Rewarding Learning

AS LEVEL

FACT FILE

Sports Science

Subject content link:

AS Unit 1: Fitness and Training for Sport

- Components of Fitness
- Focus on Aerobic Endurance
- Training Methods
- Fitness Testing

sports science

and the active leisure industry

FACT FILE

sports science
and the active leisure industry

AS Unit 1: Fitness and Training for Sport

Learning Outcomes

Students should be able to:

- Explain the different components of fitness
- Develop a knowledge and understanding of the methods and principles of fitness training
- Examine the importance of fitness testing, correct protocol, validity and reliability

Course Content

Aerobic Endurance

Definition - Aerobic endurance allows the athlete to take part in prolonged periods of activity through the efficient use of oxygen. This form of endurance depends on the effective functioning of the cardiovascular and respiratory systems.

Importance - Aerobic endurance forms the basis for performance in a wide variety of sports, the longer the duration of the activity the greater the importance of this form of endurance. Endurance events such as marathons, triathlons, adventure races, cross-country skiing and rowing rely on high levels of aerobic endurance.

Photos: ©iStock/Stockbyte/Digital Vision / Thinkstock.com

Test Method

Multi-Stage Fitness Test

The objective of the Multi-Stage Fitness Test (MSFT) is to monitor the development of the athlete's maximum oxygen uptake (VO2max). This test is very good for games players as it is specific to the nature of the sport but, due to the short sharp turns, it is perhaps not suitable for rowers, runners or cyclists.

Required Resources to undertake this test:

- Flat non-slip surface 25m long
- 30m tape measure
- Marking cones
- The Multi-Stage Fitness Test audio tape or CD
- Tape recorder or CD Player
- Recording sheets

How to conduct the test

- This test requires the athlete to run 20m in time with a beep from a CD recording. The athlete must place one foot on or beyond the 20m marker at the end of each shuttle.
- The athlete warms up for 10 minutes.
- If the athlete arrives at the end of a shuttle before the beep, the athlete must wait for the beep and then resume running.
- If the athlete fails to reach the end of the shuttle before the beep they should be allowed 2 or 3 further shuttles to attempt to regain the required pace before being withdrawn.
- The assistant records the level and number of shuttles completed at that level by the athlete when they are withdrawn.

Assessment

The athlete's maximum oxygen uptake (VO2max) can be determined from a MSF Table using the Level and Shuttle achieved.

Additional Work:

- *Find examples of performance in 20MST for different sports / level of participation.*
- *Research other tests: e.g. Cooper Run. Harvard Step Test.*
- *Research further to find explanations of HR / VO2Max.*

Training methods

Continuous training:

Low intensity training performed at a steady heart rate (60-70%MHR) for long periods of time (up to several hours).

©iStock / Thinkstock.com

Fartlek Training

Variations in speed and intensity allow the aerobic and anaerobic energy systems to be trained in a single session. Sessions are continuous and last up to 60minutes, allowing a high degree of aerobic / cardiovascular endurance to be developed. Suited to 'intermittent' games such as rugby, Gaelic football or hockey where aerobic and anaerobic work is required at different times in the game.

Interval Training

Periods of exercise are alternated with recovery periods. The intensity, duration and recovery periods can be varied to develop aerobic or anaerobic endurance. Generally high intensity work will be of short duration with longer recovery, whilst lower intensity work periods will be longer with shorter recovery.

Interval Training For 10-km Runners

Best 10-km time (min)	Reps	Interval distance (m)	Rest interval (s)	Time per interval (min)
46:00	20	400	60-120	2:00
43:00	20	400	69-90	1:52
40:00	20	400	60-90	1:45
37:00	20	400	60	1:37
34:00	20	400	60	1:30

Activities

Additional Work

1. *Research and produce flash cards showing each component of fitness, associated fitness tests, training methods and relevant sports.*
2. *Practical sessions to devleop understanding of types of training, HRT Zones, Max HR, Anaerobic threshold, LTHR training methods and tests to find LTHR.*

Heart Rate Training Zones

(Ref: Athletes Training Bible, J. Friel)

Zone	Training Focus	Description	%LTHR	Duration (mins)	Work: 'Rest'
1	Recovery	Active recovery after hard workouts, form a vital part of the training programme.	65-75%	30-90	None
2	Extensive Endurance	Long low intensity workouts ... 'conversation' level. Forms a large part of an endurance athletes training programme and the training 'base' for games players. 'Slow' twitch muscle fibres are mainly involved, little lactate build up.	75-85%	60+	None
3	Intensive Endurance	'Base building', greater stress on the aerobic system and more lactate produced as more 'fast' twitch muscle fibres recruited to help 'slow' twitch.	85-95%	10-120	4:1
4 & 5A	Threshold	The vital training zone. Athletes work close to their Lactate Threshold ... maximal level of aerobic work. Vital to improve lactate tolerance / removal and raise lactate threshold, so improving performance ... go 'faster longer'.	95-105%	5-60+	2:1
5B	Anaerobic Endurance	Produces high levels of lactate so interval training is commonly used in this zone.	105-115%	1-6	1:2
5C	Power	Short maximal efforts followed by 'long' recovery periods. Very stressful to the body and must be followed by Recovery Zone sessions.	>120%	15-30secs	1:6

COUNCIL FOR THE **CURRICULUM EXAMINATIONS** AND **ASSESSMENT** 29 Clarendon Road, Clarendon Dock, Belfast BT1 3BG
✆ +44 (0)28 9026 1200 🖷 +44 (0)28 9026 1234 ☎ +44 (0)28 9024 2063 ✉ info@ccea.org.uk 🌐 www.ccea.org.uk

Rewarding Learning