

# PHYSICAL EDUCATION

## Units 3 & 4 – Written examination



## 2011 Trial Examination

### SOLUTIONS

#### SECTION A: Multiple-choice questions (1 mark each)

##### Question 1

*Answer:* C

*Explanation:* The correct order of importance of the energy systems during a 400m sprint is ATP-CP, anaerobic glycolysis, aerobic glycolysis.

##### Question 2

*Answer:* A

*Explanation:* The perceived benefit of stimulants is that they reduce fatigue.

##### Question 3

*Answer:* B

*Explanation:* At a work: ratio of 1:7 the dominant energy system would be the ATP-CP energy system.

##### Question 4

*Answer:* C

*Explanation:* Fartlek training has the ability to develop the anaerobic glycolysis and aerobic system which are indicated as the two most important systems in the pie chart provided.

**Question 5**

*Answer:* C

*Explanation:* Increased alveoli-capillary surface area and oxidation of fat are respiratory and muscular adaptations to aerobic training.

**Question 6**

*Answer:* B

*Explanation:* The resistance training protocol prescribed would develop the fitness component of local muscular endurance.

**Question 7**

*Answer:* A

*Explanation:* The ATP-CP system produces 0.7 ATP per PC molecule.

**Question 8**

*Answer:* D

*Explanation:* Using ice following contact sports or intense training sessions assists to decrease blood flow, minimise bruising and reduce swelling.

**Question 9**

*Answer:* C

*Explanation:* 4 sets of 4 reps is the most appropriate amount of progressive overload as the workload has been increased by the smallest amount possible or less than 10% and only one variable has been manipulated.

**Question 10**

*Answer:* C

*Explanation:* The Semo Agility Test would be the most appropriate agility test of the options as it assesses athletes performing a range of locomotion patterns required for basketball.

**Question 11**

*Answer:* D

*Explanation:* When performing interval training repetitions greater than 150 metres in distance an individual is conducting long interval training that will develop the aerobic energy system.

**Question 12**

*Answer:* C

*Explanation:* An increased cardiac output at the commencement of exercise is due mainly to an increase in stroke volume.

**Question 13**

*Answer:* A

*Explanation:* Knowledge, attitudes and beliefs are the most likely factors to influence the individual component of the social-ecological model.

**Question 14**

*Answer:* D

*Explanation:* During isokinetic resistance training variable resistance is provided by a machine throughout the range of motion of an exercise.

**Question 15**

*Answer:* B

*Explanation:* Observational tools are the only objective method of physical activity measures of the options available.

**SECTION B- Short answer questions**

**Question 1**

**a.**

Individual

Physical environment

Social environment

Policy

4 marks

**b.** Using a multi-level intervention approach involves promoting behaviour across all four components of the social-ecological model. This is believed to be more effective rather than just focusing on the individual.

2 marks

**c.** Examples could include the following, with an explanation of the factor which may influence physical activity:

The individual level can include:

- knowledge, attitudes, behaviours, beliefs, perceived barriers, motivation, enjoyment
- fundamental motor skills, abilities, disabilities or injuries
- age
- sex
- level of education
- socioeconomic status
- job status
- employment status
- self-efficacy

The social environment includes:

- family
- spouse/partner
- peers
- schools, workplaces and community organisations
- social support networks
- influence of health and other professionals such as doctors, teachers and coaches
- community/cultural norms

The physical environment includes:

- natural environment
- availability and access to facilities
- availability and access to equipment
- aesthetics of facilities or the natural environment
- environment safety

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- community design
- public transport.

Policy includes:

- urban planning policies
- active transport policies
- education policies
- school rules
- health policies
- physical activity recommendations
- environmental policies
- workplace policies
- funding policies.

2+2= 4 marks

Total 10 marks

**Question 2**

- a. Oxygen consumption starts to increase as a result of an intensity increase, in this case commencement of exercise.

2 marks

**b.**

Respiratory response:

Increase respiratory rate

Increased tidal volume

Increased ventilation

Cardiovascular response:

Increased HR

Increased stroke volume

Increased cardiac output

1 + 1= 2 marks

- c. The individual has reached a steady state where oxygen consumption meets oxygen demand.

2 marks

**d.**

- i) 11 to 15 minutes

- ii) At the 15 minute mark the individual's oxygen consumption has returned to 0.4 L/min which is back to the pre-exercise level at the start of the session.

1 + 1= 2 marks

Total 8 marks

**Question 3**

**a.**

Intrinsic motivation is motivation that comes from internal factors

Enjoyment	Stimulation	Fulfilment
Satisfaction	Challenge	Achieving goals

Extrinsic motivation is motivation that comes from external factors

Rewards	Money	Sponsorship
Trophies	Recognition	

4 marks

**b.** Most coaches believe it is better to have athletes that are intrinsically motivated because it is a more powerful and sustainable form of motivation over a long period of time.

2 marks

Total 6 marks

**Question 4**

**a.** The National Physical Activity Guidelines aim to promote **health** benefits of physical activity. For Australian children and youth the NPAGs recommend at least **60 minutes of moderate to vigorous** physical activity every day.

3 marks

**b.** Recommendation 2 for Australian children and youth should not spend more than two hours a day using electronic media for entertainment particularly during daylight hours.

2 marks

Total 5 marks

**Question 5**

**a.**

<b>Athlete</b>	<b>Legal/ illegal substance</b>
400m swimmer	<b>Bicarbonate</b>
Sprint cyclist	<b>Growth hormone</b>
Archery	<b>Beta blockers</b>
Marathon runner	<b>Erythropoietin (EPO)</b>

4 marks

b. One of:

<b>Athlete</b>	<b>Legal/ illegal substance</b>
400m swimmer	<b>Bicarbonate</b> Increased ability to buffer H <sup>+</sup> ions, decreasing muscle function inhibition that H <sup>+</sup> ions cause while working anaerobically
Sprint cyclist	<b>Growth hormone</b> Enhanced muscle mass development increasing strength and power Increases lipolysis use in the body, increasing lean muscle mass decreasing body fat
Archery	<b>Beta blockers</b> Reduces heart rate, reduce blood pressure, body tremors which enable the archer to be in a more relaxed when taking their shots increasing precision
Marathon runner	<b>Erythropoietin (EPO)</b> Increases number of red blood cells, therefore increasing oxygen carrying capacity increasing aerobic endurance

3 marks

c. One of (must be the same as Part b.):

<b>Athlete</b>	<b>Legal/ illegal substance</b>
400m swimmer	<b>Bicarbonate</b> Gastrointestinal discomfort
Sprint cyclist	<b>Growth hormone</b> Acromegaly Thickened skin Decrease in immune function Diabetes Hypertension Heart disease
Archery	<b>Beta blockers</b> Hypotension Impaired circulation Heart problems Fatigue
Marathon runner	<b>Erythropoietin (EPO)</b> Increased blood viscosity Blood clotting Increased risk of stroke

	Hypertension Dehydration
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1 mark  
Total 8 marks

**Question 6**

**a.** Any one of:

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Heat</li> <li>• Ice</li> <li>• Compression</li> </ul> | <ul style="list-style-type: none"> <li>• Hyperbaric chambers,</li> <li>• Massage</li> <li>• Sleep</li> </ul> |
|--|--|

2 marks

**b.** Any one of:

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Carbohydrate loading</li> <li>• Glycemic index</li> </ul> | <ul style="list-style-type: none"> <li>• Carbohydrate gels</li> <li>• Protein supplementation</li> </ul> |
|--|--|

2 marks

**c.** Any one of:

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Meditation,</li> <li>• Motivational techniques</li> <li>• Optimal arousal</li> </ul> | <ul style="list-style-type: none"> <li>• Mental imagery</li> <li>• Concentration</li> </ul> |
|---|---|

2 marks

**d.** Hird and his staff should conduct a games analysis to identify the specific requirements of AFL football to enable specific training programs to be designed. The game analysis should include information regarding fitness components, skill requirements, energy system usage, movement patterns and muscle groups and actions utilised.

Prior to commencement of the new training program pre-fitness testing of the players should be conducted to establish base level, identify strengths and weaknesses and provide motivation.

Training methods aimed at developing the fitness components and energy systems identified in the game analysis should be incorporated into the training program.

After a period of time post-fitness testing should be conducted to evaluate player progress and therefore the effectiveness of the training program.

4 marks

**e.** Any two of:

- GPS data
- Heart rate data
- Skill frequency charts
- Lactate readings
- Work to rest ratios

2 marks



f.

- GPS data – movement patterns, muscle groups and energy systems used
- Heart rate data - determine energy systems used
- Skill frequency charts – fitness components, muscle groups and actions
- Work to rest ratios – determine energy systems used

The data collected will determine the training methods selected and how the training principles are applied to each training method.

4 marks  
Total 16 marks

**Question 7**

a.

Anaerobic glycolysis:

- 200-400m sprints
- 50-200m swim
- Team sports requiring repeated high intensity efforts such as basketball, AFL football.

Aerobic:

- Marathon
- Cross country skiing
- Triathlon
- Road race/time trial cycling

2 marks

b.

• Anaerobic glycolysis	• Aerobic
<ul style="list-style-type: none"> <li>• Does not require oxygen</li> <li>• Short duration (10-60 secs)</li> <li>• High intensity (80-95% max)</li> <li>• Produces small amounts of ATP (1-2 moles)</li> <li>• Fast ATP production rate</li> <li>• Uses one food fuel – Carbohydrates</li> <li>• Produces fatiguing by-product: hydrogen ions</li> </ul>	<ul style="list-style-type: none"> <li>• Requires oxygen</li> <li>• Longer duration (&gt;60 secs)</li> <li>• Sub-maximal intensity</li> <li>• Produces large amounts of ATP</li> <li>• Slow ATP production rate</li> <li>• Can use three food fuels: carbohydrates, fats and protein</li> <li>• Produces non-fatiguing by-products: CO<sub>2</sub>, H<sub>2</sub>O &amp; heat</li> </ul>

4 marks  
Total 6 marks

**Question 8**

a. Depletion of glycogen

1 mark

b. When an individual experiences depletion of glycogen there is an increased reliance on fat as a fuel source. Greater reliance on fat for ATP production necessitates a decrease in exercise intensity due to the higher oxygen cost of fat metabolism.

3 marks

c.

Hypertonic: sports drinks have a lower proportion of water and higher concentration of carbohydrates that delay the rate at which fluid is absorbed.

Hypotonic: sports drinks contain fluid, electrolytes and a low level of carbohydrates that have a lower osmotic pressure to another fluid.

Isotonic: sports drinks contain fluid, electrolytes and 6 to 8 percent carbohydrates that have an equal osmotic pressure to another fluid.

1+1+1= 3 marks

Total 7 marks

**Question 9**

**Most accurate**

1. Observational tools
2. Accelerometry
3. Pedometry
4. Recall surveys/diaries

**Most practical**

Total 4 marks

**Question 10**

- a. Muscular power is the ability of the body to produce force as quickly as possible. It is a combination of speed and strength.

1 mark

b.

Sets	Reps	Load	Rest
3-6	3-6	30-60% 1RM	2-3minutes

4 marks

- c. The load chosen can only be moderate (30-60%) in relation to an individual’s 1RM as muscular power is a combination of speed and strength. The athlete has to be capable of moving the weight as fast as possible therefore combining speed and strength.

2 marks

- d. **Progressive overload:** increase only one variable and by less than 10%.

**Frequency:** an appropriate frequency would be 3-4 training sessions per week depending on how her program was designed. Anaerobic athletes train less often than aerobic athletes due to the stress it places on the body and the greater recovery time required.

**Intensity:** Each High Jump attempt is performed at maximum intensity; subsequently Meaghan needs to ensure that the intensity of her training is very high (85-100%maximum heart rate) to be of benefit.

**Specificity:** Movements and muscles groups worked need to replicate those required for Meaghan to improve at High Jump.

4 marks

Total 11 marks

**Question 11**

- a. As exercise intensity (speed) increases, blood lactate concentration increases.

1 mark

- b. Lactate inflection point is the final exercise intensity that there is a balance between lactate production and lactate removal. Beyond lactate inflection point lactate production exceeds lactate removal and fatigue will begin to occur.

2 marks

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- c. Endurance athletes would benefit from a high lactate inflection point as it enables them to go for a longer duration at a higher intensity before they begin to fatigue.

2 marks

- d. Active recovery: involves performing the same activity at a lower intensity with the aim of returning the body to its pre-exercise state. An active recovery maintains an elevated heart rate and therefore oxygen consumption which helps to accelerate the process of ridding the muscle of metabolic by-products that have been produced and accumulated. It also helps to prevent venous pooling of blood in inactive muscles following activity especially in the lower extremities.

4 marks

Total 9 marks

**Question 12**

- a. The purpose of the World Anti-Doping Code is to protect athletes' fundamental right to participate in doping-free sport.

1 mark

- b. Athletes can violate the World Anti-Doping Code in the following ways:

- The presence of a prohibited substance in an athlete's sample
- Use of a prohibited substance or method
- Refusal to submit a sample or evading sample collection
- Failure to file whereabouts and missed tests
- The tampering or attempted tampering with any part of the doping process
- Possession of a prohibited substance or method
- The trafficking or attempted administration to an athlete of a prohibited substance or method
- Administration or attempted administration to an athlete of a prohibited substance or method including assisting, encouraging, aiding, abetting or covering up of an anti-doping rule violation.

3 marks

Total 4 marks

**Question 13**

Any two as long as they are from different settings:

Schools:

- Jump Rope for Heart
- The Walking School Bus
- Active After School Communities
- Ride2School

Workplace:

- Find Thirty
- Go For Your Life – Men's Health Initiative
- Healthy Workplace

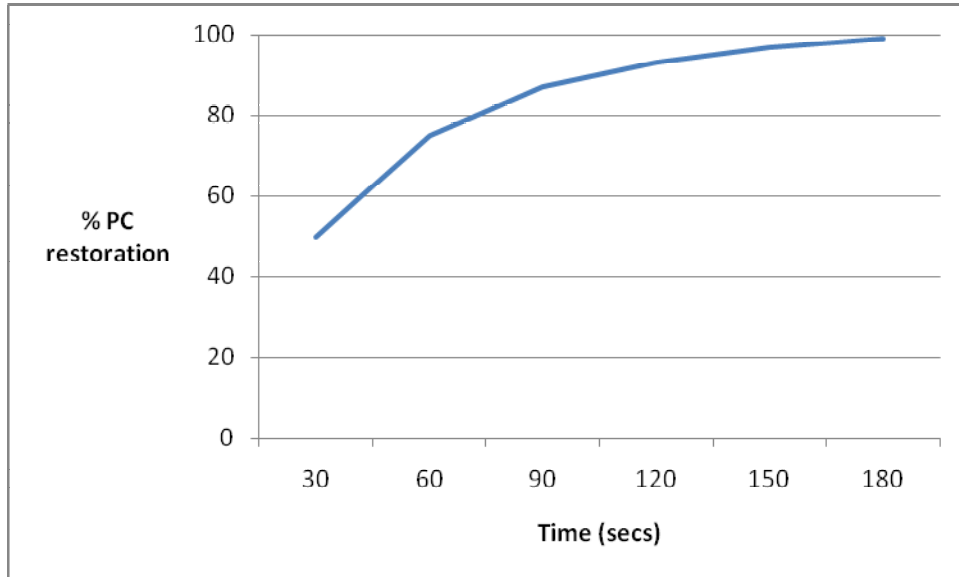
Community:

- Go For Your Life
- 10,000 Steps Challenge

- TravelSmart
- Healthy Spaces and Places
- Streets Ahead
- Measure Up
- Active Script Program
- Heartmoves

2 + 2 = 4 marks

**Question 14**



a. PC stores replenish rapidly in the initial 30 seconds of recovery (approximately 50%) and then replenishment slows with the remaining 50% taking up to 3 minutes for full replenishment to occur.

2 marks

b. The individual's ATP-CP system would not be totally replenished after 120 seconds, therefore, their second 200m sprint would have a greater reliance on the anaerobic glycolysis energy system and subsequently could not be performed at as high an intensity as the first 200m sprint.

2 marks

c. Passive recovery: is total rest or very low intensity. This is the optimal method for replenishing CP stores rapidly between intense bouts of exercise.

4 marks

Total 8 marks