

Govan High  
HIGHER

**PREPARATION OF THE  
BODY**



**SWIMMING**

Name.....

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Key Concept	Key Feature
<p><b>KC 1: Fitness assessment in relation to personal performance and the demands of activities</b></p>	<p>Consider how fitness assessment can contribute to performance and training through either of the following:</p> <ul style="list-style-type: none"> <li>• the accurate collection and recording of data in standard tests or in full performance context.</li> </ul> <p>For example:  <b>Physical</b> - 12 min Cooper, Leger, Sit and Reach  <b>Skill-related</b> - Ruler drop, Alternate hand throw</p> <ul style="list-style-type: none"> <li>• identifying strengths and weaknesses in relation to physical, mental or skill-related fitness.</li> </ul>
	<p>Consider the use of test results to help planning and monitoring of training programmes for performance improvement.</p>
<p><b>KC3: Physical, skill-related and mental types of fitness</b></p>	<p>All types of fitness should be covered, as well as 2 aspects of fitness from each type which are to be studied in depth</p> <p>Physical Aspects: Cardio Respiratory Endurance, Muscular Endurance, Strength, Speed, Power, Flexibility.</p> <p>Skill Related Aspects: Reaction Time, Agility, Coordination, Balance</p>

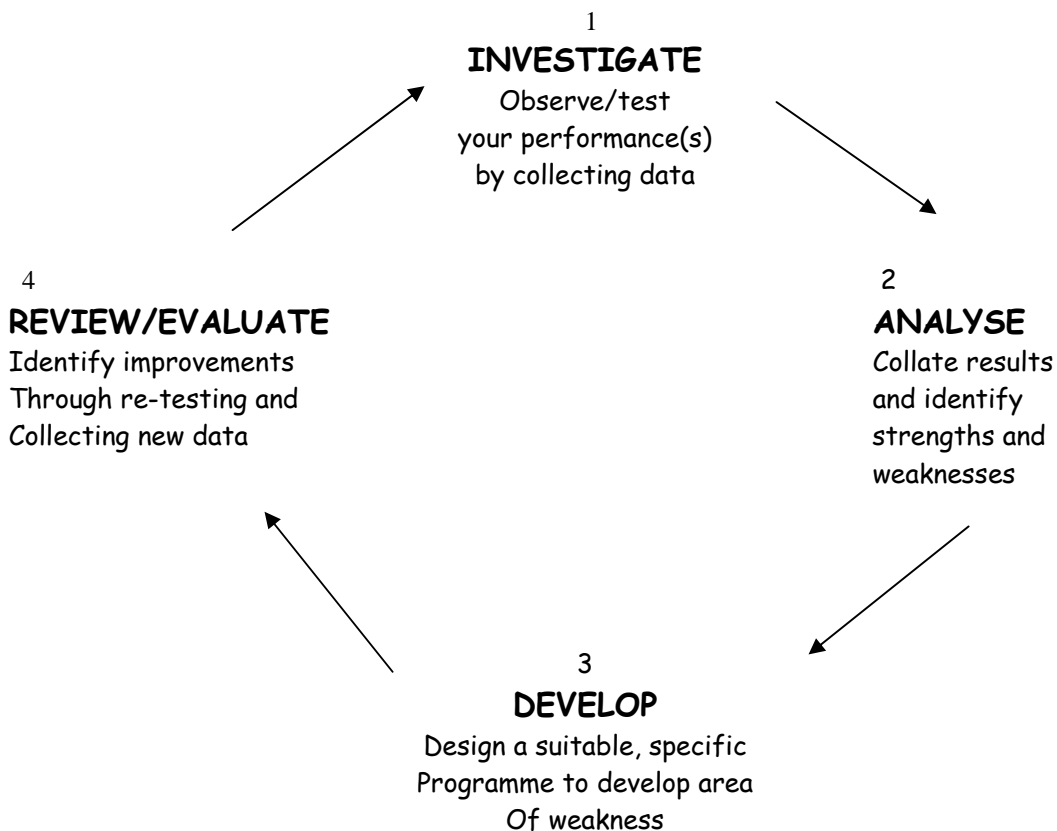
	<p>Mental Aspects: Mental Rehearsal, Managing Emotions</p> <p>Look at the relationship between different types/aspects of fitness and the development of performance,</p>
<p><b>KC 4: Principles and methods of Training</b></p>	<p>Know and understand the relevant principles of training (SPORT)</p> <p>Specificity: activity/person/performance</p> <p>Progressive Overload: frequency/intensity/duration/adaptation</p> <p>Select different training methods to improve physical, mental and skill related fitness (eg. circuit training, weight training, conditioning, relaxation)</p>
<p><b>KC 5: Planning, implementing and monitoring training</b></p>	<p>Different phases of training, including phase within a single training session and in the longer term (eg. Pre-season, competition, close season)</p> <p>Understand the importance of planning and monitoring progress in pursuit of personal goals using one or more of the following methods:</p> <p>Methods: Video/observation sheets/ training diary/personal evaluation/game analysis</p>

## THE CYCLE OF ANALYSIS

The Cycle of Analysis is useful for analysing and developing your performance as part of your performance improvement programme. Using the Cycle of Analysis, you collect information about your performance in an organised way.

Study the six stages of the Cycle of Analysis in diagram 1. These six stages can be applied effectively to badminton. By using the Cycle of Analysis, you can continue to improve your performance and so avoid reaching a **learning plateau** - a stage of no apparent progress.

## Cycle of Analysis



## INTRODUCTION

In *Preparation of the Body* we look at improving our performance in swimming (200m front crawl) by improving our physical fitness.

We will look at the various *aspects of fitness* and how they relate to achieving your peak performance.

We will collect *data* based on the whole performance and from *standardised tests* in order to identify our *strengths and weaknesses*. Furthermore we will use this data to *monitor* and *evaluate* our performance in order to identify improvements.

We will design a *training programme* based on results of our evaluation. The training programme will be created using different *methods of training, mid testing* and *end testing*. We will also apply the *principles of training* to ensure our training is *progressive*.

## FITNESS DEMANDS IN SWIMMING

Fitness demands will vary enormously between different activities. For example if you are a professional footballer, this does not mean you have the same fitness as a swimmer.

There are three types of fitness-

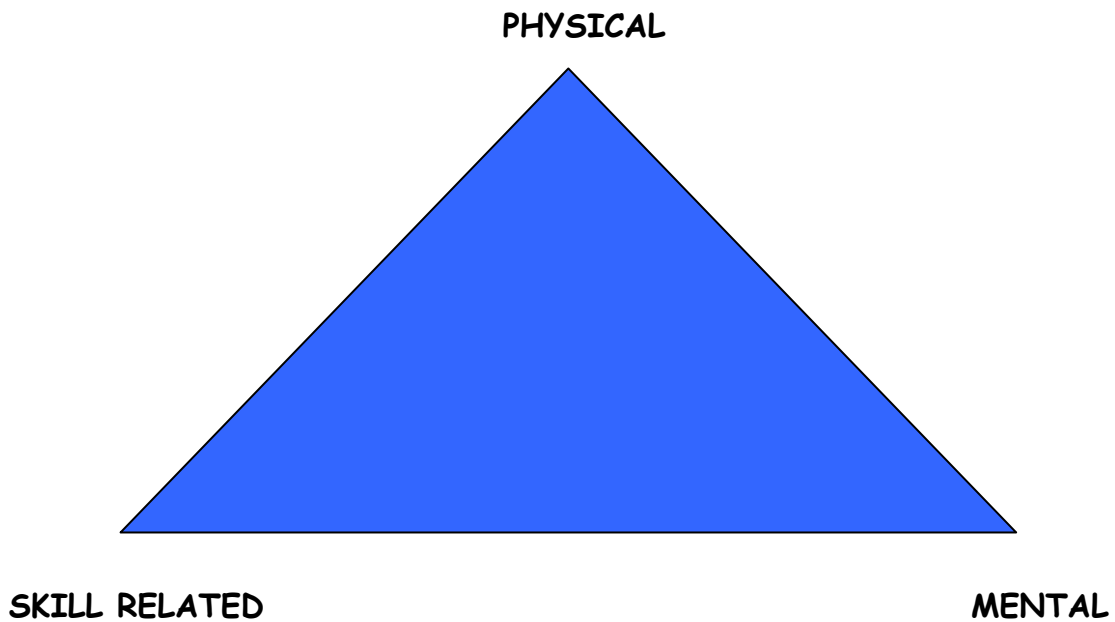
**Physical**

**Skill Related**

**Mental**

Each of these types of fitness have several aspects within them that can be tested individually in order to identify which are **strengths** and which are **weaknesses**.

## TYPES OF FITNESS



## ASPECTS OF FITNESS

<b>MENTAL</b>	<b>PHYSICAL</b>	<b>SKILL-RELATED</b>
<b>Determination Motivation Level of Arousal Concentration Managing Emotions</b>	<b>Cardio-Respiratory Endurance (CRE) Power Strength Flexibility Speed Muscular Endurance</b>	<b>Agility Balance Co-ordination Reaction Time</b>



## PHYSICAL ASPECTS OF FITNESS

The table below outlines the 6 Physical Aspects of fitness. During the course you will perform these tests and should complete the results section

ASPECT	DEFINITION	TESTS	MY RESULTS
<b>1. Cardio Respiratory (cardio-vascular) endurance</b>	The ability of the heart (Cardio) and lungs (Respiratory) to maintain a plentiful supply of oxygenated blood to the muscles enabling the athlete to maintain near maximal effort over a long period of time.	<ul style="list-style-type: none"> <li>• 20 metre shuttle run (bleep) test.</li> <li>• Cooper 12 minute run.</li> <li>• T5 Swim Test</li> <li>• 10m Multistage Swim test (MSST)</li> </ul>	
<b>2. Local Muscular Endurance</b>	The ability to use the same muscle or group of muscles repeatedly without getting tired.	<ul style="list-style-type: none"> <li>• 30 second sit up test</li> <li>• 2 minute push up test</li> <li>• Harvard Step test (5mins)</li> </ul>	
<b>3. Speed</b>	The ability to contract a muscle group or muscle quickly -whole body and part body speed.	<ul style="list-style-type: none"> <li>• 50 metre sprint (leg speed)</li> </ul>	
<b>4. Strength</b>	The maximum amount of force a muscle or group of muscles can exert in a single effort.	<ul style="list-style-type: none"> <li>• Hand dynamometer (hand strength)</li> <li>• Leg dynamometer (leg strength)</li> </ul>	
<b>5. Power</b>	The ability to release maximum force very quickly - a combination of strength and speed.	<ul style="list-style-type: none"> <li>• Standing Broad Jump (leg power)</li> <li>• Standing vertical Jump (Leg Power)</li> <li>• Throwing a ball/discus (Arm Power)</li> </ul>	
<b>6. Flexibility</b>	The ability to move muscles through their full range of movement and to move joints with ease.	<ul style="list-style-type: none"> <li>• Sit and Reach test (Hamstrings and Lower back)</li> <li>• Arm and Shoulder Reach.</li> <li>• Trunk extension test.</li> </ul>	

## SKILL RELATED ASPECTS OF FITNESS

As with the Physical Aspects of fitness it is possible to test objectively the skill-related aspects of fitness. Look at the information sheets, "skill related aspects of fitness" in the Fitness Gym which describe these tests and when you have performed them fill in your results in the table below.

<b>SKILL RELATED ASPECT OF FITNESS</b>	<b>DEFINITION</b>	<b>TEST</b>	<b>RESULT</b>
<b>Co-ordination</b>	The ability to control movements smoothly and fluently	Alternate Hand Wall Test S40 Stroke Count test	
<b>Agility</b>	The ability to move the body quickly and precisely	The Illinois Agility Test	
<b>Balance</b>	The ability to retain the centre of gravity over your base of support- static and dynamic balance.	Stork Test	
<b>Reaction Time</b>	The time taken between the recognition of a signal and the start of a movement	Ruler Drop Test	

## MENTAL ASPECTS OF FITNESS

Mental preparation is important in many activities. In some cases performers will attempt to "visualise" their performance and to mentally "rehearse" what they have to do.

<b>MENTAL ASPECT</b>	<b>DESCRIPTION</b>
<b>Determination</b>	Determination to challenge and win the ball/race, determination to remain focused. Determination to improve performance level through training.
<b>Motivation</b>	Motivation to desire to win the game/race. Motivation to attend training (early morning swim). Motivation can also be external factors such as trophies/rewards.
<b>Level of Arousal</b>	Must be optimum to produce the right climate for the game/race.
<b>Concentration</b>	Allows players to focus on the important aspects of the game and ignore unimportant negative factors such as crowd noise.

## PERFORMANCE FITNESS REQUIREMENTS FOR SWIMMING

Depending on the distance that you swim and the stroke being used during a race the fitness emphasis will shift. Longer distances require more endurance, whilst shorter distances require more speed and strength. However all of the following are important to some degree.

### PHYSICAL ASPECTS OF FITNESS

**Cardio respiratory endurance** is more important in longer distance swims. During these swims your body is working at a steady pace over a long period of time. The energy required to do this is supplied **aerobically** (this will be explained in detail later), which requires your heart, lungs and blood system to supply O<sub>2</sub> to the working muscles throughout the swim. Therefore a high level of **CRE** delays the **onset** of **fatigue**. This means that your stroke rate doesn't drop allowing you to complete a race in a quicker time. You will also be able to maintain a high level of stroke production (as fatigue can also effect your control, concentration and coordination).

**Muscular endurance** Swimming requires repeated contractions of our arm muscles (biceps and triceps), shoulder muscles (deltoids), back muscles (trapezius and lats) and our leg muscles thighs (quadriceps), hamstrings, gluteals (buttocks) and calves. Therefore muscular endurance is vital to delay the onset of fatigue, which prevents our muscles from working to full capacity thus affecting our ability to swim and execute the stroke effectively. Having effective muscular endurance also delays the production of lactic acid and you can tolerate higher concentrations of it thus delaying fatigue.

**Flexibility** is extremely important especially of the shoulder and ankle joints. This allows a wider range of movement and also allows you to place the limb or limb segment in the most mechanically advantageous position. This will increase the stroke efficiency; allow optimum pull through the water and aid stream lining all of which can decrease the time taken to complete the swim.

**Strength** is required in the shoulders (deltoids) arms (biceps and triceps) and back (trapezius and lats) to pull the body through the water.

**Power or explosive strength** is required for starts to give the swimmer the maximal force to propel them forward at speed to gain an advantage at the beginning of a race.

**Speed** is important in shorter distance races where you are working at your maximal pace to cover the distance as quickly as you can it can also be important in a longer distance race to produce a sprint finish at the end of the race.

## SKILL RELATED ASPECTS OF FITNESS

**Coordination** the swimmer is required to use arms and legs in a specific order and move the head to facilitate breathing. Therefore coordination of the se movements is vital for the flow and efficiency of the stroke. Timing of the arm action, leg action and breathing are vital for the stroke to flow and remain efficient.

**Reaction time** is important at the start of the race when you want to get off the starting block as quickly as possible.

**Agility** is important when turning as you need to change your body position and direction of travel very quickly

## MENTAL ASPECTS OF FITNESS

**Motivation** it is important that you are motivated to do your best if not you will lack the desire to try hard and will give up too easily when the going starts to get tough.

**Concentration** it is important to remain focused on your goal at the start and during the race. It is also important to concentrate on your stroke production throughout the race.

**Level of arousal** it is important to be in the right frame of mind to perform. If you are not "up for the race" then you will not perform to the best of your ability and lack enthusiasm. However, if you are too psyched up or anxious you will also not perform to your best, for example false starting or increased muscle tension leading to poor stroke production.

## TASK 1 - SWIMMING FITNESS DEMANDS

A long distance swimmer (1500m) will have more cardio vascular endurance than a short distance swimmer (50m) who will have more speed endurance.

Fill in the tables below by ticking the aspect (s) of fitness that relates to that particular event.

### SWIMMING- EVENTS AND FITNESS

EVENT	SPEED	POWER	CV ENDURANCE	MUSCULAR ENDURANCE	FLEXIBILITY	STRENGTH
60m						
200m						
400m MEDLEY						
1500m						

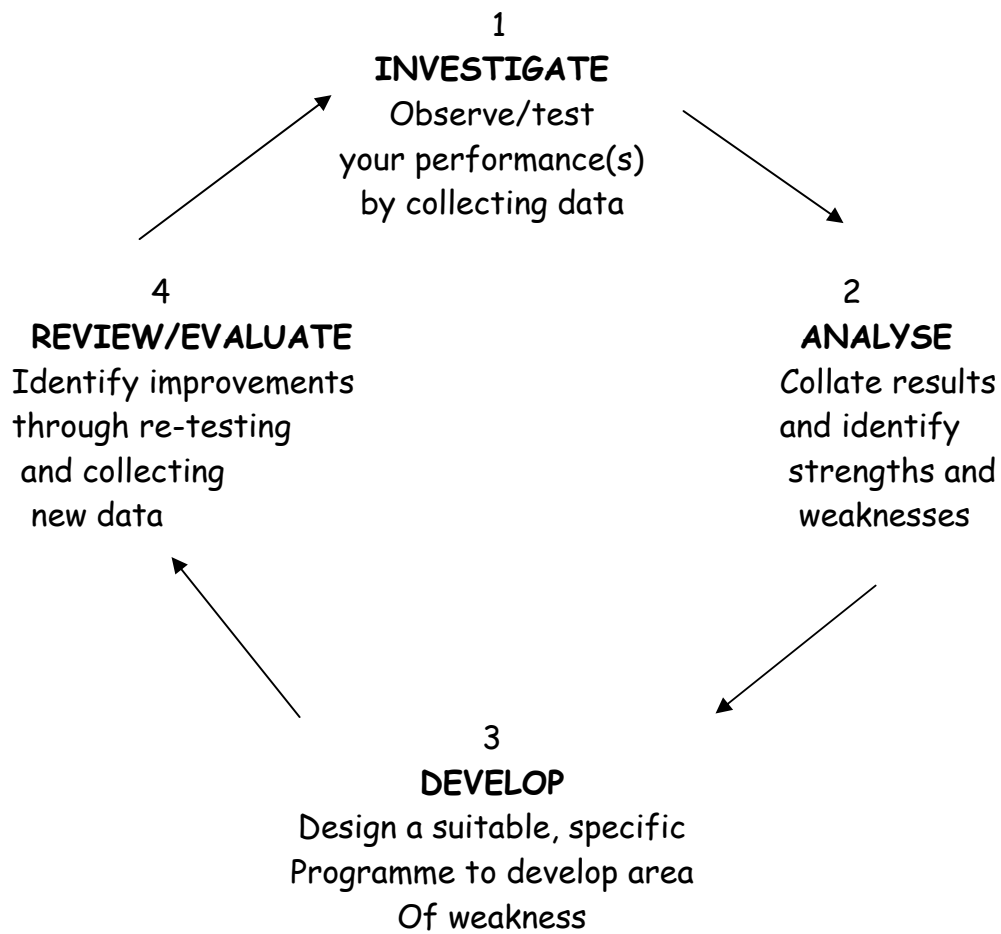
## DATA COLLECTION - Fitness Testing

The 'Cycle of Analysis' is a useful way on analysing and improving performance. The first stage requires us to collect and record data during performance. After doing this you are able to identify what your strengths are and what areas of weakness require development.

The main ways we will collect data are-

1. Observation Schedules in conjunction with video analysis
2. Knowledge of Results
3. Match/ Race Analysis Sheet

### CYCLE OF ANALYSIS



## Fitness Testing

It is useful to use both fitness testing and whole performance to collect information about your fitness. This way your fitness results can be used to support your findings on your whole performance.

Within the activity: 200m front crawl (10 x20m lengths)

<b>Length No</b>	<b>Culminative time LME</b>	<b>Quality Criteria Check LME</b>	<b>Number of arm strokes LME</b>	<b>Number of breaths CRE</b>	<b>5 min swim CRE</b>
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					



## Front Crawl

Insert grades 1-4 for stroke production using the criteria below with number 1 being based on a model performer.

### Leg Action

1 = Extended leg kick. Positive alternate kicking action to assist streamlining.

2 = Extended leg kick. Continuous kicking action.

3 = Generally extended leg kick. Some splash as legs roll and kick out of water.

4 = Uncomfortable leg action. Rolling and bending at knee.

### Arm Action

1 = High arm recovery, strong effective catch and pull from mid line of body.

2 = Clear arm recovery, effective catch and pull from mid line of body.

3 = Arm recovered then a catch position loosely established. Arm cycle quite fast.

4 = Wide arm recovery. Hand entering away from mid line of body. Quick pull.

## CYCLE OF ANALYSIS - INVESTIGATE

Investigating performance means you have to collect information about your own performance and fitness (DATA COLLECTON). Initially this is done through *testing*. Refer to 'Physical Aspects of Fitness' and Skill-related Aspects of Fitness' tables.

Testing can be done through standardised testing (Bleep test etc) or in full performance context (observation schedule).

*Why do you have to test yourself?*

1. So you can identify your strengths and weaknesses physically, mentally or skill related.
2. So you can compare to standard test norms and previous test to monitor any improvements you have made.

## **TASK- TEST AND ANALYSE**

Test yourself in class on the test in the tables of Physical Aspects of Fitness and Skill Related Aspects of Fitness and compare yourself to standard test norms. What do your results tell you about your fitness? What are your strengths and weakness?

*Now you have initially tested yourself and identified you strengths and weaknesses, what do you do next?*

## Stage 3 - DEVELOP

### Designing a Training Programme

When you are designing a training programme for any activity you must make sure the training programme is **SPECIFIC** to the activity. This means you must train to meet the demands of the activity.

You must also apply the Principles of Training in order to make the programme *progressive*.

We need to establish our current level of fitness, our training goals and consider the principles of training as a pre-requisite for creating a Training Schedule to improve our fitness for football.

### PRINCIPLES OF TRAINING (SPORT)

<b>FREQUENCY</b>	How often. (at least 3 times per week.)
<b>INTENSITY</b>	How hard. (ie 70%MHR)
<b>DURATION</b>	How long. (30mins or 4 sets of 12 reps)
<b>RECOVERY</b>	How much rest between sessions / sets /reps.
<b>REVERSIBILITY</b>	Use it or lose it.
<b>OVERLOAD</b>	Increasing F-I-D throughout the programme
<b>SPECIFICITY</b>	Specific to demands of activity and level of fitness.
<b>ADAPTATION</b>	Adaptation to cope with demands of training.
<b>PROGRESSION</b>	Gradual overload over set period of time.

## METHODS OF TRAINING

### **INTERVAL**

Alternating activity with periods of rest. (eg 10x50m sprints with 15secs rest OR 5x400m sprints with slow jog in between.

Can improve Cardio-Respiratory Endurance (aerobic and anaerobic) and speed / speed endurance.

### **CONTINUOUS**

A whole body activity (such as, running, cycling, rowing, swimming) that is performed without a rest. Normally done at a low intensity (50-80%MHR) and lasting a minimum of 20mins.

Can improve CRE.

### **FARTLEK**

Also known as 'speed play'. The pace of the activity is varied (eg jog, run, sprint, jog, walk, run, sprint). Particularly good for games players as it reflects the short bursts of intense activity followed by periods of low intensity movements.

Can improve Cardio-Respiratory Endurance (aerobic and anaerobic) and speed / speed endurance.

### **CONDITIONING**

Training through the game. This method incorporates skills training into games training. This develops skills and fitness at the same time. It can be designed to meet specific needs.

## PLANNING, IMPLEMENTING and MONITORING YOUR FITNESS PROGRAMME.

Now that you know:

- how to assess your fitness level
- The fitness demands of your chosen activity
- the types/methods of training available to you

It is now necessary to plan, implement and monitor your training programme.

To do this you will need to assess

- **When you wish to reach your peak level of performance.** In some activities, e.g. Athletics, Swimming, elite performers will need to peak for particular competitions, e.g. Olympic Games, World Championships. In other activities, especially team activities such as Football, Rugby and Hockey the requirement for peak performance may be spread out over a long season of 6 - 7 months.

**This long term planning is called Periodisation.**

## PERIODISATION

A periodised training year can be broken down into 3 main phases of training.

1. Preparation - e.g. Pre-season training.

During this phase you must concentrate on building up your general aerobic endurance (CRE). Running/circuit training/drills specific to your activity.

\*Training should be related to your activity so that it improves your skill related fitness also.

During this phase you will gradually increase the intensity of your training.

2. Competition - This can be season long but may contain times when you will want to peak for individual competitions. For these you may need to taper down i.e. reduce the intensity of your training immediately before each competition to avoid fatigue. Then allow more time for rest and recovery.

\*There will be a focus on 'fine-tuning' skills here and looking at technique

3. Transition - This follows the competition phase and can be thought of as active rest. It allows the body time to recover after competition. However a general level of physical fitness is maintained. (take part in other activities).

## TRAINING PROGRAMME

Design an 6-week training programme to improve your CRE for a 200m race.

You will have tested your CRE before the training programme has started therefore you must make sure that your programme is specific to your current level of fitness.

An example programme of weeks 1, 3 and 6 have been done for you.

### Sample Training Programme

Activity- Swimming (200m race)

Aspect of fitness- Cardio-Respiratory Endurance

#### WEEK 1

DATE	STROKE	METHOD OF TRAINING	REST	Total Time
WEEK 1 1/11/08	General warm up using different strokes	5min Swim	Nil	
	Front crawl	Interval Training 5min Swim	2min	
		Interval Training 5min Swim	2min	
		Interval Training 5min Swim	2min	
		Interval Training 5min Swim	2min	
	General warm down using different strokes	2min Various Strokes	Nil	35min

### WEEK 3

DATE	STROKE	METHOD OF TRAINING	REST	TOTAL TIME
WEEK 3	General warm up using different strokes	5min Swim	Nil	
	Front crawl	Interval Training 6min Swim	1min	
		Interval Training 6min Swim	1min	
		Interval Training 6min Swim	1min	
		Interval Training 6min Swim	1min	
	General warm down using different strokes		Nil	35min

### WEEK 6

DATE	STROKE	METHOD OF TRAINING	REST	TOTAL TIME
WEEK 6	General warm up using different strokes	Interval Training 7min Swim	1min	
	Front crawl	Interval Training 7min Swim	1min	
		Interval Training 7min Swim	1min	
		Interval Training 7min Swim	1min	
		Interval Training 7min Swim	1min	
	General warm down using different strokes		Nil	35min



## TRAINING PROGRAMME

Design an 6-week training programme to improve your CRE for a 400m race. You may use the examples above and create sessions for week 2, 3, 4, 6 and 7.

You will have tested you CRE before the training programme has started therefore you must make sure that your programme is specific to your current level of fitness.

### 6-WEEK TRAINING PROGRAMME

#### WEEK 1

DATE	STROKE	TYPE OF TRAINING	REST	TIME TOTAL

**WEEK 2**

DATE	STROKE	TYPE OF TRAINING	REST	TIME TOTAL

**WEEK 3**

DATE	STROKE	TYPE OF TRAINING	REST	TIME TOTAL

**REMEMBER**- You are now half way through the programme- re-test to monitor progress (Do you need to make changes to the programme? E.g Overload more?)

**WEEK 4**

DATE	STROKE	TYPE OF TRAINING	REST	TIME TOTAL

**WEEK 5**

DATE	STROKE	TYPE OF TRAINING	REST	TIME TOTAL

**WEEK 6**

DATE	STROKE	TYPE OF TRAINING	REST	TIME TOTAL

**You have reached the end of you training programme. Re-test to see if you have made an improvement to your CRE.**



**CLASS TASK 1**

ACTIVITY	ROLE	PHYSICAL FITNESS DEMANDS
ATHLETICS	10,000 metres/Marathon runner	(1)
		(2)
		(3)
	100 metre sprinter	(1)
		(2)
		(3)
FOOTBALL	Midfielder	(1)
		(2)
		(3)
	Striker	(1)
		(2)
		(3)
SWIMMING	50 metre Sprinter	(1)
		(2)
		(3)
	1500 metre	(1)
		(2)
		(3)

Fitness demands will vary enormously between different activities/different roles. Complete the principal physical fitness demands of the above activities/roles.

## CLASS - TASK 2

Look at the sheet "Physical Components of Fitness" and from your chosen activity give an example of how each Component is important to your activity.

**My activity** \_\_\_\_\_

(a) Cardio-respiratory

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(b) Muscular endurance

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(c) Speed

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(d) Strength

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### **CLASS TASK 3**

Key Concept 1- Fitness assessment in relation to personal performance and the demands of the activity.

**Discuss the methods of collecting data you have used in swimming and describe the information you can derive from your results (5 Marks)**

### **HOMEWORK QUESTION 4**

Key Concept 2- Application of different types of fitness in the development of activity specific performance.

**Discuss the aspects of fitness relevant to you chosen activity and the effect they have on your overall performance. (5 marks)**

### **HOMEWORK QUESTION 5**

Key Concept 3- Physical, skill-related and mental types of fitness

**List the aspects of fitness relevant to your activity under each heading**

**Physical**

**Skill-Related**

**Mental**



## **HOMEWORK QUESTION 6**

Key Concept 4- Principles and methods of training.

**Explain how you used the principles of training to develop a training programme to improve your performance (4 marks)**

## **HOMEWORK QUESTION 7**

Key Concept 5- Planning, implementing and monitoring training

**Discuss how you monitored your progress during your training programme (4 marks)**

## SECTION 2 - PREPARATION OF THE BODY

### Exemplar Answers

5. (a) Choose an activity from your course.

Name of activity            SWIMMING

Choose **one** aspect of fitness from the list below.

- **Cardio-respiratory endurance**
- **Strength**
- **Speed**
- **Local-muscular endurance**
- **Power**
- **Flexibility**

Aspect of fitness            C/R ENDURANCE

Explain **why** this is important to your performance in your chosen activity.

In the 4 x 100M Individual Medley, high levels of C/R Endurance are needed to cope with it's demands. The swimmer must maintain a high stroke rate with 4 different strokes. Poor endurance will result in errors in technique and less propulsion in the second half of the event. Loss of co-ordination and timing will reduce stroke efficiency and increase time. It is also likely that turns will be slower and less powerful.

**Now** choose **one** of the following from the second list:

- **Agility**
- **Co-ordination**

- **Balance**
- **Reaction time**

Aspect of fitness                      **CO-ORDINATION**

Explain **why** this is important to your performance in your chosen activity.

It is important that the arm/leg actions, breathing and streamlining work in harmony to produce an efficient stroke in all 4 strokes. Co-ordination is also important in starts and turns to maintain momentum and speed. Timing the fast approach, tumble turn and drive off the wall can give the swimmer an advantage over opponents.

**5 (a) (continued)**

**Now choose one** of the following from the third list:

- **Anxiety control**
- **Use of mental rehearsal**
- **Stress**
- **Confidence**

Aspect of fitness                      **MENTAL REHEARSAL**

Explain **why** this is important to your performance in your chosen activity.

This is important in training and competition. Training for swimmers can be long and repetitive so frequent rests are necessary to allow recovery and rehearsal, running over in your mind what to do to perform well. It is also important, prior to competition, to prevent you becoming

distracted or over anxious.

(b) Some aspects of fitness can be measured by using a test.

Give an example of **one** test you have used to measure your fitness.

Name of test            T/5 TEST

Explain **why** this test was a good way to measure your fitness.

It is a test to measure Aerobic Capacity. You swim at a steady pace for 5 minutes. A recorded takes 25M split times. At the end the distance covered is divided by the time to give a speed that gives your Anaerobic Threshold. This helps me decide on short term goals in training sessions.

What did your results from the test tell you about your fitness?

I only swam 9 lengths in the time. My two times got slower during the 5 minutes. This told me my C/R Endurance was below average and my Anaerobic Threshold speed was low 0.75.

**5 (continued)**

(c) Describe **one** training session you have used to improve your fitness.

After the test I did a programme concentrating on Endurance.

WARM UP	VARIOUS STROKES	200M EASY PACE
BFLY SECS	3 X 50M	150M REST 45
BR/STROKE	3 X 50M	150M REST 30

SECS		
B/CRAWL	3 X 50M	150M REST 30
SECS		
F/CRAWL	4 X 50M	200M REST 30
SECS		

WARM DOWN	ANY STROKE	200M
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TIMES BASED ON 60% OF MAXIMUM

(d) Describe the changes your training programme made to your performance.

I was able to swim further in the 5 minutes. The times of splits although slowing towards the end were slightly more even. My breathing was more regular which helped me stay streamlined even towards the end of the time.