Are you fit?

How do you know?

Let me back up. Our definition of fitness: **readiness**. Are you ready, right now, without any warmup or preparation, to sprint at your top speed? Are you prepared to jump as high as your desk? If you had to, could you quickly pick up something heavy and lift it overhead?

In our seated society, these needs may seem a bit extreme. No terrorist is going to storm your office this morning. Fire will likely not tear through your living room tonight. A boulder is unlikely to pin your buddy to the pavement on the way home from work.

"...we have not spent the last 65 million or so years finely honing our physiology to watch Oprah. Like it or not, we are the product of a very long process of adaptation to a harsh physical existence, and the past couple centuries of comparative ease and plenty are not enough time to change our genome. We humans are at our best when our existence mirrors, or at least simulates, the one we are still genetically adapted to live. And that is the purpose of exercise."
— Coach Mark Rippetoe

Our needs as humans differ not by kind, but by scale. Late for a meeting, you're going to have to bound up a set of stairs and not be found panting at the top. Moving your buddy to a new apartment, you'll need to climb up on that tailgate somehow. And grandma's gotta get that flour from the pantry, no matter what shelf it's on. You may never appear at WPO nationals with a 1100lbs squat, but you'll want to be able to sit down and stand back up again for as long as you live.

"Trainers and civilians needs are more akin to the firefighter, cop and soldier than they are to the elite athlete. The reason being, you don't know what gameday will look like, you don't know when it will occur and you don't know what the stressor will be, you just don't know." – Coach Greg Glassman

You have plenty of reasons to be fit: longevity, avoidance and minimization of disease and its effects, interpersonal relationships, mental state, quality of life...and just plain old ability to LIVE while you've got the chance.

Our society's common view of the 'fit' persona is that of a low bodyfat percentage. However, less body fat is not a determinant of fitness, but rather a correlate. People who are fit, generally, don't carry a lot of fat. But people

who carry little fat aren't necessarily fit; think about survivors of concentration camps, the very poor, and the eating-disordered. Likewise, a low weight or BMI score is a faulty indicator of fitness. Think of the thousands (millions?) who smoke to keep their weight low through appetite suppression: they may be 10 pounds lighter than you are, but will they live longer? Are they enjoying life?

There are different kinds of fitness, of course. Runners maintain that they're most fit, but they're talking about aerobic fitness alone. Powerlifters are strong, but suffer more heart attacks than average. Gymnasts look the part, but have never shown more resistance to disease, or longer lifespans than the average; in fact, their sport has huge injury rates at the competitive level. Bodybuilders….well, come on. Martial artists are very agile; sprinters are fast; high jumpers have a lot of power. But they're all lacking elsewhere. None are good at everything. Specialization – being excellent at one thing – necessarily means the sacrifice of something else.

Our concern is the development of overall fitness: the kind that increases your lifespan, improves the life you have, broadens your horizons, keeps you 'able,' and maybe even makes you a hero. Lots more to come on that particular topic.

Different sports or specializations measure fitness differently. Until now, there has never existed an overall scale upon which to place yourself. When the 2008 Olympics were over, the popular question among athletes at Catalyst was, "Who's the better athlete – Usain Bolt, or Michael Phelps?" And the common answer was, there's no way to know.

Believe it or not, until this point, everyone's been talking about getting fit, or getting more fit, or improving fitness, and no one's developed an all-encompassing scale to measure starting points and progress. No one has put runners and powerlifters and dancers and jumpers and ping pong players on a level playing field, deconstructed their physical traits, and then compared them to one another. The wait is over.

Before we get to the CAT scale, it's helpful to see what brought us, Catalyst Fitness, to this point.

Up To This Point

In 2006, Catalyst Fitness began to study exercise adherence in depth. We put together a double-blind study to compare the adherence rates for two groups of exercisers: one group was given a booklet of exercises and a workout plan in a binder, and one was given the same booklet of exercises, but received a daily email with their workout instead.

From there, we changed variables on a rotational basis. We were very precise about detail. All we cared about was this: if we do X, are you more likely to do the workout? Will you like the exercises better if we change Y?

When we started, we had no one behind us. Government bodies took no interest. We had no funding. But we knew we needed to find out WHY people LIKE exercise before we could deliver the kind of elite coaching that we wanted to deliver.

A few things, out of the dozens we found out:

1. The common template of breaking the body into component parts and training them separately decreases adherence. You won't like it, and you probably won't do it, at least not for long.
2. If you have to do it alone, you probably won't do it for long.
3. If we name a workout, and then give it to you again later, and tell you how you did the first time, you'll do better the second time. You're more competitive than you think.
4. If we give you a monthly rank, you'll want to improve it.
5. If we tell you the BEST score or time EVER for a particular workout, you'll do better. You need a frame of reference, in other words.
6. If we connect you, anonymously, to other people doing the same workout, you're more likely to do it, and report that you enjoyed it, even if there's no chance they

Why Adherence?

Research typically tries to measure one variable at a time: strength gain, or fat lost, or another individual element of fitness (or a correlate of fitness, like weight loss.)

Here's what we DID know at the start of all this: when you start exercising for the first time, ANYTHING and EVERYTHING will work. This is how Curves stays in business. It's how people get roped into signing up for year-long memberships to their local Vibro-Gym.

The trick, as we saw it, was to keep people exercising long enough to experience those initial benefits, and open their eyes to the wider experience of exercise. After that initial period where anything and everything will improve your fitness, there follows a dip where your body is no longer challenged by your current activity level. If your trainer, coach, or program-writer doesn't dramatically change your activities, you'll stop making significant progress. This change can be horizontal (you can do something different,) or vertical (you can do more, or better, of the same) but it has to come. That's when your life changes. And that's our goal: to get you through that exciting startup period, keep you going through that 'dip,' and bring you through to our world: the world of the fit.

could find out your real identity.

7. Exercises using your bodyweight or free weights are much more enjoyable than using machines. We like free weights and bodyweight exercises for lots of other reasons, too, but this is a big one.

8. Measurement should be broad and include as many variables as possible. Throw away the scale! Measure your progress on individual workouts, loads moved, time to completion, comparison against others, feeling of well-being, towels soaked through…anything. But don't put it all on the scale. The scale as a measurement for fitness is invalid. There are just so many other factors to consider that you can't put all your eggs into one basket.

A True Measure of Fitness: The CAT Scale

We've broken 'Fitness' into its component elements. They are:

1. Cardiovascular/Respiratory Function – the ability of body systems to gather, process, and deliver oxygen.
2. Stamina – the ability of body systems to utilize, store, process, and deliver energy.
3. Strength – the ability of a muscular unit, or group of muscular units, to apply force.
4. Flexibility – the ability to maximize the range of motion at a given joint.
5. Power – the ability of a muscular unit, or combination of muscular units, to apply maximum force in minimum time.
6. Speed – the ability to minimize the time cycle of a repeated movement.
7. Coordination – the ability to combine several distinct movement patterns into a single movement.
8. Agility – the ability to minimize transition time from one movement to another.
9. Balance – the ability to control the placement of the body's centre of gravity in relation to its support base.
10. Body Composition – the maintenance of lean muscle tissue and a low bodyfat percentage.

In choosing the 10 Elements, we found our best definition through a combination of our research and Crossfit, who in turn borrowed their definitions from Jim Cawley, and Bruce Evans of Dynamax. As mentioned in the 'Catalyst and Crossfit' section (later,) we've substituted Body Composition for Accuracy, but otherwise the list is the same.

The CAT Scale assigns a value – from 0 to 10 – to each of these Elements, which will give a total of 100 possible points. Assigning an equal value to each attribute brings the idea of General Physical Preparedness to the forefront, since no Element is more important than another. What good, after all, is a 10 out of 10 in the Cardiovascular/Respiratory category if you're developing osteoporosis from overtraining and poor eating choices? Strength is also critically important in life.

The Elements are correlated, though: it's unlikely that an individual will score a 10 out of 10 in the Stamina Element, but have a high bodyfat percentage (Body Composition Element.) In that way, improving performance in one category indirectly impacts performance in another.

Can increased performance in one Element adversely affect performance in another? Of course. The closer you are to specializing in one Element, the more your score in a competing Element will suffer. Remember, our goal is broad-based, general fitness. Specialists in one Element (aka competitive athletes,) won't train for this type of GPP other than very early in the off-season.

As an example, a huge score in the Strength Test may require bodily changes that negatively effect your Coordination score. To some, that may be perfectly acceptable. But our goal is to present an overall picture of fitness.

Last question: is a score of 100 truly attainable? We think so. None of us are there yet, but who's to say it can't be done?

Measuring the 10 Elements of Fitness

Our research over the last several months of 2008 was largely in the area of validity testing. We've chosen tests for each of the 10 Elements based on:

1. Longevity – they've been around awhile
2. Peer-review – they've been used and critiqued and argued extensively
3. Scientific – they're replicable
4. Validity – they provide precisely the type of information we require
5. Simplicity – they can be done with minimal equipment
6. Rigor – while they can be performed by a novice, their level of accuracy improves in the hands of a professional.
7. Relevance – each Element must be challenging even to one specialized in that particular Element.

As an example, Element #1: Cardiovascular/Respiratory function uses the O'Neill Aerobic Test to determine aerobic capacity. We chose the O'Neill Test from literally thousands of tests done with varying pieces of equipment. We picked O'Neill over V02Max testing because of equipment availability and new research questioning the replicability of breath-measuring tests. We chose the ergometer over running for the test because different variables unrelated to aerobic prowess can influence a running test (injury, muscular fatigue, and technique.) The O'Neill Test has been thoroughly validated in the scientific literature, is replicable anywhere, is simple to perform (just go as far as possible in 4:00,) and can be done by anyone, but is more accurate when coached by a professional.

Each test selection required the same level of scrutiny. While we advocate the CAT Score system for use in the non-competitive population, it can serve as a measuring stick (and sometimes a real eye-opener!) for professional athletes.

One final note on relevance: Different specializations (ie athletes in different sports,) measure different physical attributes according to different scales. Runners call hill running 'strength training,' and powerlifters call kettlebell swinging 'cardio.' We've chosen tests that would be applicable even to their specialists. We haven't gone for a spectrum of relativity here: if you're a golfer, and you're 'agile enough' for golf, that doesn't mean you're 'agile enough' on the larger scale. If you're 'strong for a runner,' well, that just isn't enough on a broad, general scale, of which running is only a small part. Other Elements of fitness may be seriously lacking.

Using The CAT Score To Improve Fitness

Your Total CAT Score, out of 100 possible points, is a nice figure to have. It will be motivational, for one thing, and give you a good overall sense of your fitness. However, the real treasure is in the individual Element scores and how they compare to one another.

Since total fitness depends on each of the 10 Elements equally, large discrepancies will indicate potential health hazards. They will also provide guidance when establishing workout plans and training priorities.

To use the Strength vs. Cardiovascular capacity example again, you may find that your Strength score is a 9 out of 10 (if that's true, way to go! Great!) But if your Cardiovascular score isn't even close (a 3 or 4? Uh-oh!) then you may wish to reexamine your training priorities; your health may be at risk. Since an obese person can still have a terrific Strength score, dominance in one category at the expense of another is not a great idea. More support in favour of developing general, broadly-applied fitness.

To flip that example on its head, a runner who scores a 9.25 out of 10 on the Cardiovascular score may be more likely to become injured while moving a load, or develop osteoporosis, or suffer a joint injury as a result of muscle imbalance.

When you look at your overall CAT Score, search out the biggest discrepancy between Elements. When in doubt, just find the Element in which you scored lowest. Prioritize that Element in your training. Do the activity (activities) necessary to improve that Element's Score early in the week; pursue them with greater intensity; seek professional guidance; play a sport where that Element is the dominant one.

If your Strength score is 9, and your Cardiovascular score is 3, begin training for a 5k running race, for example. Spend more time reading about running, putting miles under your feet, getting coaching, and running with friends. Maintaining your strength level as a secondary goal is fine, but prioritize the Cardiovascular Element for a few months. Don't worry, your strength won't completely desert you, and you can always come back to it later. Our argument is that a 3-point improvement in one Element is worth the sacrifice of 1 point in another. You're still 2 points ahead in your total CAT score. Again, competitive athletes may be unwilling to slip even one point in the Element of their specialty; that's obvious. That's where a professional comes in: to minimize slippage in one Element while drastically improving your score in another Element.

Catalyst and Crossfit

In 2005, an athlete mentioned Crossfit to me. We were in the pit at the St. Joseph Island Triathlon (a great local race, www.stjosephislandtriathlon.com) and he asked me if I'd heard of it. My initial response was something like, "That sounds like bulls---."

Keep in mind that, in 2005, I was a product of my education up until that point. I was primarily familiar with athletic training (specialization, in other words,) and bodybuilding. I thought that 'fitness' was a combination of the two. It wasn't until we started conducting our own research that I started to contradict my own education. And it wasn't until we'd done two YEARS of studying variables that I had to change my mind: we were no longer studying fat loss, or running speed, or strength, or even adherence. We were studying all of them. We were studying Crossfit.

To use the Crossfit community's own definition, CrossFit is a strength and conditioning system built on constantly varied, if not randomized, functional movements executed at high intensity.

But Crossfit is also whole-body exercise. It's heavy lifting, but it's also gymnastics, sprinting, running, Olympic lifting, calisthenics, and a game. Most Crossfit enthusiasts call it 'The Sport of Fitness,' because it's predicated on the simple idea of raising work capacity (General Physical Preparedness, or GPP.) And it's fun.

When we, at Catalyst, talk about raising each person's CAT score, we're talking about increasing their GPP. That is, we want to make everyone generally good at everything without specializing in anything, except in the case of the athlete, where specialization is obviously the norm.

Our definitions of fitness, and the different elements therein, are the same as Crossfit's definitions, with one exception: body composition. We believe that body composition is independent enough of the other measurements to warrant its own score. For simplicity, we've substituted body composition as one of our 10 elements in place of Crossfit's 'Accuracy' element. Accuracy relies not only on your body, but also on an external implement (for instance, the quality and materials of the ball will determine your accuracy in its throw as much as your own spatial awareness will.) However, body composition is not standard among non-exercisers; your genetics play a role. That's why we give body composition equal weight when considering our 10 elements of fitness.

That said, we often use Crossfit to help our clientele achieve higher CAT scores. And it works well. Crossfit training is second only to using a Catalyst Trainer when it comes to improving your overall fitness. It integrates most (if

not all) of the components we discovered were necessary to increase adherence.

A final idea which may raise questions: that the Jack of all trades is master of none. While we avoid specialization in a given sporting event, you can become excellent at different categories of fitness – even categories that may seem mutually exclusive – without detriment. True, an Olympic-level weightlifter may never win the Olympic Marathon, but that doesn't mean they can't run 5km without throwing up. There's more overlap between physical traits than there is friction. The best Olympic weightlifters, for instance, are excellent sprinters, at least at short distances. High jumpers have high levels of coordination. Soccer players, in general, have not only good aerobic endurance, but also high stamina levels.
Some recreational gym-goers may be afraid to lose muscularity in their pursuit of anaerobic excellence, but they need not worry. Only at the very elite levels (meaning a very specific skill set) is there risk of performance decline when training other fitness traits.

Testing Overview

1. Cardiovascular/Respiratory Function – the ability of body systems to gather, process, and deliver oxygen.
   Test: O'Neill 4-Minute Test (Concept II)

2. Stamina – the ability of body systems to utilize, store, process, and deliver energy.
   Test: Tabata Squat and Pushup

3. Strength – the ability of a muscular unit, or group of muscular units, to apply force.
   Test: Crossfit Total

4. Flexibility – the ability to maximize the range of motion at a given joint.
   Tests: Trunk Rotation, 90/90 Hamstrings Test, V-Sit Test, Shoulder Flexibility Test, Posterior Chain Test

5. Power – the ability of a muscular unit, or combination of muscular units, to apply maximum force in minimum time.
   Test: Vertical Jump Test (Sargent Jump)

6. Speed – the ability to minimize the time cycle of a repeated movement.
   Test: 40yd sprint

7. Coordination – the ability to combine several distinct movement patterns into a single movement.
   Test: Skipping.

8. Agility – the ability to minimize transition time from one movement to another.
   Test: Dots Drill.

9. Balance – the ability to control the placement of the body's centre of gravity in relation to its support base.
   Test: Stork Test

10. Body Composition – the maintenance of lean muscle tissue and a low bodyfat percentage.
    Test: Skinfold Measurement

Testing Order

Since fatigue from one type of test can influence the score of the next, it's important to perform the tests in such an order that fatigue is minimized. During the initial testing period, perform the tests in this order:

Aerobic (O'Neill Test)
Body Composition
Flexibility
Power
Speed
Balance
Agility
Coordination
Stamina

…the **Strength** test (Crossfit Total) may be performed on a different day, following a general and then specific warm-up, due to the heavy central nervous system taxation on elite clients.

Retesting is done on a test-by-test basis, but never again on the same day. Crossfit will dictate that some tests (stamina, strength) are done on a fairly random basis, but others should be planned for retest based on their typical rate of improvement. For instance, aerobic capacity should be retested after 3 weeks of training, because aerobic capacity is typically improved after that period.

The Tests

Element #1: Cardiovascular/Respiratory Function – the ability of body systems to gather, process, and deliver oxygen.

Four Minute O'Neill Fitness Test
The O'Neill Fitness Test is designed to give a simple and reliable test of aerobic fitness.

After about 10 minutes of familiarization with the Concept2 Indoor Rower, the test can be carried out to get an indication of baseline aerobic fitness by simply comparing the distance covered in four minutes on the chart.

Further regular tests will indicate progress and are suitable for people of all ages and gender.

Test Protocol
Set the monitor on the Concept2 Indoor Rower for four minutes.

Row for four minutes (wind resistance set to '3.')

Look for your age and weight category in the left hand column.

Find your distance covered and check your condition from the row at the top.

Women	Excellent	Good	Above Average	Average	Below Average
19-29 Lwt	1078	1038	958	878	798
30-39 Lwt	1050	1010	929	849	769
40-49 Lwt	1030	990	909	829	749
50-59 Lwt	1011	971	891	811	730
60-69 Lwt	992	951	871	791	711
70-79 Lwt	973	933	852	772	692
19-29 Hwt	1105	1065	985	905	824
30-39 Hwt	1057	1017	936	856	776

40-49 Hwt	1044	1004	923	843	763
50-59 Hwt	1037	997	917	836	756
60-69 Hwt	1023	983	903	823	743
70-79 Hwt	944	904	823	743	663

Lwt = 61.5Kg or less (9st 9lb)

Men	Excellent	Good	Above Average	Average	Below Average
19-29 Lwt	1243	1203	1122	1042	962
30-39 Lwt	1227	1187	1107	1026	946
40-49 Lwt	1208	1168	1087	1007	927
50-59 Lwt	1172	1132	1051	971	891
60-69 Lwt	1131	1091	1011	931	850
70-79 Lwt	1052	1012	931	851	771
80-89 Lwt	953	912	832	752	672
19-29 Hwt	1281	1241	1161	1080	1000
30-39	1237	1197	1117	1037	957

Hwt					
40-49 Hwt	1219	1178	1098	1018	938
0-59 Hwt	1182	1142	1062	982	901
60-69 Hwt	1141	1101	1021	940	860
70-79 Hwt	1061	1020	940	860	780
80-89 Hwt	993	953	872	792	712

Lwt = 75Kg or less (11st 11lb)

Juniors	Excellent	Good	Above Average	Average	Below Average
Women J12	886	846	766	685	605
Women J13	956	916	835	755	675
Women J14	999	955	885	795	725
Women J15	1042	1001	921	841	761
Women J16	1074	1034	954	874	793
Women J17	1109	1069	988	908	828
Women J18 Lwt	1046	1006	926	846	765
Women J18 Hwt	1100	1060	980	899	819

Men Junior 12	888	848	768	687	607
Men Junior 13	1008	967	887	807	727
Men Junior 14	1095	1055	974	894	814
Men Junior 15	1171	1130	1050	970	890
Men Junior 16	1212	1172	1092	1011	931
Men Junior 17	1251	1211	1130	1050	970
Men Junior 18 Lwt	1221	1180	1100	1020	940
Men Junior 18 Hwt	1281	1241	1161	1081	1000

Lwt = 75Kg or less (11st 11lb)

Scoring for CAT Test:

Aerobic	Test: O'Neill Test	Points
Excellent		10
Very Good		9
Good		8
Above Average		7
Average		6
Below Average		5
Below Average – 100		4
Below Average – 200		3
Below Average – 300		2
Below Average – 400		1

Element #2: Stamina – the ability of body systems to utilize, store, process, and deliver energy.

Test: Tabata Squat and Pushup

For twenty seconds do as many reps of the assigned exercise as you can - then rest 10 seconds. Repeat this seven more times for a total of 8 intervals, 4 minutes total exercise. The score is the least number of reps for any of the eight intervals.

Start with a bodyweight squat. The athlete's thighs must reach parallel, as defined in the 'strength' category. Arms may either travel in front of the torso or stay on the hips, but must not make contact with the floor or the thigh.

Following 8 rounds of the squat, the athlete has only their normal 10-second break to set up for the pushup.

Scoring: take the lowest number of reps achieved from the 8 sets of squats, and add it to the lowest number of reps achieved from the 8 sets of pushups.

Example(using 3 rounds only)

Round	SQ	PU
1	18	15
2	17	16
3	19	14

The lowest number of reps achieved is 17 in the SQ, and 14 in the PU. Total of 31 reps.

Score Chart:

MALE(reps)	FEMALE(reps)	
>45	>40	10
40-45	35-39	9
35-39	30-34	8
30-34	25-29	7
25-29	20-24	6
20-24	15-19	5
15-19	10-14	4
10-14	5-9	3
5-9	1-4	2
1-4	0	1

Element #3: Strength – the ability of a muscular unit, or group of muscular units, to apply force.

Test: Crossfit Total

Crossfit Total is based on the powerlifting meet template. Powerlifting meets are set up to maximally test pushing strength, lower-body extension strength, and whole-body pulling strength, using the back squat, bench press, and Deadlift. Crossfit, though, chooses to use the Press instead of the bench press. The reasons go back to the origins of weightlifting (that is, Olympic Weightlifting,) when there were 3 events: the Clean, the Press, and the Snatch. The Press was dropped from Olympic competition eventually. The Squat, Bench Press, and Deadlift were all originally accessory movements to help increase the Clean and Jerk and Snatch. Powerlifting is the ultimate test of those 3 movements. Crossfit Total is a terrific tool for testing the same measure of strength without using the bench press.
The order for performing the three lifts will be squat, press, and then deadlift. The best single attempt for each of the three lifts are added together for the CrossFit Total.
There is no time limit for each lift or for the length of the session in which they are all performed, but they must all be performed during one session—i.e., you cannot leave the area to rest or perform other activities between the three lifts. Multiple progressions to the best attempt are not allowed; do not work up to your best squat, then change an item of equipment or clothing and work up to it again to try to better your first effort.

Squat Rules

The squat must be done from the squat stands or power rack. The bar must be placed on the back and walked out to clear the rack completely. No contact with the rack is permitted until the bar is replaced in the rack. Once the bar is lowered, the stance cannot change until the bar is to be racked. The starting position must be completely upright, with the knees and the hips fully extended and with the chest up. The hips are lowered until the top surfaces of both of the legs at the hip joint are lower than the knees, and then the bar is lifted back up. The bottom position is identified by A) the apex of the crease in the shorts formed as the hips

are lowered, B) the surface of the top of the patella, C) the plane formed by a straight line between the two, and D) the dipping of the hip end of that plane below horizontal. The finish position is the same as the starting position, and the athlete must return to it before the bar is racked. When the finish position is secure, the bar must be walked back into the rack and successfully replaced. Any halt in the upward motion of the whole bar, identified at its position on the back rather than at its ends, constitutes a missed attempt, as does any change in position of the feet against the floor during the squat. Any deliberate attempt to lower the bar counts as an attempt. No more than two spotters are permitted, and they are not allowed to touch the bar during the attempt, which is finished only after the bar is successfully replaced in the racks. The spotters are permitted to steady the racks, and to take the bar if the lifter loses control of it. Any touching of either the bar or the lifter by any spotter invalidates the attempt.

Press Rules

The press is also done from the racks. The bar is held in both hands in front of the neck, taken out of the rack and walked back away from the rack. No contact with the rack is permitted until the bar is replaced in the racks. Once the stance is assumed it cannot change until the lift is completed. The starting position must be upright, with the knees and hips fully extended and the chest up. The bar must be in contact with the top of the shoulders or the chest, whichever individual flexibility permits. After the starting position is correctly assumed, the bar is pressed overhead until the elbows are completely extended, with the bar in a position directly above the ears. Once this position has been attained, the bar is lowered back to the front of the shoulders and walked back into the rack and replaced. Any halt in the upward motion of the bar, identified as the part of the bar between the hands, constitutes a missed attempt, as does any change in the position of the feet against the floor during the attempt, any bending of the knees, or excessive backward lean of the torso as identified by A) the position of the most anterior aspect of the armpit, B) the most posterior aspect of the buttocks, C) the plane formed by a straight line between these two points, and D) the movement of that plane to a position behind the vertical. Any deliberate attempt to raise the bar counts as an attempt. Spotters are not permitted for this lift.

Deadlift Rules

The deadlift is performed with the bar on the platform or floor. The lifter assumes a position facing the bar, with the bar parallel to the lifter's frontal plane. The bar is gripped with both hands, and pulled with one continuous uninterrupted movement until the lifter is standing erect with knees and hips fully extended, the chest up and shoulders back. Once this position is attained and the bar is motionless, the bar is lowered under control with both hands back to the ground. The bar may not be dropped. Any halt in the upward motion of the bar constitutes a missed attempt, as does failure to assume a fully erect position with both knees and hips extended. Any attempt to raise the bar counts as an attempt. The equipment that can be used is minimal. A belt of any type can be worn but is not required. Knee wraps or sleeves are permitted, but if they are used they must be left on for the entire duration of the session in which the lift is performed—e.g., they must be put on before the squat is warmed up and left in place until the last squat attempt is completed. Wrist wraps are permitted; lifting straps are not.

Any type of footwear may be worn, although a formal contest would require an actual shoe of some type. The shirt should be a close-fitting stretch material, like a t-shirt or a golf shirt, tight enough that the back position can be clearly observed during the press. Close-fitting shorts will allow the bottom position in the squat to be observed.

Long pants are not permitted, and neither the shirt nor the shorts can have any supportive characteristics whatsoever. Singlets are not allowed.

The process

Now that we know exactly what we're doing, we need to figure out the best way to do it. For people not used to doing single maximum attempts, some tips on how best to safely do them are in order. After a warm-up, the squat will be performed first. Some squatting with the empty bar should have been included in the general warm-up so that the knees, hips, back, and shoulders are not too terribly surprised. Anyone in a position to attempt a legitimate CrossFit Total should be familiar enough with their capabilities on the lifts to have a fairly good idea of just what might be possible for a one-rep max (1RM). This number is what you warm

up intending to do. A meet situation will involve three attempts, and this is a good way to determine a true 1RM.

The first attempt would be a weight you know you can do for a heavy set of three. The second attempt would be a weight you know without any doubt that you could do for a single, having just done the first attempt. And the third attempt is the weight you want to do, based on your performance on the previous two attempts. If you have made a mistake setting your first attempt, the next two will need to be adjusted, but you should know what you can triple, and this will always be a safe first attempt. And since you know this weight, you know what weights to use to warm up for it: you'll use the lightest weight that you normally start with for your first warm-up when you train, and 90% of the first attempt for the last warm-up, with either three or four relatively even increments in between these two. For instance, warm-ups for a 405-pound first attempt on the squat would be:

135 x 5

185 x 3

225 x 2

275 x 1

325 x 1

365 x 1

After the squat, rest a while (long enough to rest, not long enough to get cold) and follow the same procedure with the press. Since press numbers will be much lighter, the warm-ups will be closer together, and you might choose to use fewer intermediate warm-ups. This is fine, since the squat has provided quite a bit of systemic warmup, if not actual fatigue. After a rest and a drink following the press, the deadlift warm-up might be abbreviated even further, with a heavier first warmup and only two or three intermediate sets before the first attempt.

Done correctly, the CrossFit Total is perhaps our best tool for telling us the things we need to know about a very important aspect of fitness: Strength.

Scoring:

Strength	Crossfit Total	Points
>1200m/>1000w		10
>1100m/>900w		9
>1000m/>800w		8
>900m/>700w		7
>800m/>600w		6
>700m/>500w		5
>600m/>400w		4
>500m/>300w		3
>400m/>200w		2
>300m/>100w		1

Element #4: Flexibility – the ability to maximize the range of motion at a given joint.

Test: Sum of 5 (2 points available for each. In measuring both arms/legs, take the average of both to determine score, out of a possible 2 points.)

Testees should be shoeless for all of these tests.

Flexibility Test A: Trunk Rotation

The purpose of this flexibility test is to measure trunk and shoulder flexibility, which is important for injury prevention and in particular is important in swimming, racquet sports and throwing sports.

equipment required: wall, a piece of chalk or pencil, ruler or tape measure.

description / procedure: Mark a vertical line on the wall. Stand with your back to the wall directly in front of the line, with your feet shoulder width apart. You should be about arms length away from the wall, though you may need to adjust the distance from the wall once you start the test. Extend your arms out directly in front of you so they are parallel to the floor. Twist your trunk to your right and the touch the wall behind you with your fingertips, keeping your arms extended and parallel to the floor. You are allowed to turn your shoulders, hips and knees as long as your feet don't move. Mark the position where your fingertips touched the wall, and measure the distance from the line. A point before the line is a negative score and a point after the line is a positive score. Repeat for the left side with your feet in the same position.

scoring: Take the average of the 2 scores (left and right sides). Use the table below to convert the score measurement to a rating.

Ratings	Score	CAT Score
Excellent	20 cm	2.0
Good	15 cm	1.5

Very Good	10 cm	1.0
Fair	5 cm	0.5
Poor	0 cm	0

Flexibility Test B: Groin

purpose: This simple test measures the flexibility in the adductor muscles.

equipment required: ruler or tape measure.

description / procedure: Sit on the floor with your knees bent, and your feet flat on the floor and legs together. Let your knees drop sideways as far as possible keeping your feet together. The soles of your feet should be together and facing each other. Hold on to your feet with both hands, and pull you ankles as close to your body as possible. Measure the distance from your heels to your groin.

scoring: Use the table below to convert the score measurement to a rating.

Ratings	Score	CAT Score
Excellent	5 cm	2.0
Good	10 cm	1.5
Very Good	15 cm	1.0
Fair	20 cm	0.5

Poor	25 cm	0

Flexibility Test C: Shoulder

purpose: To test the flexibility of the shoulder joint, which is important for injury prevention and in particular is important in swimming, racquet sports and throwing sports.

description / procedure: Test your left shoulder by standing with your right arm straight up, then bend your elbow so your hand hangs behind your head. Keeping your upper arm stationary, rest your palm between your shoulder blades. Reach around behind you with your left arm so the palm is facing out and try to touch the fingers of both hands together. Reverse the procedure and repeat with the opposite shoulder.

scoring: measure the minimum distance between hands. See the table below for general guidelines for interpreting the results

RANK	Specifications	CAT Score
Good	Fingers are touching	2.0
Fair	Fingertips are not touching but are less than two inches apart.	1.0
Poor	Fingertips are greater than two inches apart.	0

equipment required: ruler or tape measure.

Flexibility Test D: 90/90 or Active Knee Extension (AKE)

purpose: to assess the range of active knee extension in a position of hip flexion, as required in running and kicking.

equipment required: goniometer with extended arms and spirit level (optional), and a firm table.

description / procedure: The subject lies supine, head back and arms across the chest. The hip is passively flexed until the thigh is vertical (use the spirit level if available). Maintain this thigh position throughout the test, with the opposite leg in a fully extended position. The foot of the leg being tested is kept relaxed, while the leg is actively straightened until the point when the thigh begins to move from the vertical position. The thigh angle at this point is recorded.

measurement: measure the minimum angle of knee flexion with the thigh in the vertical position. The measurement unit is degrees. If the leg is able to be fully straightened, the angle would be recorded as 0. Any degree of flexion will be recorded as a positive number, e.g. 10, 20 degrees etc. In cases where the full knee extension is achieved without thigh movement, the knee is flexed and the thigh is moved to 30 degrees past the vertical position, and the knee again straightened. The angle of knee flexion at which the thigh begins to move is again recorded.

RANK	Specifications	CAT Score
Great	Angle 0	2.0
Good	Angle 10 degrees	1.5
Fair	Angle 20 degrees	1.0
Sub	Angle 30 degrees	0.5

Poor	Angle >30 degrees	0

Flexibility Test E: Posterior Chain

purpose: to assess the ability of the posterior chain musculature to move and flex as a unit, without a particular muscle group (or group thereof) limiting the unit as a whole.

equipment required: goniometer with extended arms

description / procedure: The subject stands with hands on hips, and descends into a squat position slowly, keeping his heels on the ground (barefoot or sock feet only.) Hip angle is measured at the point where the heels rise from the floor using the goniometer.

RANK	Specifications	CAT Score
Great	Angle <45	2.0
Good	Angle 45-75 degrees	1.5
Fair	Angle 75-90 degrees	1.0
Sub	Angle 90-120 degrees	0.5
Poor	Angle >120 degrees	0

Scoring for CAT Test:

Flexibility	SUM of 5	Points	
			10
Trunk:			9
Groin:			8
Shoulder:			7
AKE:			6
Pos. Chain:	+		5
	=		4
			3
			2
			1

Element #5: Power – the ability of a muscular unit, or combination of muscular units, to apply maximum force in minimum time.

Test: Vertical Jump Test (Sargent Jump)

This procedure describes the method used for directly measuring the height jumped. There are also timing systems that measure the time of the jump and from that calculate the vertical jump height.

equipment required: measuring tape or marked wall, chalk for marking wall (or Vertec or jump mat.)

description / procedure (see also variations below): the athlete stands side on to a wall and reaches up with the hand closest to the wall. Keeping the feet flat on the ground, the point of the fingertips is marked or recorded. This is called the standing reach. The athlete then stands away from the wall, and jumps vertically as high as possible using both arms and legs to assist in projecting the body upwards. Attempt to touch the wall at the highest point of the jump. The difference in distance between the standing reach height and the jump height is the score. The best of three attempts is recorded.

scoring: The jump height is usually recorded as a distance score. The table below provides a ranking scale for adult athletes based on my observations, and will give a general idea of what is a good score. For more information, see a selection of vertical jump test results. It is also possible to convert vertical jump height into a power or work score.

rating	males (inches)	males (cm)	females (inches)	females (cm)
excellent	> 28	> 70	> 24	> 60
very good	24 - 28	61-70	20 - 24	51-60
above average	20 - 24	51-60	16 - 20	41-50
average	16 - 20	41-50	12 - 16	31-40
below average	12 - 16	31-40	8 - 12	21-30

poor	8 - 12	21-30	4 - 8	11-20
very poor	< 8	< 21	< 4	< 11

Scoring for CAT Test:

Power	Vertical Jump	Points
> 70	> 60	10
61-70	51-60	9
51-60	41-50	8
41-50	31-40	7
31-40	21-30	6
21-30	11-20	5
< 21	< 11	0
MALE(cm)	FEMALE(cm)	0
		0
		0

Element #6: Speed – the ability to minimize the time cycle of a repeated movement.

Test: The 40 Yard Dash

purpose: The aim of this test is to determine acceleration, and also a reliable indicator of speed, agility and quickness.

equipment required: measuring tape or marked track, stopwatch or timing gates, cone markers, flat and unobstructed grass, track, or turf surface of at least 60 yards.

description / procedure: The test involves running a single maximum sprint over 40 yards, with the time recorded. A thorough warm up should be given, including some practice starts and accelerations. Start from a comfortable stationary 3-point stance position, a position that is most familiar to you and that you think will yield the best time. The front foot must be on or behind the starting line. This starting position should be held for 3 seconds prior to starting, you may lean across the starting line, and no rocking movements are allowed. The tester should provide hints to maximizing speed and encouragement to continue running hard past the finish line.

40 yard Sprint Scores (general guidelines)	
College Footballers	4.6 - 4.9 secs
High School Footballers	4.9 - 5.6 secs
Recreational College athletes (male)	~5.0 secs
Recreational College athletes (female)	~5.8 secs

results: Two trials are allowed, and the best time is recorded to the nearest 2

decimal places. The timing starts from the first movement (if using a stopwatch) or when the timing system is triggered, and finishes when the chest crosses the finish line and/or the finishing timing gate is triggered.

target population: football and other sports in which speed over that distance is important

comments: 40 yards is 36.58 meters.

Scoring for CAT Test:

Speed	40yd Dash	Points
<4.0	4.1-4.5	10
4.1-4.5	4.6-5.0	9
4.6-5.0	5.1-5.5	8
5.1-5.5	5.6-6.0	7
5.6-6.0	6.1-6.5	6
6.1-6.5	6.6-7.0	5
6.6-7.0	7.1-7.5	4
7.1-7.5	7.6-8.0	3
7.6-8.0	8.1-9.0	2
8.1-9.0	9.1-10.0	1
MALE(s)	FEMALE(s)	

Element #7: Agility – the ability to minimize transition time from one movement to another.

Test: Dot Drill

First conceived by basketball coach Adolph Rupp in the 1940's, and then later popularized by Bigger Faster Stronger Inc. a few decades later, the dot drill is both a remarkable agility, foot strength, and anaerobic conditioning exercise, as well as a superb and easy-to-administer testing tool.

It is unique in that it creates not only a high level of fatigue, but also a high quality of fatigue, making agility tougher. Agility has also been described as the time necessary to move from one direction of movement to another at full speed; the Dot Drill is nothing more complicated than that.

The dot drill is a battery of 5 separate drills, performed in rapid succession, with each drill performed six times in a row before proceeding to the next drill (please refer to the diagram as you read the description).

Dot Drill Schematic

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The dot drill features (5), five-inch diameter dots orientated in a pattern similar to the five dots on a pair of dice, expect that the "square" is three feet by two feet. Use a solid surface such as weight room matting, and tie your shoelaces. Tight.

Begin the drill as follows:

First drill: Starting position: your left foot is on "A" and your right foot on "B." Hop forward and touch "C" with both feet simultaneously, then continue forward so that your left foot lands on "D" at the same instant your right foot lands on "E." (a total of 2 hops). Now go back to the starting position by reversing what you just did (hopping backward). That's one rep. Repeat for a total of six reps.

Second drill: From the starting position, lift your left foot in the air and with right foot only, hop to "C," "E," "D," "C," "A," and back to "B." That's one rep. Repeat for a total of six reps.

Third drill: Repeat the last drill but using the left foot only (hop to "C," "E," "D," "C," "A," and back to "B.") That's one rep. Repeat for a total of six reps.

Fourth drill: Repeat the last drill but using both feet, keeping the feet together- this looks somewhat like a skiing drill. Repeat for a total of six reps.
Fifth drill: This is very similar to drill number one, with a slight variation: When you reach the top of the pattern (left foot on "D" and your right foot on "E."), instead of hopping backward to get back to the starting position, you instead jump-spin and land on the same two dots (only now your left foot will be on "E" and your right foot on "D."), facing the opposite direction. Then hop forward and touch "C" with both feet simultaneously, then continue forward so that your left foot lands on "B" and your right foot on "A." Lastly, jump-spin again to assume the starting position. That's one rep. Repeat for a total of six reps.
Errors: Subtract .10 seconds for every missed dot from the total time.

TABLE 1

BFS Dot Drill Standards

Agility	Dots Drill	Points
<40	<45	10
40-44	45-49	9
45-49	50-54	8
50-54	55-59	7
55-59	60-64	6
60-64	65-69	5
65-69	70-74	4
70-74	75-79	3
75-79	80-84	2
80-84	85-90	1
MALE(s)	FEMALE(s)	

Element #8: Balance – the ability to control the placement of the body's centre of gravity in relation to its support base.

Test: Stork Balance Stand Test

purpose: To assess the ability to balance on the ball of the foot.

equipment required: flat, non-slip surface, stopwatch, paper and pencil.

description / procedure: Remove the shoes and place the hands on the hips, then position the non-supporting foot against the inside knee of the supporting leg. The subject is given one minute to practice the balance. The subject raises the heel to balance on the ball of the foot. The stopwatch is started as the heel is raised from the floor. The stopwatch is stopped if any of the follow occur:

1 the hand(s) come off the hips
2 the supporting foot swivels or moves (hops) in any direction
3 the non-supporting foot loses contact with the knee.
4 the heel of the supporting foot touches the floor.

Rating	Score (seconds)	CAT Score
Excellent	> 50	10
	45-49	9
Good	40-44	8
	35-39	7
Average	30-34	6
	25-29	5
Fair	20-24	4
	15-19	3
Poor	10-14	2

	5-9	1

Scoring: The total time in seconds is recorded. The score is the best of three attempts.

Element #9: Body Composition – the maintenance of lean muscle tissue and a low bodyfat percentage.

Test: Skinfold Measurement

description / procedure: Estimation of body fat by skinfold thickness measurement. Measurement can use from 3 to 9 different standard anatomical sites around the body. The right side is usually only measured (for consistency). The tester pinches the skin at the appropriate site to raise a double layer of skin and the underlying adipose tissue, but not the muscle. The calipers are then applied 1 cm below and at right angles to the pinch, and a reading in millimeters (mm) taken two seconds later. The mean of two measurements should be taken. If the two measurements differ greatly, a third should then be done, then the median value taken.

results: Because of the increased errors involved, it is usually not appropriate to convert skinfold measures to percentage body fat (%BF). It is best to use the sum of several sites to monitor and compare body fat measures. In order to satisfy those who want to calculate a percentage body fat measure, there is a sample of equations for calculating this here. Below is a table of general guidelines for using total sum (in millimeters) of the seven main skinfold sites (tricep, bicep, subscap, supraspinale, abdominal, thigh, calf)

		Excellent	good	average	Below average	poor
Normal	Male	60-80	81-90	91-110	111-150	150+
	Female	70-90	91-100	101-120	121-150	150+
Athletic	Male	40-60	61-80	81-100	101-130	130+

	Female	50-70	71-85	86-110	111-130	130+

equipment required: skinfold calipers (e.g. Harpenden, Holtain, Slimglide, Lange). These should be calibrated for correct jaw tension and gap width.

target population: suitable for all populations, though it is sometimes difficult to get reliable measurements with obese people.

CAT Scoring: sum of skinfolds (mm)

Body Composition		Points
41-50	50-60	10
51-60	61-70	9
61-70	71-80	8
71-80	81-95	7
81-90	96-110	6
91-100	111-125	5
101-110	126-140	4
111-120	141-155	3
121-130	156-170	2
131-150	171-190	1
MALE(mm)	FEMALE(mm)	

Element #10: Coordination – the ability to combine several distinct movement patterns into a single movement.

Test: Skipping.

The client performs a simple two-foot skip with a jump rope (leather or vinyl, not cotton.) They're timed. Any stoppage of the rope results in a stop of the clock. Clients are allowed two attempts.
CAT Score:

Coordination	Skipping	Points
<10mins		10
9-10mins		9
8-9mins		8

7-8mins	7
6-7mins	6
5-6mins	5
4-5mins	4
3-4mins	3
2-3mins	2
1-2mins	1

Aerobic	O'Neill	Points	
Excellent			10
Very Good			9
Good			8
Above Average			7
Average			6
Below Average			5
Below Average - 100			4
Below Average - 200			3
Below Average - 300			2
Below Average - 400			1

Stamina	Tabata SQ/PU	Points	
>45	>40		10
40-45	35-39		9
35-39	30-34		8
30-34	25-29		7
25-29	20-24		6
20-24	15-19		5
15-19	10-14		4
10-14	5-9		3
5-9	1-4		2
1-4	0		1
MALE(reps)	FEMALE(reps)		

Strength	Crossfit Total	Points	
>1200m/>1000w			10
>1100m/>900w			9
>1000m/>800w			8
>900m/>700w			7
>800m/>600w			6
>700m/>500w			5
>600m/>400w			4
>500m/>300w			3
>400m/>200w			2
>300m/>100w			1

Flexibility	SUM of 5	Points	
			10
Trunk:			9
V-Sit:			8
Shoulder:			7
AKE:			6
Pos. Chain:	+		5
	=		4
			3
			2
			1

Power	Vertical Jump	Points	
> 70	> 60		10
61-70	51-60		9
51-60	41-50		8
41-50	31-40		7
31-40	21-30		6
21-30	11-20		5
< 21	< 11		0
MALE(cm)	FEMALE(cm)		0
			0
			0

Speed	40yd Dash	Points	
<4.0	4.1-4.5		10
4.1-4.5	4.6-5.0		9
4.6-5.0	5.1-5.5		8
5.1-5.5	5.6-6.0		7
5.6-6.0	6.1-6.5		6
6.1-6.5	6.6-7.0		5
6.6-7.0	7.1-7.5		4
7.1-7.5	7.6-8.0		3
7.6-8.0	8.1-9.0		2
8.1-9.0	9.1-10.0		1
MALE(s)	FEMALE(s)		

Coordination	Skipping	Points	Agility		Points
>10mins		10	<40	<45	10
9-10mins		9	40-44	45-49	9
8-9mins		8	45-49	50-54	8
7-8mins		7	50-54	55-59	7
6-7mins		6	55-59	60-64	6
5-6mins		5	60-64	65-69	5
4-5mins		4	65-69	70-74	4
3-4mins		3	70-74	75-79	3
2-3mins		2	75-79	80-84	2
1-2mins		1	80-84	85-90	1
<1min		0	MALE(s)	FEMALE(s)	

Balance	Stork Test	Points	Body Composition		Points
> 50		10	41-50	50-60	10
45-49		9	51-60	61-70	9
40-44		8	61-70	71-80	8
35-39		7	71-80	81-95	7
30-34		6	81-90	96-110	6
25-29		5	91-100	111-125	5
20-24		4	101-110	126-140	4
15-19		3	111-120	141-155	3
10-14		2	121-130	156-170	2
5-9		1	131-150	171-190	1
0-5		0	MALE(mm)	FEMALE(mm)	