

AS LEVEL

FACT FILE

Sports Science

Subject content link:

**AS Unit 1 : Fitness and Training for Sport**

- Planning fitness programmes and leading exercise sessions
- Task 2 support
- Task 3 support

**FACT FILE**

sports  
science  
*and the active leisure industry*

## AS Unit 1 : Fitness and Training for Sport



### Learning Outcomes

#### Students should be able to:

- design a fitness programme for an individual.
- act as a fitness coach/instructor to lead a planned exercise session:
  - plan and complete an exercise session (for example circuits, spinning, exercise to music);
  - identify goals, design individual sessions, perform safety checks, consider warm-up / cool-down, examine emergency procedures; and
  - review and discuss the delivery of the exercise sessions (communication skills, instruction methods, motivation, observation and technique).



### Course Content

<b>Training Plan:</b>	The development of muscular strength endurance for a road cyclist.
<b>Aim of Training Session:</b>	An anaerobic strength endurance workout.
<b>Method:</b>	Indoor training session on a 'spinning' type indoor bike. The session simulates an outdoor ride with a hilly profile. The profile breaks down as follows: Warm-up      12 minutes Hill phase 1    24 minutes Recovery        6 minutes Hill phase 2    6 minutes Cool-down      10 minutes
<b>Warm-up Phase:</b>	Steady pedalling (80-90RPM) to raise pulse rate and muscle temperature followed by 30sec phases of faster pedalling (100RPM) and 30sec periods of single leg pedalling concentrating on pedalling technique. Target HR at

completion of the warm-up should be 70-75%MHR.

#### Hill Phase 1:

'Rolling' up-hill ride in seated and standing climb riding positions with some short bursts of slightly faster pedalling to simulate going round hairpin bends.

Cadence 70 – 80RPM to simulate long fairly gentle climb with slight variations in gradient (5% and 8%).

#### Hill Phase 2:

Steeper climb (5 - 15%) that require more resistance and a slower cadence. Cadence should stay above 60RPM to prevent excessive pressure on the knees and ankles. Should really challenge client and achieve the maximum HR occurring during the ride.

#### Recovery:

Simulates fast downhill descent with faster cadence (100-120RPM), client must not let HR drop below 75%MHR

**Cool-down Phases:** Client will decrease resistance and cadence progressively to allow body systems to recover and return to close to pre-session levels.

#### Background Information:

The client is a high level cyclist, competing regularly throughout Ireland in road race and time-trial events. He has been a member of the Cycling Ulster and Cycling Ireland Youth Development Squads and his current focus is to improve his force output / strength endurance to improve performance in 10 to 25 mile time-trial events. Cycling Ireland guidelines for selection to the Junior Men's Elite Performance Squad require a threshold power to weight ratio > 4.8 w/kg and a maximum power to weight ratio > 6.0 w/kg. The session is designed for the client to work at or slightly above his anaerobic / power threshold for 24 minutes and then 6 minutes following a 6 minute recovery phase. This intensity means a large proportion

of energy must be produced anaerobically and it will improve the body's ability to tolerate and remove lactic acid. This will allow the client to ride faster for longer, ideal for improving time-trial performance. This type of session involves a Lactate Threshold Heart

Rate (LTHR) of >100% and requires a significant recovery period. This type of ride should not be ridden more than once a week. In this training programme it is used every two weeks and mixed with recovery rides (75-80%LTHR), long endurance rides (80-90%LTHR) and threshold rides

Detailed Training Session Sheet (Indoor Cycling)									
Name:		Goals for the Training Programme: Cycling: To improve strength and ability to climb hills							
Week: 6			Session Number 2						
Date and Time 10 January 2013 10.30-11.30am		Location Fitness Suite With 'Spinning' bike'.		Focus of Session Strength Endurance for Hill Climbing					
Music	Activity	Time	Profile	HR	Cad'				
Offshore	Safety Intro'. Warm-up 30s Single legs x 3	8.55		60- 65%	80- 100				
The Race	30s Surges / spin ups	3.20		65- 70%	80- 100				
Small Step	Stepped Climb Hairpins (out of saddle)	6.15		70- 85%	60 -90				
Don't Give Up	Standing/seated/standing ... progressive resistance	8.23		80- 85%	60 -70				
No Ordinary Morning	Hard steady seated Hairpins (out of saddle)	5.11		80- 85%	70 -100				
Cold Drink, Hot Girl	Top of hill (4mins) and downhill (2m.25s)	6.25		90- 75%	70 110				
Slave to Wage	Downhill 30s Surges	3.48		75%	100- 120				
Rock Steady	Stepped Climb (Increase in C and R)	2.47		75- 80%	70 -80				
Right Here, Right Now	Climb to finish ... progressive resistance	3.53		80- 90%	80 -60				
Eyes Open Chasing Cars	Cool-down Spin steady pace/Stretch	4.36 5.30		90- 60%	100				
R = Resistance		C = Cadence							
S = Surge (faster cadence) ↑		HP = Hairpin		59.07					
	Seated Flat		Seated Climb		Downhill		Standing Climb		'Hairpins' (Standing surge)
Other details	Safety	Correct bike set up. Technique. Safety. Emergency action.							
	Nutrition	Encourage correct fuelling / recovery strategy.							
	Hydration	Water / sports drink bottle beside / on bike.							
	Medical	Experienced, high level cyclist with no known medical issues.							
	Other	Clothing and footwear.							
Feedback and Evaluation		Excellent session ... could change some of the music to cater for clients 'taste' in music. Achieved heart rate targets and was able to adjust resistance / cadence to keep in target zones.							
Adaptation/Progression ... after client consultation		Client enjoyed sessions, especially the visualisation methods used during the climbing phases. Agreed session achieved aim and was very challenging. Repeat similar intensity then add progression.							
Client Signature									
Instructor Signature									
Teacher / Supervisor Signature									

(95-100%LTHR).

To deliver any training session there are a number of things to organise and checks to make if the session is to be delivered safely and effectively:

## Pre-session Preparation

**Planning of session:** Time, location and details of the training session agreed with the client. Music planned and organised to deliver the cycling profile / session.

**Facility and equipment safety check:** Arrive early to ensure the facility is set up for the session correctly (bike available and working safely, sound system available and working, location of first aid resources and emergency help / procedures). Check the exercise bike and the training environment (risk assessment) and try music.

## Session Preparation

### Bike Set-up.

Ensuring the bike is 'set-up' correctly for the client is essential for both comfort and safety during the session. An incorrect riding position could put pressure on different areas of the body, such as the back, neck and knees, and may result in injury.

There are three areas to consider in setting up the bike:

**Saddle Height:** The saddle should be adjusted so that the client's knee is slightly bent at the bottom of the pedal stroke ('the 6 o'clock position'). There should be a 25 -30 degree bend at the knee at the bottom of the pedal stroke. This will avoid 'rolling' at the hips if the saddle is too high; or excessive pressure on the knees / thighs if the saddle is too low.

**Saddle Position:** The saddle should be level and must be adjusted forwards or backwards so that the client is in a comfortable riding position. The front of the knee cap should be in line with the centre of the pedal when the pedal is in the '3 o'clock position'. The elbows should be slightly bent when in an 'upright' riding position

**Handlebar Height:** Handlebar height is important to avoid excess pressure on the elbows, back and neck. Experienced riders will be more flexible and used to riding with the handlebars lower (slightly below saddle height) than inexperienced cyclists. Handlebars should be higher (above saddle height) if the client has any back problems.

### Heart rate monitor.

Specific heart rate targets have been worked out for the client and for this session to be effective the use of a heart rate monitor is essential. This will allow the

client to monitor the intensity of his work and keep his heart rate in the different target zones for the required duration of time.

Target heart rates for the client based on Karvonen Formula:

Resting	54
60%	143
65%	150
70%	158
75%	165
80%	172
85%	180
90%	187
Max HR	202

### Safety instructions for the client.

To ensure the safety of the client the instructor must go through an introduction and safety briefing before each session. This will be done whilst the client is starting his warm-up on the bike.

### Safety on the bike:

The following information will be delivered to the client at the start of the warm-up:

- This is a fixed wheel bike which means you cannot freewheel as on a normal road bike or mountain bike ... if the flywheel is turning so are the pedals.
- The bike has two controls, firstly the brake which will stop the flywheel just like a normal bike brake. (Identify where brake is and how it works) You will not need to use the brake unless something is wrong. One possibility is that your foot may 'slip' off the pedal. If this happens keep your foot away from the bike so it does not get hit by the pedal which will still be turning and use the brake to stop the bike.
- The second control is the 'gear lever' which controls the resistance provided by the flywheel, turn the control clockwise to change up or increase resistance and anti-clockwise to change down or reduce the resistance.

### Riding an indoor bike:

The following information will be delivered to the client during the early part of the warm-up:

- The hands must be on the handlebars at all times ... except when using the brake or changing the resistance (if these controls are not on the handle

bars). There are three hand positions whilst riding on most indoor cycles:

1. Hand position for seated riding: hands slightly apart on the handlebars.
2. Hand position for standing riding: hands wider, usually at the ends of the 'bull horn' handlebars found on most indoor bikes. If on a turbo-trainer the hands will be on the 'hoods' of the brake levers.
3. Time trial position: where the hands are close together and the elbows are resting on the time trial handlebars. This is a position for experienced cyclists and requires the bike to be set up very carefully.

In each of these positions it is important to keep the wrists in a 'neutral' position to avoid pain from excessive periods of over extension or flexion.

- Pedalling must be kept as smooth as possible (best achieved using clip-less pedals), try to achieve a 'full circle' pedalling action throughout the ride.
- The speed of pedalling or cadence will vary during a session, this will imitate fast flat and steep hilly sections of the profile. The cadence for each type of terrain is as shown ... remember what works for one rider may be too fast or too slow for another, everyone is different!

Flat or downhill sections	light resistance 80 to 120 rpm.
Seated climbs	heavy resistance 60 rpm up to 80 rpm moderate resistance
Standing climbs	heavy resistance 60 rpm up to 80 rpm moderate resistance
Surges or Spin-ups	10% increase in pedal speed for 5 to 10s

- Cadence will be checked at intervals during the ride by counting pedal strokes for one leg over 15 second period and multiplying this figure by 4 ... 15 second count of 18 equals a cadence of 72rpm.

### Cool-down:

The cool-down will involve 2 phases:

- Cool-down on the bike which involves gradually reducing the cadence and using a light resistance to bring the heart rate down. The aim of this light pedalling must be explained to the client and the aim is to bring the heart rate down to below 100bpm whilst on the bike. Once this is achieved the client will be able to get off the bike.
- Cool-down off the bike which consists of some

developmental stretching of the main muscle groups used whilst cycling; hamstrings, quads, calves, hip flexors, lower back, gluteals and iliotibial.

## Presentation of the Training Session

### Pre-session preparation

As outlined above

### Client safety introduction

As outlined above, check client has fluids and towel.

### Instructions

Clear and easy to understand, eye contact, move around client.

### Client performance

Monitor performance throughout, checking:

- heart rate target zones are achieved and maintained;
- clients riding technique and position remain correct throughout, especially neutral wrist position in standing climb;
- motivate / encourage client as required ... does not like shouting, so quiet encouragement best;
- use visualisation of climbs the client knows to help performance: the client likes climbs on Slieve Croob and in the Mourne Mountains, so will use Irish mountain landscape for visualisation.
- client keeps hydrated, room hot so important to drink;
- seek feedback from client on how they feel during the session and what he thought of the session at the end.

### Instructor performance

Monitor own performance throughout:

- introduce session correctly, be friendly and make client comfortable in the training environment;
- not on own bike for this session in order to closely monitor target heart rate zones;
- use quiet but firm motivation to encourage the client, he does not like shouting and be aware of when to say nothing;
- success of visualisation depends on knowledge of climbing which would be achieved better with aid of DVD of famous cycling routes.

## Review of Session

### Facilities and Resources

- Facilities good.
- Bikes in good condition, easy to set up for client.
- Music system fine, plenty of volume and microphone system available but not used.

### Suggestions for improvement:

Room we were in is not air conditioned and was too hot, need to get heat turned down or arrive earlier to get

fans on and windows open;  
Get cycling DVD and lap-top / projector to help with visualisation and add variety for some future sessions.

### Training Session Plan

- Very good. Heart rate targets were achieved and maintained throughout;
- Profile was varied and the use of visualisation during the climbs helped maintain the client's work rate.

### Suggestions for improvement / progression:

- Cycling DVD as outlined above;
- Maintain target heart rates, work loads / intensity for at least one more session before applying any progression.

### Client Performance

- Worked hard to achieve and maintain all the targets contained in the programme;
- Still rides with wrists extended at times unless reminded;
- Suggestions for improvement / progression;
- Agreed after discussion with the client to keep the duration and intensity of the next session similar to this one before thinking about any progression; and
- Remember wrist alignment.

### Instructor Performance

- Instructor felt training session went well and was well planned to match the ability and requirements of the client;
- Felt more relaxed than previous indoor cycling sessions, probably getting more used to the presentation aspect of these sessions; and
- Going to the Spinning classes at Lisburn Leisureplex has helped with confidence in the introduction phase and in planning profiles.

### Suggestions for improvement:

- DVD to add variety and help visualisation;
- Sort out heating in the training room before any future sessions;
- Tweak music more to the liking of client than to own likes / dislikes;
- Visual reminder of target heart rates would help client and stop repetitive reminders of range he should be in at different times during the training session.

### Next Sessions:

- |                  |   |
|------------------|---|
| <b>Sunday</b>    | <b>Long steady endurance ride (client's regular long training ride)</b><br>4 hours 60 -70 miles<br>Mainly 65 – 75%MHR                                 |
| <b>Tuesday</b>   | <b>Strength endurance weights session:</b><br>Planned and supervised, Session 2 of Task 3.  |
| <b>Wednesday</b> | <b>Recovery ride: indoors or outside depending on weather.</b><br>30 – 40 minutes 60 – 65%MHR   |
| <b>Thursday</b>  | <b>Indoor Cycling Session: Planned and supervised, Session 3 of Task 3.</b><br>60 minutes - Focus on Interval Training to improve Anaerobic Endurance |

## Unit AS 1: Fitness and Training for Sport.

### Instructing Fitness Programmes: Tutor Testimonial Sheet (Task 3)

Instructing Fitness Programmes						
(Completed by the tutor during the Planning and Performing Fitness Programmes phase)						
Name						
Session 1 / 2 / 3	Date		Venue			
Criteria			Grade			
			HC	C	A	L
Planning	Detailed session plan provided					
	Preparation of facilities and equipment					
	Suitable activities to achieve goals					
	Correct intensities / workloads					
	Risk assessment completed					
	Knowledge of emergency procedures					
Instructing	Appearance (clothing, footwear)					
	Appropriate teaching style / positioning					
	Correct, clear and audible instructions					
	Technically correct demonstrations					
	'Good practice' followed throughout					
	Warm-up / cool-down					
	Quality of feedback given to the client					
	Motivational strategies used					
	Adaptation / correction applied if needed					
	Facility left neat and tidy for next user					
Evaluating	Student's ability to comment on the session when asked about:	Organisation				
		Safe practice				
		Instruction methods				
		Planned activities				
		Motivation methods				
		Quality of feedback				
Explanation of Grading						
HC ... Highly Competent	C ... Competent	A ... Adequate	L ... Limited			
Signature : Teacher / Tutor			Signature : Candidate			

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