



LOCKER 27
ATHLETIC DEVELOPMENT

LOCKER 27

**AT HOME
TRAINING
GUIDE**



USING THE LOCKER 27 LOCKDOWN TRAINING MANUAL

In this short guide we're going to be outlining some basic principles of training in order for you all to be able to take control of your own sessions if you'd like to. Remember, for the duration of the shutdown we'll be sending out 6 sessions per week (as well as a bonus session here and there for those who are missing the classic Hybrids or Big Pump Friday sessions) which can be found on our Instagram and YouTube, as well as being emailed over to you. Education is a massive part of Locker 27, and we hope that this small guide will continue that during the lockdown.

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- Principles of Training
- Energy Systems
- RPE (Rate of Perceived Exertion)
- Training Methods
- Training Structures

"Give a man a fish, and he'll eat for a day. Teach a man to fish and he will eat for a lifetime."

Unknown

PRINCIPLES OF TRAINING

This section is about the principles of training, and a very brief overview of why we train, and how we can get the most from it. Even in the current climate, we can all strive to become better by working smarter and by utilising some basic physiological principles of training.

Fundamentally, all training is based on overcoming something called homeostasis; this is the body's natural inclination to keep things exactly as they are. To change ourselves and have a positive training impact, we must overcome this desire for homeostasis and cause disruption (in a good way!) in the system. One of the most important principles of training refers to this, and is known as progressive overload. There are many ways to overload a system.

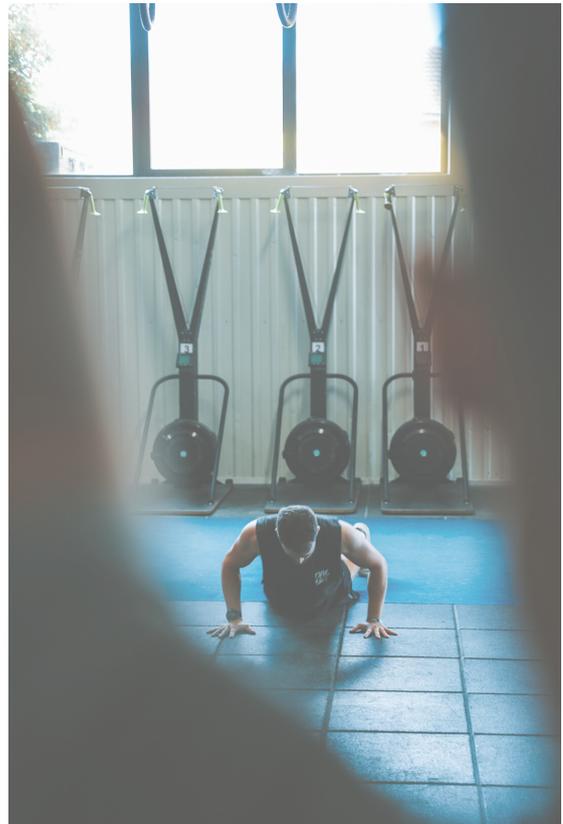
Intensity

Whilst we're in the gym the most common way is to simply increase the weight or intensity of an exercise. If you're performing a back squat for 3 sets of 10 repetitions at 60kg, and then the next time you train perform 3 x 10 at 70kg, you will have practiced progressive overload - your total training volume is 700kg, rather than 600kg. However - during this period, the simplest way to create this progressive overload is not available unless you've got access to a well kitted out home gym! So we have to be a bit more creative. Luckily, there are many different ways that we'll outline below.

PRINCIPLES OF TRAINING

Volume

After intensity, comes volume. We can create more volume by reducing intensity - the two are inversely related. This means that as intensity goes up, our volume will tend to reduce and visa versa. When our ability to increase intensity is reduced, we can still create progressive overload by increasing our volume. For example, if we start by performing 3 sets of 15 push-ups we can increase our volume to 3 sets of 20 push-ups, or 4 sets of 15 push-ups.



Either way, we have performed more mechanical work by doing more reps than the previous session. This will continue to drive adaptation in the long term. Do be aware however that progression like this is rarely linear (or that quick!) and won't go up session by session. Always be guided by your technique - don't be tempted to push out poor repetitions in the chase for overload.

PRINCIPLES OF TRAINING

Density

Density is the third method in which we can produce progressive overload. This is simply the idea of doing more mechanical work in less time. If we take our push-up example again, we perform 3 sets of 10 repetitions with a 2 minute rest in between sets. Instead of increasing intensity (more weight) or volume (more repetitions or sets) we can perform 3 x 10 with only 1 minutes rest. This teaches our system that it needs to recover from muscular effort faster, and can make us more efficient at recreating energy (more on that later).



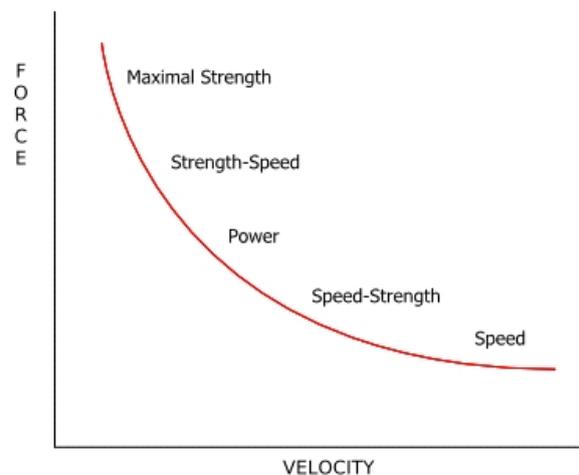
PRINCIPLES OF TRAINING

Force Velocity Relationship

The force velocity profile is a well understood principle of training, and utilised heavily in Strength and Conditioning Programmes.

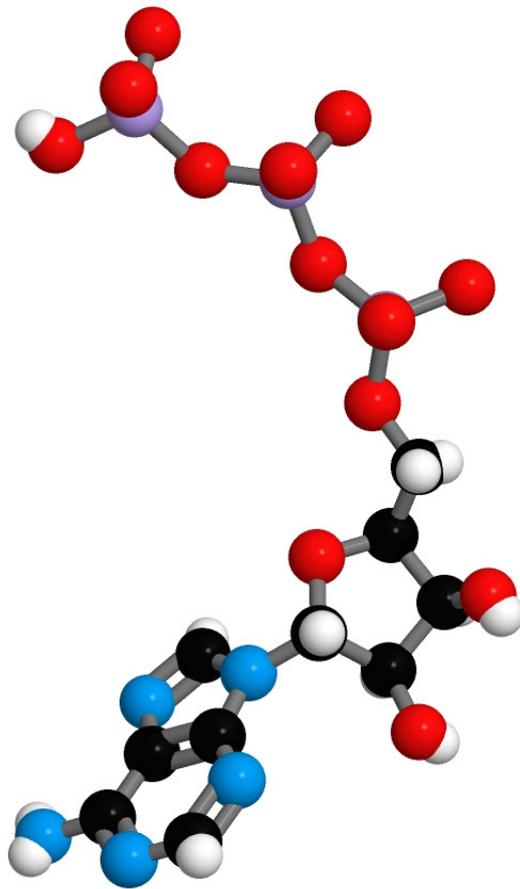
Essentially, all exercises we perform are on a continuum of Force and Velocity. The

quicker we perform a movement (so with more velocity), the less force we're able to produce - conversely, if the force is high (for example more weight), we cannot perform that movement as fast. One of the best ways to understand the FV curve is through a squat. If we look at the Velocity end of the curve, we can have a countermovement jump - simply jumping as high as you can. Equally, at the other end of the curve we have a 1RM back squat. The movement is essentially the same - a bilateral (i.e. 2 footed) movement of bending and straightening at the ankles, knees and hips followed by a reversal of that movement. This is important to us training at home with minimal equipment in a number of ways. What this tells us is that we can still create maximum force through the body, simply by changing our focus from the normal Force end of the curve to the Velocity end, allowing us to still make meaningful progress in our training. Some of the most powerful stimuluses can come from training with just your bodyweight - think jumping, hopping, sprinting, bounding and landing from those movements.



HUMAN ENERGY SYSTEMS

Energy Systems 101



A complete understanding of the body's energy systems and their training is the subject of countless PhDs and MScs, and requires more than a lifetime of study. It's also continually evolving and as such, is far beyond the scope of this short (ish) guide to training. However, it is important for your training to have an extremely brief overview on what works when, for how long and why. One of the most

important principles is that unlike many of the things you read, all your energy systems are working all of the time - they don't switch on and off like light bulbs! Your body is NOT that simple. However, the training we perform will bias the body towards a certain energy system, although they will all still be doing something. All of the energy in the body is made by the breakdown of a molecule called ATP (adenosine triphosphate) to ADP (adenosine diphosphate) by breakdown of a high energy bond - and all our energy systems work to re-synthesise this molecule. We'll cover the major systems from short to long.

HUMAN ENERGY SYSTEMS

ATP-PCr System



The first system is called the ATP- CPr (Adenosine Triphosphate) - (Phosphocreatine) system. ATP is stored in all cells, particularly muscles. It is the only system that doesn't require a blood supply and has no waste products. There are not many steps in the chemical reactions that make up the ATP-PCr system. The reactions can take place in the absence of oxygen and phosphocreatine is a relatively high energy molecule. As a result, the ATP-PCr system can provide a lot of energy quickly but only for immediate and short (10s) maximum intensity efforts. In a sense, it is free energy because the body stores ATP to make it available for immediate use, however, you can only use it once and it needs recovery time to restore the storage. Once you have depleted Phosphocreatine stores in a sprint it can take as long as 5 minutes to restore them to their resting levels, ready to sprint again. Making it a high rate – low capacity system.

HUMAN ENERGY SYSTEMS

Glycolitic System

The next major phase is called the Glycolitic or Lactic (LA) system. After the 20 seconds of the ATP-PCr system, the body requires another ingredient – glucose - to be added to continue. This system breaks down carbohydrate to produce medium amounts of power for medium amounts of time. Regardless of how long an effort is, carbohydrate is always initially broken down through a chemical reaction called anaerobic glycolysis. Oxygen is not required for this reaction and whilst only about 5% (2 ATP molecules) of the energy potential of a glucose molecule can be realised the energy is liberated quickly, so this energy system is well suited to high intensity efforts greater than 10 seconds to 2 minutes. Because anaerobic glycolysis can only supply short efforts, the time limitation is related to the chemical processes involved in anaerobic metabolism and their interaction with the body, rather than a lack of availability of carbohydrates. Its by-product, lactic acid, comes from the breakdown of the glucose released from the muscles. Lactate is not a waste product but is actually an important part of anaerobic and aerobic metabolism and contrary to popular belief, does not cause the “burn” often felt during high intensity exercise. Lactic Acid does not exist in the blood but instead dissociates into Lactate and Hydrogen. Clearing Lactate from the body depends upon many factors, but it is a fuel for the working muscles to use or an important precursor to remaking glucose through gluconeogenesis (the making of new glucose molecules). Some research has indicated the more aerobically fit the individual, the better they are able to utilise the Lactate produced by glycolysis. The hydrogen is buffered to make CO₂ and H₂O and excreted through the lungs, although it is the accumulation of these hydrogen ions and the subsequent acidosis of the working muscle that creates the feeling normally attributed to lactic acid.



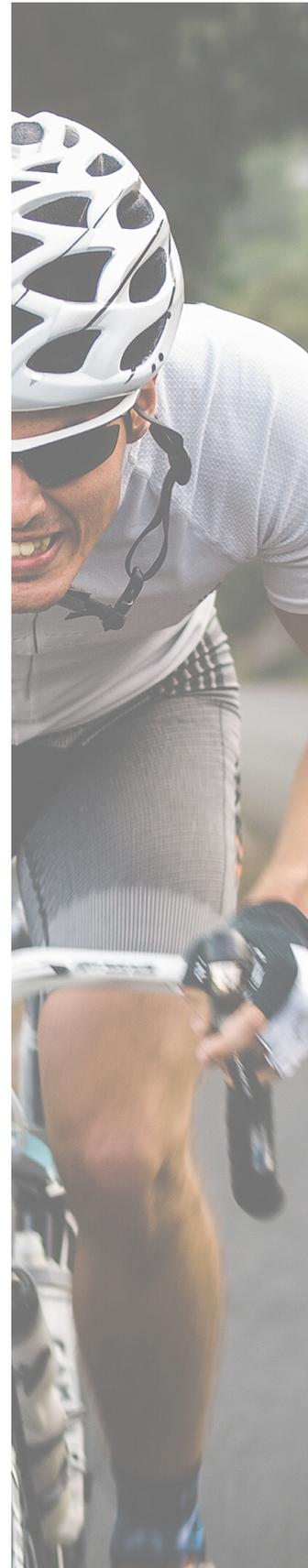
HUMAN ENERGY SYSTEMS

Aerobic/Oxidative System

The aerobic pathway is by far and away the most important system of energy development in the body, as is capable of producing far more ATP (38 compared to 2) for far longer periods of time than either anaerobic pathways. To do this however takes a relatively long time due to the number of chemical reactions involved (known as the Krebs cycle) and requires the use of oxygen, so is limited in the intensity at which it can produce energy.

Aerobic metabolism takes place in the mitochondria of the cell; these are small self contained units known as organelles and a critical part of our metabolism. Athletes higher trained aerobic systems have a greater number and density of mitochondria, allowing them to produce more energy from the aerobic system at higher levels of intensity.

Your aerobic system utilises fat during low intensities and gradually changes to glucose as intensity increases. Aerobically stronger athletes are able to utilise more fat at higher intensities, saving their carbohydrate (glucose) stores for when they need it most. As well as this, they are able to clear lactate quicker from their system and so use their anaerobic pathways more effectively (remember, everything is working all the time!). Because of this, being strong aerobically is important for everyone, not just marathon runners and Tour de France cyclists! If you have a strong aerobic system, you can recover faster in between sets, sessions and tolerate more work as a whole.



HUMAN ENERGY SYSTEMS

Heart Rate Zones

We can judge which energy system we're using (roughly - sophisticated physiological testing is required for complete accuracy utilising gas exchange) by use of Heart Rate Zones. This uses a percentage of your maximum heart rate (HR) to prescribe and monitor training.



Zone 1
Approximately 55-70% HR
Easy breathing
Can hold a conversation easily



Zone 2
Approximately 60-70% HR
Nasal breathing
Can hold a short conversation



Zone 3
Approximately 70-80% HR
Mix of nasal and mouth breathing
Can speak 1-2 sentences



Zone 4
Approximately 80-90% HR
Breathing hard
No conversation



Zone 5
Approximately >90% HR
Very hard breathing, gasping
No conversation

HUMAN ENERGY SYSTEMS

Rate of Perceived Exertion (RPE)

Even if you're not using a HR monitor, being conscious of what you're feeling and how you're breathing can help identify (roughly) what HR zone you are in. We can also use RPE to judge our intensity, a scale called Rate of Perceived Exertion. This is a scale from 1-10 with 1 being any activity other than sleeping/sitting etc, and 10 being an all out maximal effort.

10

Max Effort Activity

Impossible to sustain for any length of time. Very out of breath and unable to talk. (Heart Rate Zone 5)

9

Very High Intensity Activity

Extremely hard to maintain. Can hardly breathe and unable to talk. (Heart Rate Zone 4-5)

7-8

Vigorous Activity

Uncomfortable but sustainable for short periods. Can speak 1-2 sentences (Heart Rate Zone 3-4)

4-6

Moderate Activity

Could sustain intensity for a prolonged (1-2 hrs) period. Can hold short conversations. (Heart Rate Zone 2-3)

2-3

Light Activity

Feels like you can maintain for hours with no real cost. Easy to breathe and carry on conversation. (Heart Rate Zone 1)

1

Very Light Activity

Anything other than sedentary (sleeping, sitting watching TV etc).

TRAINING METHODS

Now armed with some knowledge around the principles of training, and what we're trying to achieve with each type of training we're going to go through some methods to use while training to give us the overload we need with just bodyweight or minimal equipment.

Types of Muscular Contraction

Muscles work in 3 stages during a contraction:

- Eccentric or lowering phase
 - Eg. when bending our knees and hips during a squat, our quads are lengthening under tension
- Isometric or pausing phase
 - Eg. at the bottom of the squat, before initiating the upward phase, our muscles are under tension but not moving
- Concentric or shortening phase
 - Eg. returning to standing from the bottom of our squat

It's important to know these 3 phases of muscle action, as we can then manipulate these to cause a training effect even when we have very limited equipment available to us. By focusing on one part, or all of these muscle contraction types we can create a training effect with very little load.

TRAINING METHODS

Tempo

By changing the tempo of an exercise, we can make even the simplest movements very hard. This works by keeping the muscle under constant tension and not allowing the contraction of the working muscles to dissipate. This is also known as “statodynamic”, and traps the build up of waste products in the working muscles to produce an occlusion effect which can give a big stimulus to our muscles.

Occlusion is also known as blood flow restriction, or BFR. When our muscle tissue is contracted, it's far harder to get blood into the tissue. This is one of the best athletes in the world are not only amazing at contracting their tissue to throw, run, jump or pedal, but at relaxing it quicker than others too.

For example, instead of focusing on repetitions of an exercise, we can choose to use time. This could be 60s for one set, and be written as “Push-Ups, 3 x 60s” with a defined rest time. If we utilise tempo training for this, we can use 4 numbers to dictate tempo - for example 4040. In this example we have 4s lowering (eccentric), 0s at the bottom (isometric), 4s upwards (concentric) and 0s at the top (isometric).

It's very surprising how hard this can get, especially when using exercises that use a lot of working muscles such as squats, lunges and pushups. As mentioned above, we can use density and volume to create a training effect when intensity, or adding weight isn't available to us.

TRAINING METHODS

Isometric Training

Isometric training, or producing force without changing the length of a muscle, is also a fantastic way to train with minimal equipment. One of the most common isometric exercises is the humble plank, and a wall-sit is another - you must tense a large amount of muscles and resist movement.

We can use these isometric exercises to increase the demand on the muscle, and can use them to increase the difficulty of any exercises. For example, using pushups, if we hold the bottom of the pushup for a count of 3s, then push up, you will find that you are not able to do half as many pushups as you did before! You can play around with where you put your pause or isometric. At the bottom, in the middle, on the way down, on the way up - the possibilities are only as limited as your imagination.

We can also make use of *yielding* or *overcoming* isometric contractions. A yielding isometric involves lowering down, and holding at a specific point against force (e.g. gravity if we're using bodyweight or weights) such as described above. An overcoming isometric involves pushing or pulling against a fixed immovable object - this is an extremely powerful stimulus as it forces your muscles to contract at nearly their maximum output. Both types of isometric can be programmed for time or repetitions.

Long-duration isometrics are also a great tool - accumulating 3 minutes per side at the bottom of a split squat in as few sets as possible, for example, can leave your legs feeling like they've worked extremely hard whilst also having some great benefits for tendon health and requiring no equipment.

TRAINING METHODS

High Velocity Movements



Thinking back to the FV curve talked about in the Principles of Training section, some of the most powerful stimuluses we can give the body are by trying to move as fast as we possibly can and with maximum intent. This means that we're making the body work maximally, even though we don't have any extra weight to use. Examples of these movements would be jumps, throws and even landing from a height. Jumps can be performed anywhere, and require no equipment or even a great deal of space. Simply performing a jump straight up in the air (also known as a countermovement jump, or CMJ) can be a potent stimulus when done with maximum intent and speed. From there, there are a multitude of jumps that can be performed. Horizontally, laterally, or rebounding from a drop (these can be very intense, so be careful with any drop or depth jump - if in doubt contact your Locker 27 Coach for guidelines) can be used to create big impulses on the body without requiring anything other than a safe space in which to do so.

TRAINING METHODS

Volume and Density

Volume is simply the idea of doing more repetitions and doing more mechanical work than the previous training session. If we perform 3 x 10 squats at bodyweight, our total training volume is 30 squats. The next session, we can perform 4 x 10 or 3 x 15 - both of these giving us a higher total training volume than before. This is why it's always a good idea to keep a training diary so that we know if we're progressing or not

Once again, an increase in density can be used instead of an increase in intensity. If, using our squat example from above, we decide to increase density rather than volume or intensity, we could change 3 x 10 with an undefined rest to:

- 3 x 10 with 90s rest
- 3 x 10 with 60s rest
- 3 x 10 with 30s rest

The amount of squats we are doing (30) stays the same. When utilising density, we create an overload effect by doing the same volume in a shorter time period. Another way to increase density is to use "Escalating Density Training" or EDT. A very simple example of EDT is a small circuit of exercises such as 5 pushups, 5 squats, and 10 v-sits. If we set a timer for 15 minutes, we may complete 10 total sets, meaning we have completed 50 pushups, 50 squats and 100 v-sits. The next time we perform this EDT session, we simply aim to beat 10 full sets within the 15 minute time frame and so have increased (or escalated) the density of my training. This method can be a fantastic way to continually make progress when other more conventional methods (like increasing weight/intensity) are not available to us.

TRAINING METHODS

Exercise Choices

Our exercise choice can also help us to increase difficulty, and create progressive overload and increases in intensity simply by putting ourselves at a mechanical disadvantage. As an example, doing things unilaterally (with one side) rather than bilaterally using both sides. An easy example of this is instead of performing squats, performing split squats, skater squats or pistol squats. All are squats, but by changing the nature of the exercise to focus on one leg, that one leg now has to work twice as hard.

As coaches, when we write programmes we generally will look to include several different exercises from differing movement patterns over the course of a training programme. This is not necessarily each day or every session, but we can help to make well rounded athletes by using a well rounded exercise selection.

Defining movement categories decisions such as:

- Knee Dominant
 - Lunges, Squats, Step ups
- Hip Dominant
 - Deadlifts, Glute Bridges, Straight Leg Deadlifts
- Push (horizontal and vertical)
 - Push-Ups, Pike/Handstand Pushups
- Pull (horizontal and vertical)
 - Bent over row, pullunders, chinups
- Brace
 - Farmers walks, bear crawls, planks
- Rotate
 - Band Rotations, Woodchops, Throwing

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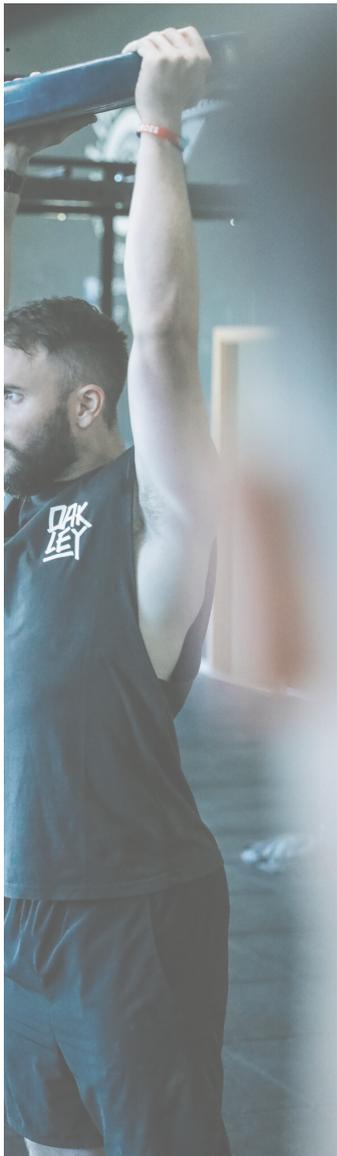
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TRAINING METHODS

Set Styles and Training Ideas

When working with minimal equipment, or no equipment during this period, training can become stale or boring. This is where thinking about changing the structure of your training can help to keep you engaged and looking forward to your training, rather than the simple sets x reps structure (although there's nothing wrong with this). As such, we've listed some below that can be used with almost anything!



AMRAP

As Many Rounds as Possible

As the name suggests, pick 2 or more exercises, dictate repetitions and set a timer. Get as many rounds as you can completed. This can be long or short - really anything goes here!

EMOM/E2MOM/E3MOM

Every Minute On the Minute

Again, pick an exercise or set of exercises. At the start of the minute, complete the circuit and rest the remainder of the minute. This can be for a set period, or until you can no longer complete the repetitions inside of the minute. A second EMOM is a density version - also known as "Death By" sessions. For example, in "Death by Burpees", complete 1 burpee in minute 1, 2 in minute 2, until you cannot complete any more.

TRAINING METHODS

Interval Weight Training

IWT is a resistance based exercise, followed by a cardio activity. For example, it could be 20 squats and pushups followed by 2 minutes of running for a predetermined amount of rounds.

Density Circuits

These were mentioned in the density section above, and are also known as escalating density circuits. Pick 2-5 exercises and set a timer. Complete as many rounds as possible during that time, and record the total number of repetitions or rounds achieved - then try to beat that the next time you perform that session.



Ladders

There are many ways to structure ladders. You can have ascending ladders (1 repetition, then 2, then 3, 4, 5 etc), descending ladders (10, 9, 8...), up and down (1-10-1) or pair exercises (10 + 1, 9 + 2). All ladders are up to your creativity - they can be 10-1 of several exercises as fast as possible or a single exercise with a set rest time. There are almost no limits to what you can perform as a ladder style, or the number of repetitions or the number of sets or repetitions in your ladder.

WRAPPNG IT UP...

Hopefully this training guide has given you some ideas and some principles of training - not just for the duration of the Lockdown, but moving forwards too.

Whilst this is a strange time for all of us, it is important to look for silver linings, big or small and if this guide gives a single piece of advice that is taken in either the short or the long term, then it has achieved what it was written to do.

Stay safe, protect the NHS and save lives - and train hard. We'll all be together again in the Locker soon.

The Locker 27 Team

