good muscular strength is also important in order to have a good posture, to help prevent injuries and during your

daily lifestyle (i.e. carrying heavy bags). This goal will be achieved by completing exercises with increased weights and lower repetitions (i.e. Chest Press, 10kg for 2 sets of 13 repetitions).

- To improve **personal qualities** such as determination and commitment while also improving self-esteem and self-image.

# SMARTER – Goal Setting

I have used 'Smarter' target-setting throughout my programme. I have listed below how each part of 'Smarter' has been incorporated into the programme.

**S – Specific**
This Programme is specific to my personal goals. I play Netball and would also like to increase the level and distance that I run. Another personal goal is to improve muscular tone of my core muscle groups. Therefore the exercises included in both circuits are specific to these goals. The intensity of which I will perform is also specific to achieving these goals (see Principles of Training).

**M – Measurable**
I will complete measurable tests throughout the programme (see Recordable).

**A – Agreed**
I am happy with the circuits, the time-length of each session and of the overall programme and the areas that I will focus on. If I was not happy then I may not put my all into some aspects of the programme and therefore could become disheartened when I do not begin to see the improvement that I may expect.

**R – Realistic**
I have not produced specific figures (results of tests), which I would like to reach by the end of this programme because I do not think my progress can be estimated before I have started. Instead I have produced a programme which (as long as there are no problems i.e. injury) will begin to achieve my goals. All four of the long-term goals can always be improved and I do not expect to of reached my plateau in any of these goals by the end of the programme.

**T – Time Related**
The Programme is initially 13-weeks long. At the end of the programme there will be a series of Tests, which will allow me to see the progress that I hopefully have made. In the long term, this programme can be changed and continued and will lead up to the start of the summer netball season, and then in half marathons throughout the year.

**E – Enjoyable**
The programme will include two circuits, each with a choice of exercises. Therefore there will be variation, which reduces tedium allowing me to enjoy performing my circuits. Any exercises that I find uncomfortable and painful, which could then reduce my enjoyment in participation, will be removed.

**R – Recordable**
At the beginning of the Programme I will complete a selection of tests. This will then be completed again during the programme and at the end of the 13 weeks. Therefore my progress can be recorded and tracked.

# Principles of Training

I have followed the principles of Training throughout this circuit-training programme.

**Specificity**
The type of training that I do should be specific to my sport and myself. Therefore the exercises that I include in the programme should be specific to the goals that I want to achieve. One of the goals in my programme is to improve muscular strength in my upper body. Therefore when I perform the upper body exercises I use a heavier weight, and complete fewer repetitions. However when training my lower body and core, I use less weights and complete more repetitions as this is to improve muscular endurance and muscular tone. The weights that I use are also specific and personal to my own capability. For the strength exercises I use weights at about 80% of my maximum and for the endurance exercises I use weights at about 60% of my maximum.

**Progress**
As the body adapts to training it progresses to an improved level of fitness. This happens because of hypertrophy of the muscles and increased capillarisation which then increases the level that you can perform at. Therefore throughout the 13-week programme I will need to integrate a gradual increase in intensity. This will create an overload, which will allow me to progress. The progressions cannot be planned in advance, as I do not know when and in which particular areas I will reach plateaus that I need to progress from. In order for progression to always be possible there are a number of changes that I can make to my programme.

- The number of sets can be increased; therefore the duration of the performance is increased.
- The weight can be increased; therefore the intensity is increased. In free weights the weight can be increased, when using the resistant weights the resistance can be increased. When completing the body weight circuit different positions can be used in order to increase body weight. An example is the Dorsal Raise. To begin with the arms can be help with fingers touching your temples and chest open. Then a progression on this can be to hold your arms straight out in front of you. This increases the body weight that you have to lift.
- Each exercise has its own progressions, which can be moved onto when the first 'version' is no longer as effective. An example is the Straight Leg Raise:

  For all of these progressions you always lay flat on the ground, making sure your back does not arch and your arms are resting on the side.

  1. One leg is straight (a few inches off the floor) and the other is bent at a 90° angle. Slowly you swap the position of the legs so the leg that originally is straight is then bent.
  2. Begin with both legs at a 90° angle and then straighten both legs out (horizontally) together.

The legs should not touch the floor. Bring legs back in to 90° angle.

3. Begin with both legs vertical and together. Legs should be straight but with a slight bend in the knees. Lower legs together so they are horizontal. Do not let the legs touch the floor. Move legs back to the original position.

**Overload**

By putting your body under additional stress, fitness can be progressed and increased. The extra demands that the body is put under will cause long-term adaptations that will then enable us to work efficiently at a higher level of performance. There are four ways that overload can be applied:

1. Increase in **Frequency**. As I go through my circuit-training programme I can increase the number or sets that I perform in each exercise and the number of exercises in each circuit (however this can be limiting as too many exercises in one circuit can lead to a lack of focus). I can also increase the number of sessions that I have in one week (i.e. from two to three).
   My first long-term goal is to improve muscular endurance of the lower body. Therefore in both circuits I have made sure that I perform a high percentage of lower body exercises. I then alternate between having a high percentage of core and upper body exercises between the two circuits. The table on the right shows the number of exercises focusing on each area in the two circuits.

| | Body Weight Circuit | Resistance/Free Weight Circuit |
|---|---|---|
| Lower Body | **6** | **5** |
| Core | *5* | 3 |
| Upper Body | 2 | *5* |

   This keeps an even balance of training on the core and upper body while constantly pushing the lower body in both circuits.
2. Increase in **Intensity.** This happens by increasing the difficulty of the exercise you are performing. I can increase the weights that I use within my circuits (examples in 'progression').
3. Increase in the amount of **Time** I train for. To do this I can increase the amount of exercises in a circuit (limited) and the number of sets that I perform for each exercise.
4. The **Type** of training that I perform can be increased in difficulty. I can progress from performing a standard plank in the bodyweight circuit, to performing a plank with my foot base on a BOSU Balance Trainer.

In the last month of my training, I will increase the number of exercises in each circuit by one, each week. On the last week I will perform the circuit 3 times. This is an overload in my training and means I really have to push my body. If I then choose to carry on the programme for additional weeks, I may choose to complete one more week of performing 3 sessions then drop back to two sessions a week. This is so I can let my body have a slight rest (I would then increase the overload the next week) or to overload on specific muscle groups instead. This is important to bring in variance (and therefore reduce tedium and increase enjoyment) and also to not constantly overload my body, which could result in injury.

**Reversibility**
The effects of training are reversible. If exercise is stopped or reduced in intensity, deterioration will set in. This can happen as quickly as one week after reducing intensity. The muscle atrophy will mean that strength and speed are gradually lost. If I receive an injury from performing my programme, or from other training and sport then I will have to alter the circuits in order for me to re-start training from whichever fitness level I am then at.

**Tedium**
In order to reduce tedium within my programme I have tried to incorporate variety. This will hopefully reduce boredom and increase enjoyment. If I get bored, I will not want to participate in the programme and therefore will start to see the effects of reversibility (mentioned above). I have two different circuits, one with weights and one without. The circuit with weights includes resistance machine and free weight exercises. Therefore I will not constantly be performing the same circuit again and again. There is also a range of exercises within each circuit, which again allows me to change the circuit around. Nearing the end of the 13-weeks I will stick to the same circuit so I can focus a lot more on overload and progression as the exercises included will be the ones that I enjoy performing, feel comfortable with and find the most beneficial. If I then continue to carry on the circuit I will look into new exercises to swap into the circuits to make sure that training does not become tedious.

# Personal Warm-up and Cool down

## Warm-up

" A warm-up is light aerobic exercise that takes place prior to exercise, normally including some light exercise to elevate the heart rate, some mobilising exercises for the joints, some stretching exercise for the muscles and some easy rehearsal of the skills to follow"

A warm-up is vital because it will improve your performance and help to prevent some injuries. The purpose of a warm-up is to increase the temperature of the muscles, which in turn will benefit the speed and strength of the muscular contraction

In a warm-up, your muscle fibres improve their elasticity. This is because as the muscle temperature increases, the flexibility of your muscles also increases. Therefore you have a greater strength of contraction. There is an increase in muscle temperature due to the increased flow of blood through the blood vessels and to the muscles. This happens because as you warm-up, your Heart rate and stroke volume increase which increases the volume of blood pumped from the heart to the muscle. This increased Heart rate increases the temperature of the muscle fibres. The increase in temperature increases the speed of contraction of the muscle fibres due to an increased speed of nerve transmission to the muscle fibres. The increase in temperature also decreases Blood Viscosity, which improves the blood flow to working muscles and it increases the dissociation of oxygen from haemoglobin in muscle tissues. This is when the pH in red blood cells decreases because hydrogen ions are released when carbonic acid dissociates. (Carbonic acid is the product of carbon dioxide and water). These hydrogen ions make the blood cells acidic, however haemoglobin can act like a buffer to prevent this. Therefore if hydrogen ions are present, they will displace the oxygen on the haemoglobin (known as the Bohr Effect). This increased rate of dissociation will improve the rate of delivery and removal of Oxygen and Carbon Dioxide.

Another benefit of an increase in muscle temperature is an improvement in coordination between antagonistic pairs because of an increase in flexibility. This leads to an increased speed of strength of contraction. There is also an increase in enzyme activity in warmer muscle fibres as the temperature nears the optimum working temperature for the enzyme. This increases the speed and strength of contraction.

There is a reduced risk of injury despite an increase in speed of strength of contraction due to an increase in blood flow and oxygen to the muscle. The first time you contract a muscle in one session, only around 1% of the muscle fibres are used. Each time you contract the muscle in the next 2-3 minutes, more muscle fibres are used. This is called Recruitment. By the time you are performing weight and body exercises in the circuit, you want the percentage of muscle fibres contracting to be high. The higher the percentage of muscle fibres, the less force and pressure there is on each individual fibre, which helps to protect them from injury.

**Personal Warm-up**

The Warm-up needs to gradually increase in intensity in order to increase your Inspiratory and Expiratory Capacities until they are nearer their maximum, and to increase your Cardiac Output. Your Cardiac Output is stroke volume x heart rate. Therefore your warm-up needs to increase both of these in order to increase the Cardiac Output.

As the circuits are based in a gym, the warm-up also uses gym equipment. There are three phases to the Warm-up. These are a general warm-up (pulse raiser), Static Stretching and Dynamic Stretching. This may take longer in some sessions compared to others depending on improvements in my level of fitness, and also my general energy levels and health on each particular day.

This warm-up follows closely to that of my netball warm-up. I would usually complete widths of the court, completing different exercises (i.e. lateral runs, 'knees up' and side steps) gradually increasing in pace. As I cannot complete different exercises while warming-up in a gym, I use two different machines to try and cover a greater range of muscle groups. The pulse raiser then finishes with a sprint, which again I would complete in a netball warm-up. By having a similarity between the two warm-ups it allows me to get into a routine. This is important because then I will become familiar with the order of the warm-up and it will be consistent. One of the most common reasons for injury is due to a poor warm-up, so it should help to prevent this.

## General Warm-up

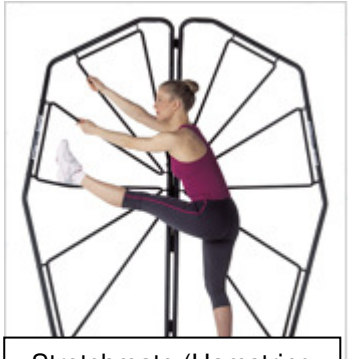
1. Treadmill (incline of 1%)
   - 2-3 minutes at a brisk walk (level 6.5)
   - 2-3 minutes at a jog (level 7.5)
   - 2-3 minutes at a run (level 9)

2. Rowing machine
   - 2-3 minutes (level 4, speed of 28spm)
   - 2 minutes (level 4, 32 spm)
   - 1 minute (level 4, 36 spm)
   - 30 seconds (level 4, 38 spm)

This general warm-up increases the heart and respiratory rate. Therefore it increases the blood flow to the muscles (increasing the transportation of oxygen and nutrients and removal of waste products). As this increases the muscle temperature, it will allow the static stretching to become more effective.

## Static Stretching

Static stretching increases the range of movement at joints, by lengthening both muscles and tendons. In the circuit-training programme I use a 'Stretchmate' to perform a series of stretches. This gives me a support, which I can use to help increase the stability of my stretches. Each stretch is held for roughly 30 seconds and can be repeated if it feels necessary. The static stretches that I complete using the Stretchmate are:



Stretchmate (Hamstring Stretch)

Calf Stretch
Hamstring Stretch
Chest Stretch
Upper Body Stretch (Triceps Stretch, Biceps Stretch and Upper Back Stretch)
Quadriceps Stretch

Upper Back Stretch without Stretchmate

## Dynamic Stretching

This phase is general stretching of all the muscle groups.

"Dynamic stretching involves a controlled, soft bounce or swinging motion to force a particular body part past its usual range of movement"

The muscles are warm from the previous pulse-raiser and so continue to stay with an increased temperature by the performer completing dynamic stretches. It is important that the muscles are already warm before completing dynamic stretches. This is because if muscles are not warm, they will not be very pliable and flexible. By then completing a bouncing or swinging motion while stretching it is very easy to become injured. Exercises for dynamic stretching include lunges and squats (lower body) and arm rotations (upper body). It is important for these stretches to become specific to the sport or activity that you are about to participate in. Therefore in this warm-up a lot of focus will be on the lower body, but the upper body must not be forgotten about.

Exercises used vary from the selection below:

- Lunges
- Squats
- Joint rotations
- Neck Mobility (Lateral Flexion, Flexion/Extension)
- Shoulder Circles
- Leg Swings (Flexion/Extension, Cross-Body Flexion/Extension)
- Hip Circles/Twists

## **Cool down**

During a workout muscle fibres are damaged and can cause soreness. This soreness is due to tiny tears (micro tears) which develop within the muscle fibres. These cause swelling of the muscle tissues which in turn puts pressure on the nerve endings and results in pain. A cool down can prevent muscle soreness. DOMS (Delayed Onset Muscle Soreness) occurs 24 to 48 hours after exercise. It is due to slight muscle tissue damage which can be caused by excessive forces acting on the muscles (particularly by the use of

excessive eccentric muscle contractions). If you start to feel sore and ache 1 to 2 days after a workout you can become less motivated to continue and you may not complete the programme.

A cool down keeps the capillaries dilated. This flushes muscles with oxygenated blood, which increases the removal of blood and waste products (i.e. carbon dioxide and muscle lactic acid) from the body.

Venous Return (VR) is the transport of blood from the body back to the heart. According to Starlings Law of the Heart, your stroke volume (SV) is dependent upon venous return. Therefore if your VR decreases, your SV will also decrease. If you do not have a great enough VR and therefore SV you can become dizzy and faint due to the lack of blood reaching your brain when you stop exercising (blood pooling). The five mechanisms that maintain Venous Return are Pocket Valves (one-way valves in the veins keeping the blood flow in the correct direction), Muscle Pump (contracting and relaxing skeletal muscles surrounding veins), Respirator pump (deeper/faster breathing causing a pressure change in the thorax and abdomen which then squeezes the large veins in the abdomen are, forcing blood back to the heart), Smooth Muscle (which contracts and relaxes in the middle layer of the vein wall, pushing blood through towards the heart) and Gravity (blood from the upper body is aided by gravity as it descends to the heart). When you stop exercising the Muscle Pump and Respiratory pump stop. The three mechanisms which are left working, are not strong enough to maintain the VR. This is when you get blood pooling which is due to blood, which has been sent to the muscles not having sufficient pressure to return to the heart. This can give the feeling of heavy legs. As the blood has not gone to the heart it also means it can not then be pumped on to other parts of the body, i.e. the brain, which is when you can become dizzy and 'light-headed'. By keeping metabolic activity high (by completing an active cool down) it allows the heart rate and respiration to gradually decrease instead of suddenly. This prevents blood pooling and keeps a stable Venous Return.

**Personal Cool down**

The cool down has three main elements. These are Gentle Exercise, Stretching and Re-fuelling.

## Gentle Exercise

This is exercise should be 'easy' and resembling the work that you have just completed. In the 13-week programme I complete around 3 minutes on a treadmill. This begins at a fast walk (speed 6.5) and slowly decreases.

## Stretching

This is the main element of the cool down.

To begin with you start standing. Then work through the following exercises, finishing on the floor. You finish on the floor because it lowers your centre of gravity. Therefore your Muscle Pump and Respiratory Pump do not have to work as hard to maintain your Venous Return. This allows your heart rate to slowly decrease. Different exercises can be incorporated into this cool down

depending on the muscle groups worked. In the body weight circuit where the exercises are predominantly core and lower body, the cool down will consist of more exercises for these muscle groups. Each stretch is held for roughly 30 seconds, and can be repeated if it feels necessary.

| | | |
|---|---|---|
| Latissimus Dorsi Stretch. | Standing upright with your arms above your head. Stretch up as far as you can. (Latissimus Dorsi) |  |
| Lateral Neck Flexion / Rotation / Forward Flexion | Look forward, not allowing your chin to drop and move your ear towards your shoulder / your chin towards your shoulder / your chin down towards your chest. (Trapezius) |  |
| Posterior Shoulder Stretch | Cross one arm across your body and use the other arm to pull your elbow towards your shoulder. (Repeat with both arms) (Posterior Deltoid, Supraspinatus) |  |
| Triceps Stretch | Place your hand on your upper back, and point your elbow towards the ceiling. Use your other arm to try and push your elbow down towards your head. (Repeat with both arms) (Triceps Brachii) |  |
| Standing Hamstring Stretch | Place on foot in front of the other. Bend the knee of the leg which is behind. All your weight should be on this leg. Tilt your upper body forwards from your hips. (Biceps Femoris, Semimembranosus, Semitendinosus) |  |
| Gastrocnemius Stretch | Stand with one leg far in front of the other. Bend the front leg and keep the back leg straight. The back heel should stay flat on the ground. You can use a wall to push against. (Gastrocnemius) |  |

| | | |
|---|---|---|
| Soleus Stretch | Stand with one leg in front of the other, close to a wall. Support your body by having both hands flat on the wall. Lean forward trying to touch the wall with your front knee. (Soleus) |  |
| Shin Stretch | Sit on your knees, with your shins flat on the ground. Slowly lean back, increasing the pressure on your shins. Support yourself with your hands flat on the ground behind you. (Tibialis Anterior) |  |
| Short Adductor Stretch | Place your feet together and hold your ankles. Push down gently on your knees with your elbows. (Adductor Magnus, Adductor Longus, Adductor Brevis) |  |
| Lower Back Stretch | Bring your knees into your body and hold firmly with your hands. (Gluteus Maximus and Erector Spinae Group) |  |
| Laying Quadriceps Stretch | Lay on your front. Bring one leg up to meet your buttocks. Your foot should be supported around the ankle (not the toe). (Rectus Femoris, Vastus Medialis, Vastus Lateralis, Vastus Intermedius) |  |
| Laying Reach | Lying on your back with your arms above your head and legs straight. Stretch yourself as far as you can. (Most of the muscles in your arms legs and core) |  |

## Re-fuel

It is important to take on fluid and food after exercise in order to keep your body energised. Your body needs to replace glycogen stores in the muscles within the first few hours after exercise. The best type of fluid is water or a good quality sports drink, and the best type of food is fruit (or any easily digestible food) in the first 20 minutes after exercise and then a larger meal containing carbohydrates and protein in the next two hours.

# Health and Safety

In this circuit-training programme there are certain areas that need to be managed carefully in order not to become a health and safety hazard.

It is important that the difficulty of the circuit is pitched at the correct level for the performer. If the level of performance is targeted above my capabilities then I could result in injury from trying to work at a level, which is beyond my ability. Weights that are too heavy can lead to direct injury to the specific muscle group (i.e. using too heavy free weights for Bicep Crunches can lead to injury of the Biceps Brachii and Triceps Brachii). Weights that exceed your maximum strength can also lead to a lack of technique such as hyper extension of the spine (i.e. during Lat Pull). Bad technique can lead to muscle damage and an in-balance in muscle hypertrophy. Movements should be controlled and smooth and joints should be moved through a full range of motion (i.e. do not lock your arms while performing the Chest Press)

When using the resistance machines it is important that foot platforms, handgrips and pads are all secure and in good condition. The weight plates should also be secure and the weight selector pin should securely fit in the chosen weight plate before movement takes place.

Bodyweight and free weight exercises should be performed in an area where there is plenty of space. If you become off balance in an exercise there should be no possibility that you could fall onto anything/anyone that could further injure you or someone else. You should not put your own health or anyone else's health at risk. Other equipment that is used during the bodyweight circuit should also be used correctly and safely. The step used to perform Toe Raises and Standing Calf Raises should be placed on a flat and even surface. The blocks must be secure and the height should be suitable for your own capabilities (i.e. sufficient in height to allow correct technique but also allowing stable balance). Your position on the fit ball (which is used for crunches and side bends) should be secure before any movement begins. If you begin to become off balance during the exercise and this cannot be easily adjusted the exercise should stop, your position should be re-stored and then the exercise can continue. The bench used for Triceps Dips should also be secure and strong enough to hold your body weight. Again this needs to be on flat ground.

When performing with free weights it is ideal to have a spotter who can stand-by while you perform your exercises and be there in case any problems occur. When picking up free weights they should be lifted correctly. You should stand close to the weight, bend down and then lift from your legs and not your back, without twisting your torso.

Plenty of liquid should also be consumed before, during, and after exercise to prevent dehydration. You should not exercise immediately after eating. When you begin to exercise your blood is re-directed to your muscles (Vascular Shunt mechanism) in order to increase the supply of oxygen and nutrients and

removal of carbon dioxide and waste. Therefore the blood supply to your digestive system is decreased (pre-capillary sphincters of arterioles leading to digestive system vasoconstrict). This means there is food within your body which has not been digested properly. This can lead to sickness during performance.  If you have any health problems such as diabetes, asthma, high blood pressure, injury or any other health concerns you should seek advice from a doctor before exercising and then inform a gym instructor of your situation. If you exercise where there is no one else then always let a friend no when you are about to begin and finish your circuits. If you begin to feel discomfort or pain during the circuits you should stop exercise immediately. Try the exercise again in your next session. If you steel feel discomfort than you should seek advice from a qualified fitness instructor.

Suitable clothing should always be worn when exercising. Clothing should allow plenty of movement and be comfortable. Shoes should be flat, secure and should also support the foot. Jewellery should not be worn as this could get caught in the resistance machines. Incorrect clothing can lead to injury.

| | Origin | Insertion | Action |
|---|---|---|---|
| | | | |
| **Muscles** | | | |
| | | | |
| Deltoid | Clavicle and Scapula | Humerus | (Anterior): Flexion (Middle): Abduction (Posterior): Extension of shoulder |
| Ticeps Brachii | Scapula and Humerus | Ulna | Extension of elbow joint |
| Biceps Brachii | Scapula | Radius | Flexion of elbow joint |
| Trapezius | Skull, Cervical and Thoracic Spine | Clavicle and Scapula | Horizonatl Extension of shoulder |
| Pectoralis Major | Clavicle, Sternum and Ribs | Humerus | Horizontal Flexion of shoulder |
| Latissimus Dorsi | Thoracic and Lumbar Spine, Sacrum and Pelvis | Humerus | Adduction of Shoulder |
| Interal Obliques | Pelvis | Ribs | Lateral Flexion and Rotation of spine |
| External Obliques | Ribs, Vertebrae and Pelvis | Pelvis | Lateral Flexion and Rotation of spine |
| Rectus Abdominis | Pelvis | Sternum and Ribs | Flexion of Spine |
| Erector Spinae group | Ribs, Vertebrae and Pelvis | Ribs, Cervical and Thoracic Vertebrae | Extension of spine |
| Illiopsoas | Pelvix and Lumbar Vertebrae | Femur | Flexion of hip |
| Gluteus Maximus | Pelvis, Sacrum and Coccyx | Femur | Extension of hip and Lateral Rotation of hip |
| Gluteurs Medius and Minimus (Hip Abductors) | Pelvis | Femur | Abduction of hip and Medial Rotation of hip |
| Quadriceps Group | Pelvis and Femur | Tibia | Extension of knee joint |
| Hamstring Group: (Biceps Femoris, Semitendinosus, Semimembranosus) | Pelvis and Femur | Tibia and Fibula | Flexion on knee joint |
| Hip Adductors: (Rectus Femoris, Vastus Lateralis, Vastus Medialis, Vastus Intermedius) | Pelvis | Femur | Adduction of hip |
| Tibialis Anterior | Tibia | Tarsals and Metatarsals | Dorsiflexion of ankle joint |
| Gastrocnemius | Femur | Calcaneus | Plantar Flexion of ankle joint |
| Soleus | Tibia and Fibula | Calcaneus | Plantar Flexion of ankle joint |

| | | Agonist | Antagonist |
|---|---|---|---|
| | | | |
| | **Resistance Machines** | | |
| Upper Body | Chest Press | **Pectoralis major**, Anterior Deltoid, Triceps Brachii | **Trapezius**, Latisimus Dorsi |
| | Lat Pull | Latissimus Dorsi | Deltoid |
| | Shoulder Press | Medial Deltoid | Latisimus Dorsi |
| Core | Abdominal | Rectus Abdominus | |
| Lower Body | Hip Abduction | Abductor Group (**Gluteurs Medius**, Gluteus Minimus) | Adductor Group |
| | Hip Adduction | Adductor Group | Abductor Group |
| | Glute | Gluteus Maximus | **Iliopsoas,** Hamstring group |
| | Seated Leg Press | Quadricep Group | Hamstring Group |
| | | | |
| | **Free Weights** | | |
| Upper Body | Shrugs | Trapezius | Pectoralis Major |
| | Biceps Curl | Biceps Brachii | Triceps Brachii |
| | Horizontal Raise | Anterior Deltoid | Latisimus Dorsi |
| | Lateral Raise | **Medial Deltoid,** Trapezius | Latisimus Dorsi |
| Core | Medicine Ball Crunch | Rectus Abdominus | Erector Spinae Group |
| | Lateral Bend | Obliques | Obliques |
| | Single Leg V-up | Rectus Abdominus, Illiopsoas | Erector Spinae Group, Gluteus Maximus |
| | Medicine Ball Twists | Obliques | Obliques |
| Lower Body | Lunges | Rectus Femoris, Vastus Medialis, Vastus Intermedius, Biceps Femoris, Semimembranosus, | |
| | | Semitendinosus, Gluteus Maximus, Illiopsoas, Gastrocnemius, Soleus | |
| | | | |
| | **Body Weight Exercises** | | |
| Upper Body | Press ups | Pectoralis Major | Latissimus Dorsi |
| | Triceps Dip | Triceps Brachii | Biceps Brachii |
| Core | Crunches (using fit ball) | Rectus Abdominus | |
| | Side Bends (using fit ball) | Obliques | |
| | Plank | **Multifidus**, Transversus | Isometric contraction |
| | Side Plank | **Transversus**, Obliques, Multifidus | Isometric contraction |
| | Dorsal Raise | Erector Spinae and Latisimus Dorsi | Rectus Abdominus |
| Lower Body | Straight Let Raise | Iliopsoas | Gluteus Maximus |
| | Floor Hip Abduction | Abductor Group | Adductor Group |
| | Floor Hip Adductions | Adductor Group | Abductor Group |
| | Toe Raise (using step) | Tibialis Anterior | Soleus, Gastrocnemius |
| | Standing Calf Raises (using step) | **Gastrocnemius**, Soleus | Tibialis Anterior |
| | Squat (using Fit Ball) | Rectus Femoris, Vastus Medialis, Vastus Intermedius, Biceps Femoris, Semimembranosus, | |
| | | Semitendinosus, Gluteus Maximus, Illiopsoas, Gastrocnemius, Soleus | |

# Muscle Fibre Type

During exercise different muscle fibres are recruited depending on the type of exercise that is being performed. The table below shows the characteristics and properties of the three different types of muscle fibres.

| | Slow Oxidative fibres (SO; type I) | Fast oxidative glycolytic fibres (FOG; Iia) | Fast glyctolytic fibres (FG; IIb) |
|---|---|---|---|
| **Sturctural Variations** | | | |
| Colour | Red | Red to Pink | White (pale) |
| Size | Small | Intermediate | Large |
| No. of mitochondria | Many | Many | Few |
| No. of capillaries | Many | Many | Few |
| Myoglobin concentration | High | High | Low |
| Glycogen Stores | Low | Intermediate | High |
| **Functional Variations** | | | |
| Contractile Speed | Slow | Fast | Fat |
| Contactile Strength | Low | Intermediate | High |
| Fatigue Resistance | High | Moderate | Low |
| Aerobic Capacity | High | Moderate | Low |
| Anaerobic Capacity | Low | High | High |
| Best Suited Activites | Endurance Type activities | Activiteis including walking, running and sprinting | Speed /Power type activities. |
| Within the Circuit Programme | These muscle fibres are used for muscular endurance. Within the circuit exericises which are being performed for increased reptitions and increased sets recruit this type of muscle fibre. An example is the Seated Leg Press which is performed for two sets of 18 repetitions. | Within the circuit programme exercises such as the Shoulder Press which is performed for 2 sets of 13 repetitions will recruit this type of muscle fibre. It is a strength releated recuritment. | These muscle fibres are recurited when working to fatigue by increasing resistance and lowering reps. In the circuit programme both the Tricep Dip and Push-ups have a resistance of my body weight and are performed for only 8 repetitions. |

# Resistance Machine and Free Weight Circuit

Exercises are in the order of the final circuit followed by information on other exercises performed during the 13-week programme.

With all of the **resistance machine** exercises it is important that your position is correct at the start, and all the way through the performance. Your legs (unless mentioned otherwise) should make a 90° angle with the floor. In order for this you may need to adjust the seat height. It is important you are comfortable before trying to complete any exercise.

When performing the following Free Weight Exercises it is important you use a weight suitable for your own body strength. If standing you need to make sure you are on level ground with a secure foot base.

With all styles of exercises, through out both programmes, you should try to exhale as you complete the movement

1

## Chest Press

Your head and shoulders should be against the back pad with your chest up. You need to grip the handles with your elbows slightly below your shoulder level.

Push the handles away from you until your arms are nearly at their full length (do not lock your arms straight). Then relax your arms slowly without letting the weights fall back onto the stack. Repeat motion.

This is exercising you Anterior Deltoids, Pectoralis Major and Triceps Brachii.

In the R/FW circuit you begin by completing 2 sets of 13 reps on a higher weight. You complete less reps and at high weight so to focus on building more muscle rather than toning muscle.


2

## Abdominals

Adjust the height of the seat so the lower back pad is resting on your lower back.

You need to complete an upper torso crunch, similarly to how you would complete a body weight crunch on the floor. Make sure you squeeze your Abdominals through out and that it is your Abdominals contracting that is creating the movement, not you arms pulling on the handles. The handles are there for guidance only.

Your Abdominals are exercised when using this machine.

In the R/FW circuit you will complete 2 sets of 18 reps. This is to focus on toning the abdominal muscles instead of increasing strength. 12.5kg is quite a low resistance but will help to make sure movement is caused from the Abdominals contracting, not due to your arms pulling on the supporting handles.

3

## Lunges

Take a large step forward with one foot. This foot should be placed in front of your other foot. Slowly bend your back leg, lowering yourself to the ground. While you do this you should also be bending your front knee, making sure it does not go over the front of your front foot. Also keep your back straight. You need to lunge as low as possible, without the back knee touching the floor. Try to hold this position then move upwards to your starting position (keeping your feet in the same place). You should hold a dumbbell in each hand and let your arms hang at your sides.

This exercises a very wide range of muscles including your Rectus Femoris, Vastus Medialis, Vastus Lateralis, Vastus Intermedius, Biceps Femoris, Semimembranosus, Semitendinosus, Gluteus Maximus, Illiopsoas, Gastrocnemius and Soleus

In the R/FW circuit this exercise should be performed for 1 set of 20 repetitions with each leg forward. The weight of the dumbbell should be 5kg. The sets should be increased to 2 sets before too long, but the exercise is often difficult to get used to and to stay balanced throughout.

4

## Shrug

Stand with your legs shoulder width apart. Hold a dumbbell in each hand, keeping your arms straight by your sides and your palms facing inwards. Then shrug your shoulders. Try to lift your shoulders as high as possible and then relax. This motion must be slowly or you could add stress to your joints due to sudden, jerky movement.

This is exercising your Trapezius.

In the R/FW circuit this exercise is performed for 2 sets of 13 repetitions using two 2kg dumbbells.

5

## Lateral Bend

You need to have your legs shoulder width apart with a slight bend in the knees. Hold a dumbbell in one hand, palm facing forward. Then lean over, bending your torso, to the side of the dumbbell. Then move back to the centre.

Throughout this movement keep your hips and knees still (do not sway them). Also keep your back straight for the same reasons as above.

This exercise strengthens your Internal and External Obliques and Erector Spinae.

In the R/FW circuit this exercise should be performed for 2 sets of 20 repetitions. One set includes 20 repetitions on each side. The weight used is 4kg.

6

## Lat Pull

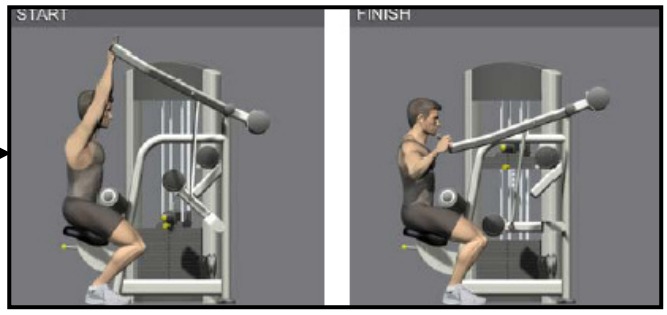
Your position on the seat needs to be a straight back, but slightly leaning forward.

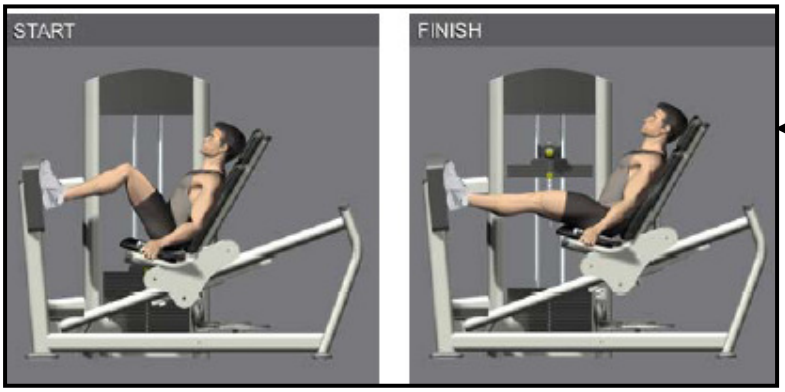
Pull your arms down until they are at shoulder level and then relax your arms. This relaxation will then lengthen your arms. It is important that your arms do not lock straight. Repeat this motion.

If you find that you cannot pull your arms down to shoulder level without feeling uncomfortable then decrease the amount of movement to a comfortable level. You can then increase this over time.

This movement is exercising your Biceps Brachii and Latissimus Dorsi.

In the R/FW circuit you begin by completing 2 sets of 13 reps on a higher weight. You complete less reps and at high weight so to focus on building more muscle rather than toning muscle.




## Seated Leg Press

Place your legs on the footplate so that your feet are shoulder width apart. Make sure that your knees do not move beyond your feet as this can lead to added excess stress on your knee joints. Push away from the footplate slowly, keeping your head and shoulders against the back pad and your chest out.

Do not lock your legs straight. Then relax your legs allowing the seat to slowly move towards the footplate. Repeat this action.

7

This is exercising the Quadriceps group, Gluteus and Hamstring group.

In the R/FW circuit you perform the Seated Leg Press for 2 sets of 18 reps.

8

## Medicine Ball Crunch

Lay on the floor, with your knees bent and your feet shoulder width apart. Hold a medicine ball at arms length and pointing upwards. Complete a regular crunch, where you lift your head neck and shoulders off the floor. Then slowly relax into the original position.

Try to keep the medicine ball at the same distance away from you at all times. Also try not to strain you neck when crunching forward, but for the pull to come from your Abdominals. Make sure (especially on your final crunch) that you don't 'slam' back into the floor, during your movement back to the starting position.

This free weight exercise is training your Rectus and Transversus Abdominus.

In the R/FW circuit this exercises is performed for 2 sets of 20 repetitions using a 1kg medicine ball. For a slightly harder workout the second set could be completed using the 2kg medicine ball until you are ready to use the 2kg medicine ball for both sets. You can also change the exercise to hold the medicine ball on the floor above your head at the starting position, and then move the ball, keeping it in a straight line with your body, as you sit-up. This works more for a sit-up instead of a crunch.

9

## Hip Adduction

To begin with find a comfortable range for your legs. Keeping you back straight and resting on the back pad, push your knees onto the pads moving your legs inwards (adduction). Slowly then allow your legs to move outwards.
This movement should be very slow, with a pause between moving away from the centre and back if possible. If you need to you can hold onto the handles either side.
Do not let the weights fall down onto the weight stack.

This is exercising your Hip Adductors.

In the R/FW circuit this exercise will be set at 2 sets of 18 reps at 60kg to begin with.

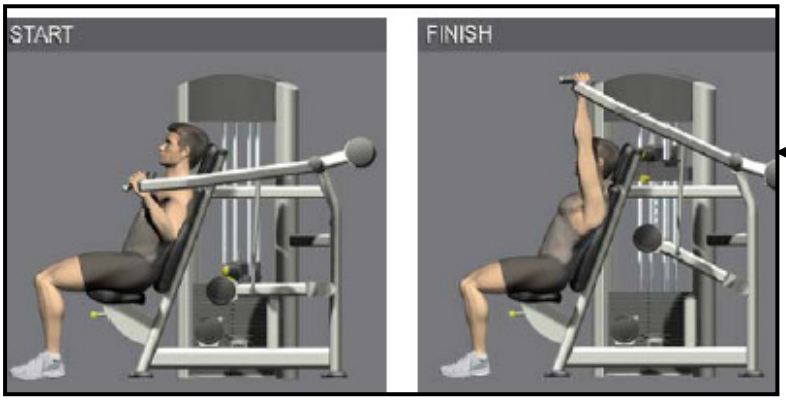

10

## Shoulder Press

Your position on the seat needs to have your back and head against the back pad. Your legs should be flat on the floor in front. Push the hands up against the resistance, until the point just before your arms locking. Then slowly lower the handles making sure the weights do not fall onto the weight stack. If you feel you are starting to have to push through your feet into the floor, and move your position, the weight is probably too high.

This is exercising your Deltoids and Triceps Brachii

In the R/FW circuit you begin by completing 2 sets of 13 reps on a higher weight. You complete less reps and at high weight so to focus on building more muscle rather than toning muscle.



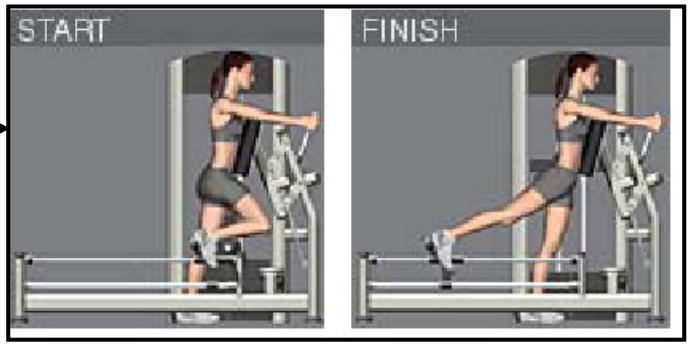

11

## Glute

Adjust the height of the chest pad so it fits comfortably between your chest and abdominals. Place one foot on the footplate.
Extend your hip and knee backwards and then slowly relax. Try to keep both legs slightly bent and your torso upright.
Then switch the footplate over and use the other leg. It is important you use both legs on this exercise.

This exercise is training your Gluteus and Quadriceps group.

In the R/FW circuit this exercise is set at 2 sets of 18 reps at a weight of 20kg. Again this is to focus on toning these muscle groups instead of building muscle.




12

## Medicine Ball Twists

Sit on the floor with your knees slightly bent and your heels lightly resting on the ground. Hold a medicine ball in front of you with both hands. Twist from one side to the other, tapping the medicine ball on the floor at each side. Try to make sure the twist comes from the waist and not the shoulders.
A progression of this exercise is to lift your heels off the ground. Therefore you have to use more core stability in order to balance.

This exercises your Internal and External Obliques.

In the R/FW circuit this exercise should be performed for 2 sets of 20 repetitions each using a 4kg ball. One repetition is one tap to the left; the second repetition would be the following twist to the right. The movements should be swift, but also smooth and controlled.

13

## Hip Abduction

To begin with find a comfortable range for your legs. Keeping you back straight and resting on the back pad, push your knees onto the pads moving your legs outwards (abduction). Slowly then allow your legs to move inwards.

This movement should be very slow, with a pause between moving away from the centre and back if possible. If you need to you can hold onto the handles either side.

Do not let the weights fall down onto the weight stack.

This is exercising your Hip Abductors.

In the R/FW circuit this exercise will be set at 2 sets of 18 reps at 60kg to begin with.


---

For the four exercises (Shrugs (ex.4), Biceps Curl, Front Raise and Lateral Raise) try not to bend your back in order to lift the weights as this can lead to back injuries. If you find you have to do this, you should use a lower weight.

A way to improve the intensity or to add variation, you can perform these exercises while standing on a wobble board. This will make you also contract your core muscles. If you are using the wobble board for variation only, you may find it helps to drop the weights down (i.e. to 3kg) so not to overload.

## Biceps Curl

Stand with your legs shoulder width apart, and your knees slightly bent. Hold a dumbbell in each hand with your arms straight by your side and your palms facing forwards. Slowly lift the weights from your thighs towards your abdominals. This will decrease the angle of the joint at your elbow (Flexion). Then slowly reverse the motion so your hands are by your side again. Do not complete jerky movements or to swing the weights as this can do damage to your joints.

This is exercising your Biceps Brachii.

In the R/FW circuit this exercise is performed for 2 sets of 13 repetitions using two 2kg dumbbells.

## Front Raise

Stand with your legs shoulder width apart, and your knees slightly bent. Hold a dumbbell in each hand with your arms straight by your side and your palms facing behind you. Slowly lift your arms out in front of you (keeping them straight) until they are at shoulder level. Then slowly lower your arms.

This is exercising your Anterior Deltoid.

In the R/FW circuit this exercise is performed for 2 sets of 13 repetitions using two 2kg dumbbells.

## Lateral Raise

Stand with your legs shoulder width apart, and your knees slightly bent. Hold a dumbbell in each hand with your arms straight by your side and your palms facing inwards. Slowly lift your arms out at the side until they are at shoulder level. Keep a bend in your elbow. Then slowly lower your arms to your side.

This is exercising your Trapezius and Deltoid.

In the R/FW circuit this exercise is performed for 2 sets of 13 repetitions using two 2kg dumbbells.

## Single Leg V -up

Begin on the floor with one leg straight out and the other bent. Make sure you are not lying on hard floor but on a pad instead to support your back. Hold a medicine ball back and above your head. As you lift your chest, shoulders and neck off the ground (similarly to the Medicine Ball Crunch) also lift your straight leg. Move the medicine ball up and forward to meet your foot.

This exercises your Rectus And Transversus Abdominus and Illiopsoas.

In the R/FW circuit this exercise should be performed for 2 sets of 20 repetitions. One set includes 20 repetitions with each leg. The weight of the medicine ball should be 2kg originally. The same weight progression can be made as with the Medicine Ball Crunch.

# Body Weight Circuit

Exercises are in the order of the final circuit followed by information on other exercises performed during the 13-week programme.

1

Crunches (using fit ball)

Balance on the fit ball until you feel comfortable. It may be an idea to play around using the fit ball first, so you can become used to it.

Sit on the edge with your legs bent at roughly a 90° angle. Then lean backwards, controlling your movement by tensing your abdominals and illiopsoas. Once you have reached a position where you can feel your muscles contracting try to pause, and then sit up to your original position. You can place your hands by your side, across your chest or by your head depending on the intensity you desire. Try to keep the same gap between your chin and chest, so you do not strain your neck.

This exercises your Rectus Abdominals and Illiopsoas.

In the B/W circuit this exercise should be performed for 2 sets of 15 repetitions, changing your arm position to affect the intensity.


2

Standing calf raise (using step)

Stand on the edge of a step, with your feet facing forward and about a shoulder width apart. Your toes should be the only part of your feet in contact with the step. Keeping your legs straight you should raise your heels up, and lower them so they are back to the original position. Then lower your heels so they are below the height of the step, and raise them back to the normal position. Try to pause at the highest and lowest point.

This is exercising your Gastrocnemius and Soleus.

In the B/W circuit it should be performed for 2 sets of 20 repetitions. 1 repetition is raising your heels to the highest and lowest points.

3

Dorsal Raise

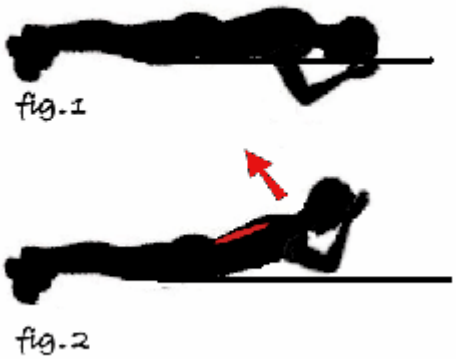
Lay on your stomach with your arms bent and hands resting on your head. Lift your upper body off the ground and hold this position. Then lower your upper body back to the ground.

It is important that you keep your legs and hips still, and that you do not apply pressure on your head or neck from your hands.

As a progression you can extend your arms so they are out in front of you. This increases the weight that you have to lift.

The Dorsal Raise is exercising your Erector Spinae group.

In the B/W circuit this exercise should be performed for 2 sets of 20 repetitions.



4

## Plank

Lay on your stomach with your forearms on the floor and hands facing forward by your shoulders. Then push up so the only points of contact with the floor are you forearms, hands and the balls of your feet. Keep all of your body level, trying not to arch or sink your back. Keep your head level with your body, not allowing it to drop. Try to contract all your muscles.
If you have your feet together, you have a narrower foot base and therefore the position will be harder to sustain.

This exercises your Rectus and Transversus Abdominus and your Erector Spinae.

In the B/W circuit this exercise should be performed in 2 sets of 30 seconds each.

5

## Triceps Dip.

Begin by sitting with your back against a bench, or step and your legs straight in front of you. Place your hands on the bench behind you, with your fingers pointing forwards (the way you are sitting). Push up so you lift your body of the ground and so that your legs are straight out in front of you. You only want to have your heels on the ground. Throughout this movement you need to keep your legs straight.
Push up and till your arms are almost straight and then lower yourself so you are near to the ground, but not touching.

This exercises your Triceps Brachii and Pectoralis Major.

In the B/W circuit you should perform 2 sets of 20 repetitions.

6

## Floor Hip Adduction

Lie on your side and place the sole of the foot from the upper leg in front of the thigh of the lower leg. Then try to raise the lower leg off the floor. Keep the leg extended. Then lower you leg to the starting position and repeat the movement.

This is exercising your Adductor Group

In the B/W circuit it should be performed for 2 sets of 20 repetitions.

7

## Side Plank

Lay on your side and place your bottom, lower arm on the floor. Your fingers should be pointing away from you (so your arm makes a 90° angle with your body). One foot should be on top of the other. Push up and so your body is off the ground. Place your other arm on your hip, or straight out at an angle from your body. Try to keep your body in a straight line, and not to tip forwards or backwards. To increase the difficulty for both the Side Plank and Plank you can place your feet on a "BOSU Balance Trainer". This will make balance more difficulty and your position less sturdy, increasing the work of your muscles in order to stabilise your body.

This is exercising your Rectus and Transversus Abdominus and Internal and External Obliques.

In the B/W circuit this exercise should be performed for 1 set of 30 seconds. 1 set includes 30 seconds on each side.

8

## Floor Hip Abduction

Lie on your side with your bottom, lower arm placed on the floor, fingers facing forwards, and supporting your body. One leg should be on top of the other. Slowly raise the upper leg off the floor (abduction of the hip). Keep the knee extended. Then lower your leg to the starting position and repeat.

This is exercising your Gluteus Medius and Gluteus Minimus.

In the B/W circuit it should be performed for 2 sets of 20 repetitions.

With both the Floor Hip Adduction and Floor Hip Abduction try to keep your body in line and let the movement be from your hip and lower body, not upper body.

## Press ups

The best way to get into your press up position is to begin by kneeling on all fours. Then stretch your legs out behind you so that your weight is an even distribution. Make sure you are balancing on the balls of your feet. Then, bend your elbows so that you can lower your chest towards the floor. Push your elbows back so you move back to your original position. Try to keep your head in line with the rest of your body, and not to drop.

To begin with you can perform a push-up where you balance on your knees and hands instead of toes and hands (Half Push-up). This is a little easier and ideal for becoming familiar with the technique.

If your base (hands and feet or knees) are wide apart then the push-up will be easier as there is more area your weight is distributed over. If you bring in your points of contact then the push-up will be hard.

This exercises your Anterior Deltoid, Triceps Brachii and Pectoralis Major.

In the B/W circuit you should perform 2 sets of 20 repetitions.

9

10

## Toe Raises

Sit on a chair, or bench with your knees bent. Lift your toes and the balls off your feet off the floor so the only point of contact is your heels. Lift your toes as high as possible and hold this position. Then relax your feet back to the original position. Repeat this movement.

This is exercising your Tibialis Anterior

In the B/W circuit it should be performed for 2 sets of 20 repetitions.

11

## Straight Leg Raise

Lay on your back and lift both of your legs off the floor. Keep your legs together and do not bend your knees. If you find it helps, cross your feet over. Only lift your legs to a height where you can feel your abdominals contracting. This should not be too high off the floor. Hold this position. If you struggle to initially lift your legs off the floor, bend your knees and bring them into your chest, and then extend your legs.

This is exercising your Rectus Femoris and Illiospoas.

In the B/W circuit it should be performed for 2 sets of 30 seconds.

## Side Bends (using fit ball)

Begin by leaning your right hip against the fit ball, and resting your right arm on the ball as well. Then straighten both of your legs. This means one foot should be resting on top of the other. You can push your feet on the bottom of the wall (Where the floor meets the wall) to help balance. You may find it easier to slightly stagger your feet so they are both in contact with the floor.

Then bend your torso to the left, lifting your right side away from the fit ball and relax back to the original position. Repeat movement.

12

This exercises your internal and external obliques.

In the B/W circuit this exercise should be performed for 2 sets of 20 repetitions where one set consists of 20 repetitions on each side.

13

## Squat (using Fit Ball)

Stand with your feet shoulder width apart and your toes facing forwards. Place the 'fit ball' in between the wall and your lower back. Lower yourself (the fit ball will roll down the wall with you) until your upper legs are horizontal with the ground. It is important that you make sure your knees do not move over your toes. If this happens then you are too close to the wall. Push up, so you move up the wall.

You should not bounce. The movement should be very slow and you should try and hold the squat position, before moving back to your original position.

A progression on this exercise can be to add a medicine ball, which you hold at arms distance away from you. This adds an extra weight that you must lift.

This is exercising your Rectus Femoris, Vastus Medialis, Vastus Intermedius, Biceps Femoris, Semimembranosus, Semitendinosus, Gluteus Maximus. Illiopsoas, Gastrocnemius and Soleus

In the B/W circuit it should be performed for 1 set of 20 repetitions.

| | | |
|---|---|---|
| | Session 1, Session 2, Session 3 | |
| | | |
| | **Resistance Machines** | |
| Upper Body | Chest Press | Anterior Deltoids, Pectorals and Triceps Brachii |
| | Lat Pull | Biceps Brachii and Latissimus Dorsi |
| | Shoulder Press | Deltoids, Triceps |
| Core | Abdominal | Abdominals |
| Lower Body | Hip Abduction | Hip Abductors |
| | Hip Adduction | Hip Adductors |
| | Glute | Gluteus and Quadriceps group |
| | Seated Leg Press | Quadriceps group, Gluteus and Hamstring group |
| | | |
| | **Free Weights** | |
| Upper Body | Shrugs | Trapezius |
| | Biceps Curl | Biceps Brachii |
| | Horizontal Raise | Anterior Deltoid |
| | Lateral Raise | Trapezius and Deltoid |
| Core | Medicine Ball Crunch | Rectus and Transversus Abdominus |
| | Lateral Bend | Internal and External Obliques, Erector Spinae |
| | Single Leg V-up | Rectus and Transversus Abdominus, Illiopsoas |
| | Medicine Ball Twists | Internal and External Obliques |
| Lower Body | Lunges | (Listed on exercise sheet) |
| | | |
| | | |
| | | |
| | **Body Weight Exercises** | |
| Upper Body | Press ups | Anterior Deltoid, Triceps Brachii, Pectoralis Major |
| | Triceps Dip | Triceps Brachii, Biceps Brachii Pectoralis Major |
| Core | Crunches (using fit ball) | Rectus Abdominals, Illiopsoas |
| | Side Bends (using fit ball) | Internal and External Obliques |
| | Plank | Rectus and Transversus Abdominus, Erector Spinae |
| | Side Plank | Rectus/Transversus Abd. and Internal/External Obliq. |
| | Dorsal Raise | Erector Spinae |
| Lower Body | Straight Let Raise | Rectus Femoris, Illiopsoas |
| | Floor Hip Abduction | Gluteus medius, Gluteus Minimus |
| | Floor Hip Adductions | Adductor group |
| | Toe Raise | Tibialis Anterior |
| | Standing Calf Raises (using step) | Gastrocnemius, Soleus |
| | Squat (using Fit Ball) | (Listed on exercise sheet) |

| Session 1, Session 2, Session 3 | Week beginning | | Week beginning | | Week beginning | |
|---|---|---|---|---|---|---|
| | 01/12/2008 | | 08/12/2008 | | 15/12/2008 | |
| **Resistance Machines** | Weight | Sets/Reps | Weight | Sets/Reps | Weight | Sets/Reps |
| Chest Press | 10kg | 2 // 13 | | ✓ | | |
| Lat Pull | 25kg | 2 // 13 | | ✓ | | ✓ |
| Shoulder Press | 7.5kg | 2 // 13 | | ✓ | | ✓ |
| Abdominal | 10kg | 2 // 18 | | ✓ | | ✓ |
| Hip Abduction | 60kg | 2 // 18 | | ✓ | | ✓ |
| Hip Adduction | 60kg | 2 // 18 | | ✓ | | ✓ |
| Glute | | | | | 20kg | 1 // 18 |
| Seated Leg Press | | | | | 22.5kg | 2 // 18 |
| | | | | | | |
| **Free Weights** | | | | | | |
| Shrugs | | | | | | |
| Biceps Curl | | | | | | |
| Horizontal Raise | | | | | | |
| Lateral Raise | | | | | | |
| Medicine Ball Crunch | 1kg | 2 // 20 | | ✓ | | ✓ |
| Lateral Bend | 4kg | 2 // 20 | | ✓ | | ✓ |
| Single Leg V-up | 2kg | 2 // 20 | | ✓ | | ✓ |
| Medicine Ball Twists | | | | | 2kg | 2 // 20 |
| Lunges | 2 x 4kg | 1 // 20 | | ✓ | | ✓ |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| **Body Weight Exercises** | | | | | | |
| Press ups | | | | | | |
| Triceps Dip | | | | | | |
| Crunches (using fit ball) | | 2 // 15 | | ✓ | | ✓ |
| Side Bends (using fit ball) | | 2 // 20 | | ✓ | | ✓ |
| Plank | | 2 // 25s | | ✓ | | ✓ |
| Side Plank | | 1 // 25s | | ✓ | | ✓ |
| Dorsal Raise | | 2 // 20 | | ✓ | | ✓ |
| Straight Let Raise | | 2 // 30s | | ✓ | | ✓ |
| Floor Hip Abduction | | | | | | |
| Floor Hip Adductions | | | | | | |
| Toe Raise | | 2// 20 | | ✓ | | ✓ |
| Standing Calf Raises (using step) | | 2// 20 | | ✓ | | ✓ |
| Squat (using Fit Ball) | | 1 // 20 | | ✓ | | ✓ |

| Session 1, Session 2, Session 3 | Week beginning | | Week beginning | | Week beginning | |
|---|---|---|---|---|---|---|
| | 22/12/2008 | | 29/12/2008 | | 05/01/2009 | |
| **Resistance Machines** | Weight | Sets/Reps | Weight | Sets/Reps | Weight | Sets/Reps |
| Chest Press | | ✓ | | ✓ | | ✓ |
| Lat Pull | | ✓ | | ✓ | | ✓ |
| Shoulder Press | | ✓ | | ✓ | | ✓ |
| Abdominal | | | | | | ✓ |
| Hip Abduction | | ✓ | | ✓ | | |
| Hip Adduction | | ✓ | | ✓ | | |
| Glute | | ✓ | | ✓ | | ✓ |
| Seated Leg Press | | ✓ | | ✓ | | ✓ |
| | | | | | | |
| **Free Weights** | | | | | | |
| Shrugs | | | | | | |
| Biceps Curl | 2x2kg | 2 // 13 | | ✓ | | ✓ |
| Horizontal Raise | | | | | | |
| Lateral Raise | | | | | | |
| Medicine Ball Crunch | 1kg | 2 // 20 | | ✓ | | ✓ |
| Lateral Bend | | | | | | |
| Single Leg V-up | | | | | | |
| Medicine Ball Twists | | ✓ | | ✓ | | ✓ |
| Lunges | | | | | | ✓ |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| **Body Weight Exercises** | | | | | | |
| Press ups | | 2 // 8 | | ✓ | | ✓ |
| Triceps Dip | | 2 // 8 | | ✓ | | ✓ |
| Crunches (using fit ball) | | ✓ | | ✓ | | ✓ |
| Side Bends (using fit ball) | | ✓ | | ✓ | | ✓ |
| Plank | | | | | | |
| Side Plank | | | | | | |
| Dorsal Raise | | ✓ | | ✓ | | ✓ |
| Straight Let Raise | | ✓ | | ✓ | | |
| Floor Hip Abduction | | | | | | 2 // 20 |
| Floor Hip Adductions | | | | | | 2 // 20 |
| Toe Raise | | ✓ | | ✓ | | ✓ |
| Standing Calf Raises (using step) | | ✓ | | ✓ | | ✓ |
| Squat (using Fit Ball) | | ✓ | | ✓ | | |

| Session 1, Session 2, Session 3 | Week beginning | | Week beginning | | Week beginning | |
|---|---|---|---|---|---|---|
| | 12/01/2009 | | 19/01/2009 | | 26/01/2009 | |
| **Resistance Machines** | Weight | Sets/Reps | Weight | Sets/Reps | Weight | Sets/Reps |
| Chest Press | | ✓ | | ✓ | | ✓ |
| Lat Pull | | ✓ | | ✓ | | ✓ |
| Shoulder Press | | ✓ | | | | ✓ |
| Abdominal | 12.5kg | ✓ | | ✓ | | |
| Hip Abduction | | | | ✓ | 62.5kg | ✓ |
| Hip Adduction | | | | ✓ | 62.5kg | ✓ |
| Glute | | ✓ | | | | 2 // 18 |
| Seated Leg Press | | ✓ | | ✓ | | |
| | | | | | | |
| **Free Weights** | | | | | | |
| Shrugs | 2 x 4kg | 2 // 13 | | ✓ | | ✓ |
| Biceps Curl | | ✓ | | | | ✓ |
| Horizontal Raise | | | 2 x 2kg | 2 // 13 | | |
| Lateral Raise | | | 2 x 2kg | 2 // 13 | | |
| Medicine Ball Crunch | | ✓ | | ✓ | | ✓ |
| Lateral Bend | | | | ✓ | | ✓ |
| Single Leg V-up | | | | | | |
| Medicine Ball Twists | | ✓ | | ✓ | | ✓ |
| Lunges | | ✓ | | ✓ | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| **Body Weight Exercises** | | | | | | |
| Press ups | | ✓ | | ✓ | | ✓ |
| Triceps Dip | | ✓ | | ✓ | | ✓ |
| Crunches (using fit ball) | | ✓ | | | | 2 // 20 |
| Side Bends (using fit ball) | | ✓ | | | | ✓ |
| Plank | | | | ✓ | | ✓ |
| Side Plank | | | | ✓ | | 1 // 30 |
| Dorsal Raise | | ✓ | | ✓ | | |
| Straight Let Raise | | | | ✓ | | |
| Floor Hip Abduction | | ✓ | | | | ✓ |
| Floor Hip Adductions | | ✓ | | | | ✓ |
| Toe Raise | | ✓ | | ✓ | | ✓ |
| Standing Calf Raises (using step) | | ✓ | | ✓ | | ✓ |
| Squat (using Fit Ball) | | | | ✓ | | ✓ |

| Session 1, Session 2, Session 3 | Week beginning | | Week beginning | | Week beginning | |
|---|---|---|---|---|---|---|
| | 02/02/2009 | | 09/02/2009 | | 16/02/2009 | |
| **Resistance Machines** | Weight | Sets/Reps | Weight | Sets/Reps | Weight | Sets/Reps |
| Chest Press | | ✓ | | ✓ | | 3 // 13 |
| Lat Pull | | ✓ | | ✓ | | 3 // 13 |
| Shoulder Press | | | | ✓ | | 3 // 13 |
| Abdominal | | | | ✓ | | ✓ |
| Hip Abduction | | ✓ | 65kg | 3 // 18 | | ✓ |
| Hip Adduction | | ✓ | | 3 // 18 | | ✓ |
| Glute | | ✓ | | ✓ | | ✓ |
| Seated Leg Press | | | | | | ✓ |
| | | | | | | |
| **Free Weights** | | | | | | |
| Shrugs | | ✓ | | ✓ | | ✓ |
| Biceps Curl | | ✓ | | | | |
| Horizontal Raise | | | | | | |
| Lateral Raise | | | | | | |
| Medicine Ball Crunch | | ✓ | | ✓ | | ✓ |
| Lateral Bend | | ✓ | | ✓ | | ✓ |
| Single Leg V-up | | | | | | |
| Medicine Ball Twists | | ✓ | | ✓ | | ✓ |
| Lunges | | ✓ | | ✓ | | 2 // 20 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| **Body Weight Exercises** | | | | | | |
| Press ups | | ✓ | | ✓ | | ✓ |
| Triceps Dip | | ✓ | | ✓ | | ✓ |
| Crunches (using fit ball) | | ✓ | | ✓ | | ✓ |
| Side Bends (using fit ball) | | ✓ | | ✓ | | ✓ |
| Plank | | 2 // 30 | | | | ✓ |
| Side Plank | | ✓ | | ✓ | | 2 // 30 |
| Dorsal Raise | | | | | | ✓ |
| Straight Let Raise | | | | | | ✓ |
| Floor Hip Abduction | | ✓ | | ✓ | | ✓ |
| Floor Hip Adductions | | ✓ | | ✓ | | ✓ |
| Toe Raise | | ✓ | | ✓ | | ✓ |
| Standing Calf Raises (using step) | | ✓ | | ✓ | | ✓ |
| Squat (using Fit Ball) | | 2 // 20 | | | | |

| Session 1, Session 2, Session 3 | Week beginning | | Order of Exercises in Final Circuit |
|---|---|---|---|
| | 23/02/2009 | | |
| **Resistance Machines** | Weight | Sets/Reps | |
| Chest Press | | ✓✓ | 1 |
| Lat Pull | | ✓✓ | 6 |
| Shoulder Press | | ✓✓ | 10 |
| Abdominal | | ✓✓ | 2 |
| Hip Abduction | | ✓✓ | 13 |
| Hip Adduction | | ✓✓ | 9 |
| Glute | | ✓✓ | 11 |
| Seated Leg Press | | ✓✓ | 7 |
| | | | |
| **Free Weights** | | | |
| Shrugs | | ✓✓ | 4 |
| Biceps Curl | | | |
| Horizontal Raise | | | |
| Lateral Raise | | | |
| Medicine Ball Crunch | | ✓✓ | 8 |
| Lateral Bend | | ✓✓ | 5 |
| Single Leg V-up | | | |
| Medicine Ball Twists | | ✓✓ | 12 |
| Lunges | | ✓✓ | 3 |
| | | | |
| | | | |
| | | | |
| **Body Weight Exercises** | | | |
| Press ups | | ✓ | 9 |
| Triceps Dip | | ✓ | 5 |
| Crunches (using fit ball) | | ✓ | 1 |
| Side Bends (using fit ball) | | ✓ | 12 |
| Plank | | ✓ | 4 |
| Side Plank | | ✓ | 7 |
| Dorsal Raise | | ✓ | 2 |
| Straight Let Raise | | ✓ | 11 |
| Floor Hip Abduction | | ✓ | 8 |
| Floor Hip Adductions | | ✓ | 6 |
| Toe Raise | | ✓ | 10 |
| Standing Calf Raises (using step) | | ✓ | 3 |
| Squat (using Fit Ball) | | ✓ | 13 |

# Evaluation

I completed two fitness tests before, during and after the 13-week programme. This allowed me to measure and record my progress so that I could evaluate how successful the circuit-training programme was.

| | Before | 7 weeks | 13 weeks |
|---|---|---|---|
| 1RM Chest Press | 20.0kg | 22.0kg | 24.0kg |
| 1RM Shoulder Press | 32.5kg | 34.0kg | 36.0kg |
| Working until failure Leg Press | 63 | 65 | 68 |

Improve Muscular Endurance
My first goal was to improve the muscular endurance of the lower body muscle groups. This was an important goal, as it would lead to improving my game in netball. By performing a test on the Leg Press (Quadriceps Group, Gluteus, Hamstring Group) where I worked until I could not perform any more repetitions it allowed me to measure the muscular endurance of these muscle groups. From the table you can see that the number of repetitions has increased through the programme. Therefore there has been an improvement in muscular endurance of the muscle groups mentioned above.

Improve Muscular Strength
In order to measure whether I had improved my muscular strength over the 13-week programme I completed two tests. Both were 1 rep maximum tests. This is when you lift the heaviest weight that you can, for a single repetition on a given exercise. This would show my maximum explosive strength. I used the Chest Press (Anterior Deltoids, Pectorals and Triceps Brachii) and Shoulder Press (Deltoids and Triceps). In both exercises my 1RM increased. As both tests showed an improvement, it is clear that I have improved my muscular strength in these muscle groups.

Another goal of my circuit-training programme was to improve body shape and muscle tone. This could be measured by having a Bioelectrical Impedance Analysis. An electrode is placed on your hand and another on your foot. An electrical impulse is passed through your body. The speed of the current determines body fat percentage. This test was not available for my circuit-training programme due to the lack of resources at the time. However if I chose to continue my programme I could look at using a test like this to measure further improvements.

Both the improvement in muscular endurance and muscular strength were desired changes. However the circuit programme was not well balanced. In both circuits I had an overload of lower body muscular endurance exercises. I

then alternated having an increased amount of core or lower body exercises between circuits. This meant that my main focus was on muscular endurance, however by wanting to improve muscular strength and core stability as well, I was trying to improve all of the muscle groups in my body in some way. This led to a complete overload. Even though I have improved in all the areas, if this circuit programme was to be repeated or continued I would change the goals to focus on just one component of fitness (i.e. muscular endurance or muscular strength). Having two goals allowed more variation to the programme, which made the circuits seem less tedious. Therefore to continue variation in the programme while focusing on one goal I would incorporate a larger range of exercises and create a circuit that I felt would be beneficial specific to each individual session. This would mean that if I wanted to use a particular exercise instead of something else on one week, then I could, and if I wanted to focus my session on a particular area (i.e. lower body), I could also do this.

Both circuits were also very long. Both the body weight circuit and the resistance/free weight circuit contained 13 exercises. If I were to complete the programme again I would change the circuits to contain no more than 10 exercises. By having so many exercises (and also completing 2-3 sets on each exercise) I would become very tired before the end of my circuit. This meant I would not put 100% into the later exercises in the circuit. By using fewer exercises in each circuit I could focus more on each exercise and also it would allow me more variation in following weeks because I would not be performing each exercise every week.