AEROBIC CAPACITY

Describe **either** the PWC-170 **or** MSSRT
Outline 1 advantage and disadvantage of the method you have chosen

(5)

1. description	Progressive test to exhaustion
2. description	Shuttle runs between 20m markers to a timed beep
3. description	Timed between bleeps reduces / speed increases until performer fails to keep up with bleep
4. description	Level & shuttle number estimates or predicts a VO2max value
Sub max 1 for advantage	
5. advantage	Good levels of validity and reliability/scores easily evaluated in published table/easy to set up (easy to access/available)/large groups can be tested
Sub max 1 for disadvantage	
6. disadvantage	Test to exhaustion not good for unfit/overweight individuals/predicted values and not 100% accurate/not good correlation/estimated with similar others/favours runners not cyclists or swimmers or rowers/relies on motivational levels of performers

PWC 170
Sub max 3 for description

1. description	Sub max test on bicycle/cycle ergometer
2. description	Performer cycles at three low to moderate intensities and heart rates recorded
3. description	Plotted on a graph to predict intensity level at a HR of 170
4. description	170 approximate anaerobic work or used as prediction of VO2max
Sub max 1 for advantage	
5. advantage	Sub-maximal test not requiring work to exhaustion/ good for less fit/overweight individuals/satisfactory levels of validity/reliability/easy to set up
Sub max 1 for disadvantage	
6. disadvantage	Cycle test favours cyclists/does not directly measure aerobic capacity or O2 consumption/predicted test of VO2max from HR/relies on linear relationship of HR & intensity

Direct Gas analysis
Sub max 3 for description

1. description	Maximal test to exhaustion
2. description	Performer measured at increasing levels of intensity while running, cycling, rowing and swimming
3. description	(Computer) analyses O2 inspired and expired.
1. description	Calculates VO2 max consumed by muscles
Sub max 1 for advantage	
5. advantage	Most accurate/valid/reliable test of aerobic capacity/directly measures O2 consumption/most activities can be measure eg running, cycling, rowing and swimming.
Sub max 1 for disadvantage	
6. disadvantage	Maximal test to exhaustion/not good for unfit/overweight individuals/not practical as it requires laboratory access and expensive equipment

Explain the effect of 3 of the adaptations to endurance training listed in Fig.4 on Aerobic endurance

(6)

(increased cardiac output) (sub max 2)
1 (hypertrophy of the heart) results in more blood being pumped out of the heart/around body
2 Therefore more oxygenated blood is delivered to skeletal muscle

(increased red blood cell count) (sub max 2)
3 more haemoglobin
4 increasing the oxygen carrying capacity of the blood/more oxygen can be delivered to muscle

(increased mitochondrial size and density) (sub max 2)
5 Mitochondria is where aerobic metabolism takes place/respiration
6 greater production of ATP

(increased myoglobin concentration) (sub max 2)
7 Myoglobin has an affinity for oxygen (and is located in the cells)
8 Therefore more oxygen can be transported to the mitochondria (for aerobic metabolism)/increased O_2 stores in muscle/delays OBLA

(increased oxidative enzyme concentrations) (sub max 2)
9 Enzymes control the rate of a reaction
10 Therefore aerobic metabolism occurs faster

(increased glycogen stores) (sub max 2)
11 glycogen is a food fuel stored in the cell/energy source
12 produce more ATP/energy/athlete can perform for longer for muscular work

Define the term VO2 max and identify three factors that affect performers VO2max.

(5)

(a)	**Define the term VO_2 max and identify three factors that affect a performer's VO_2 max** **4 marks in total (AO1)** ***submax 1 mark; (define VO2 max)*** 1 is the **maximal** volume of **oxygen** that can be **utilised** in **one minute** (during maximal exercise) (measured in ml/kg/min) ***Submax 3 marks; (factors affecting VO2 max)*** **Mark first 3 only** 2 respiratory factors 3 cardiac factors 4 vascular factors 5 muscular factors/fibre types 6 training/activity levels/altitude 7 age 8 gender 9 hereditary/physiological make-up

Devise a six month training programme that will develop Aerobic capacity.
Justify your programme by referring to the Principles of training and periodisation.

(20)

(Periodisation)

1 Initial assessment
- age/current activity levels/PARQ/health screening/aim

2 Fitness testing
- multi-stage fitness test to estimate VO_2 max
- Cooper 12 minute run based on distance covered
- PWC170 use of HR

3 Macrocycle
- Long term objective/usually year/could be 6 months for some sports
- Reach physiological peak at right time
- Increase VO_2 max/increase % VO_2 max at which OBLA occurs
- Made up of a number of mesocycles

4 Mesocycle
- Medium term objective/1 to 4 months/depends on sport/objective
- Increase in CV endurance
- Could be pre-season/competitive/off season
- Made up of a number of microcycles

5 Microcycle
- Short term objective/1 to 3 weeks/recurrent units
- Made up of a number of training sessions

6 Pre-season
- Characterised by development of basic all round fitness
- Progressively increase in intensity/focus on aerobic fitness

7 Tapering
- Close to event training load reduced/recovery periods longer
- Ensure fuels/glycogen levels are high for event

8 Competitive season
- Maintenance of aerobic fitness levels
- Training sessions reduced to avoid burn out

9 Off/transition season
- Rest/low level activity/active recovery/cross training

(Principles of training)

10 Specificity
- Muscles used/movement patterns/fibre type/energy system

11 Moderation
- Prevent injury/allow sufficient recovery/particularly at start

12 Overload
- Make body work harder/increase stress on the body
- Increase frequency/intensity/time or distance/type

13 FITT
- (F) 2/3+ a week
- (I) 60-80% VO_2/HR max
- (T) 20+ mins/3km+

14 Continuous/Fartlek
- All body exercises
- Running/swimming/cycling
- altitude

15 Interval training
- 1 set of 3-4 reps
- work interval 3+ mins
- work-relief ratio 1:1/0.5

16 Progression
- Once adaptations have been made further increases in workload
- Increase frequency/intensity/time/distance by 10%
- Best to increase time/distance as overloading aerobic

17 Variance
- Different types of training
- Different types of exercise
- Prevent boredom/overuse injury/maintain motivation

18 Monitoring/evaluating
- Training diary/regular testing
- Reversibility
- Conduction of a gap analysis