

PHYSICAL EDUCATION

Unit 3 & 4 – Written examination



(TSSM's 2017 trial exam updated for the current study design)

SOLUTIONS

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

Question 1

Answer: B

Explanation:

The 300m shuttle run test is the correct answer as the other tests are not recognised tests.

Question 2

Answer: D

Explanation:

Thermotherapy should be performed 72 hours after cryotherapy to help blood flow return to the injury to aid the healing process. Cryotherapy should be used immediately to reduce swelling and inflammation.

Question 3

Answer: D

Explanation:

Newton's 1st law is the Law of Inertia. 2nd is the law of acceleration, 3rd is the law of action/reaction.

Question 4

Answer: C

Explanation:

The dominant energy system during a 100m sprint is the ATP-PC system. The main cause of fatigue using this system is the depletion of PC which causes the anaerobic glycolysis system to increase in dominance, which has a slower rate of PC resynthesis.

Question 5

Answer: A

Explanation:

When a fitness test is valid, it means that it measures the fitness component that it is supposed to.

Question 6

Answer: B

Explanation:

The concept of diminishing returns suggests that as performers get to later stages of skill learning their rate of improvement relative to practice **decreases**.

Question 7

Answer: D

Explanation:

Whilst all athletes listed contend with relatively large inertias to be moved in their chosen events, the weightlifter would move significantly larger resistance than all others.

Question 8

Answer: D

Explanation:

There are a significant number of factors which could influence the development of skill in a child. All of the responses in this question are just some of these.

Question 9

Answer: D

Explanation:

Measurable means that the individual must be able to identify specific ways of knowing that they have achieved the goal.

Question 10

Answer: A

Explanation:

H⁺ ions make the conditions inside the muscle more acidic.

Question 11

Answer: A

Explanation:

Linear motion is where all body parts travel the same distance in the same direction at the same time. As the ice skater is gliding and holding the same position this is an example of linear motion.

Question 12

Answer: D

Explanation:

Above the lactate inflection point, production exceeds removal because the exercise intensity has increased and the body can no longer keep up with the oxygen demand, causing an increase in the use of anaerobic glycolysis. H⁺ ions accumulate inside the muscle as side effects of anaerobic glycolysis, which causes fatigue.

Question 13

Answer: D

Explanation:

Blocked practice enables the performer to concentrate on one skill at a time, free from distractions

Question 14

Answer: D

Explanation:

Contrast water therapy creates a venous pump through repeated vasodilation and vasoconstriction of blood vessels. This increases blood flow to and from the muscle to aid recovery.

Question 15

Answer: C

Explanation:

The resistance is located between the force and the axis on 2nd class levers

SECTION B: Short-answer questions

Question 1 (13 marks)

- a. VO_2 max is the maximal volume of oxygen that the body can take in and use per minute. 1 mark
- b. Aerobic capacity is the ability of the cardiovascular and respiratory systems to take up and supply oxygen to the muscles to sustain exercise. 1 mark
- c.
- i. Endurance sports have a higher aerobic capacity compared with non-endurance sports. Must quote figures as an example to receive full marks.
 - ii. This is because endurance events require a high volume of aerobic training. The chronic adaptations to aerobic training improve the functioning of the cardiovascular and respiratory systems, enabling them to delivery oxygen to the muscles more efficiently, giving an athlete a higher VO_2 max. 2 + 2 = 4 marks
- d. Possible answers include:
- VO_2 max – The higher this is, the more oxygen can be taken up, transported and utilised per kg of body weight and the greater the ability to supply ATP aerobically.
 - Lactate inflection point (LIP) – The later this occurs during activity (increased via aerobic training), the less likelihood hydrogen ions (H^+) will accumulate and affect aerobic energy production.
 - Gender – Males have greater aerobic power than females because, amongst other factors, they have larger hearts, lungs and blood volumes.
 - Age – VO_2 max peaks around 25–28 years of age and then declines by 1% per year
 - Heredity – aerobic power/ VO_2 max has a heredity estimate of 90–95%
 - Training – Athletes who can increase their stroke volume (SV), cardiac output (Q), blood volume, capillary density, lactate inflection point (LIP), arterio-venous oxygen difference (a- vO_2 diff), and slow-twitch muscle fibre characteristics will greatly improve their aerobic capacity. 4 marks
- e.
- i. A laboratory-based test is one that is completed in laboratory testing environment using specialist equipment. It is highly accurate in the results but not specific to a sporting environment.
 - ii. A field-based test can be adapted to the athlete's competitive environment and is more specific to individual sports. It is far cheaper as it doesn't require specialist equipment and larger groups of athletes can complete the tests together.

iii. Possible answers include:

1. 1.6 km run test
2. Yo-Yo intermittent recovery test (more specific for intermittent team sports than beep test)
3. Cooper's 12 minute run

1 + 1 + 1 = 3 marks

Total 13 marks

Question 2 (5 marks)

a. Centre of gravity is the central point of your body around which all parts are evenly distributed. If this is lower the wrestler will be more stable.

Base of support relates to the size of the area in contact with the ground. If this is larger or wider then the wrestler will be more stable.

Line of gravity is a line which should run down the middle of the body and line up in the centre of the base of support for optimal stability. Leaning or having outstretched limbs will throw this line outside the base of support and make the wrestler unstable.

3 marks

b. Stand with legs shoulder width or more apart

Bend knees to keep the centre of gravity low, but maintain a straight posture

Don't lean too far in any direction

2 mark

Total 5 marks

Question 3 (10 marks)

a. A situation where performance deteriorates because a heightened sense of pressure or importance is placed on an upcoming event or action. It causes a shift in concentration – to internal and narrow. This has a psychological and physiological effect on performance:

2 marks

b. Psychological:

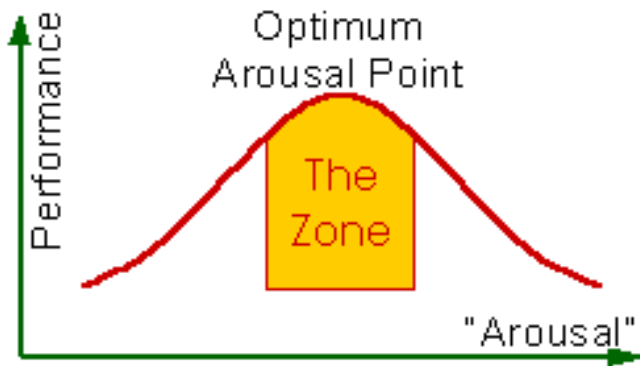
- Decreased selective attention on the important cues in the environment
- Negative self-talk
- Poor judgement and decision making

Physiological:

- Impaired timing and coordination
- Fatigue
- Muscle tension

4 marks

c.



2 marks

d. Possible answers include:

- Controlled breathing
- Tensing and relaxing muscles
- Listening to music
- Watching a movie
- Meditation
- Massage
- Stretching

2 marks

Total 10 marks

Question 4 (15 marks)

a.

OPEN	CLOSED
Netball shooting with a defender	Shooting with no defenders / indoors
Hitting balls from a machine or balls that have been pitched	Hitting a baseball off a tee
Throwing balls while the target is moving	Throwing a ball into a bucket
Surfing at a notoriously rough surf beach	Surfing at gentler swell beach / dry land drills
Swimming in the ocean	Swimming in pool

5 marks

b. Cognitive stage

Many errors
 Brief instructions which are clear and concise
 Learning through trial and error
 Lots of concentration on the skill required
 Demonstrations vital

3 marks

c. Autonomous

Skill can be performed almost automatically and is second nature
 Highly fluent and co-ordinated/ excellent timing
 Very few errors
 Excellent decision making
 Time to concentrate on other aspects of performance such as tactics

3 marks

d. Coaches must provide adequate opportunities for the skill to be practised so that they become more proficient at performing the skill successfully, more often.

Coaches should assist the performer in identifying skill errors and more importantly strategies for further improving performance based on these errors.

Coaches should vary the practice opportunities to assist with ongoing motivation and provide more opportunities within a competitive context for aspects of the skill to be further developed e.g. recognition of specific cues within the environment.

2 marks

e.

Suggested type of practice- only one answer required, both accepted

Athlete	Stage of Learning	Suggested type of Practice-
A	AUTONOMOUS	Massed, Random
B	ASSOCIATIVE	Serial, Distributed
C	COGNITIVE	Blocked, Distributed

6 Marks

Total 18 marks

Question 5 (7marks)

a.

- Speed of release
- Angle of release
- Height of release

3 marks

b. 1. A ball struck with the same force by a longer club will travel shorter / **further**

2. A ball struck with less force will accelerate **slower** / faster if struck with the same club

2 marks

c. Shorter backswing would result in less force being imparted on the ball and as a result less acceleration, enabling the angle of the clubhead to be fully utilised and the ball to go higher in the air.

Holding the club further down the shaft would enable greater control of the club. In doing so this would reduce the speed at which the club was swung and enable greater use of the clubhead and impart greater loft on the ball.

2 marks

Total 7 marks

Question 6 (12 marks)

a. Anaerobic capacity - The ability of the body to produce energy without using oxygen and hence the efficiency/power of the two anaerobic energy systems ~ ATP-PC & anaerobic glycolysis systems.

Speed – The ability to move the whole body, or body parts, from one place to another in the shortest possible time.

Muscular Power – The ability to exert a maximal contraction in one explosive effort.

Reaction Time - The time between a signal being detected and the first movement/ response to this signal.

4 marks

b.

Fitness Component	Factors that affect it
Anaerobic capacity	<p>Age – Anaerobic power tends to peak around 30 years of age and then decline by 1% per year. It declines because the body decreases in cross sectional area of muscle fibres, resulting in decreases in fuel stores (ATP & PC & glycogen) and anaerobic enzymes.</p> <p>Gender – Males have greater muscle mass than females and so will also have greater stores of ‘anaerobic fuels’ (ATP & PC) and glycolytic enzymes that can break down glycogen quickly without oxygen.</p> <p>Lactic acid and metabolite tolerance – anaerobic training calling upon the anaerobic glycolysis system will greatly improve the muscle’s abilities to tolerate build-up of H⁺, ADP and Pi.</p> <p>Fibre type – Fast-twitch fibres can generate anaerobic power quicker than slow-twitch fibres because they have greater anaerobic stores of fuels.</p> <p>Fibre recruitment – Anaerobic power relies upon fast-twitch fibres being activated quickly and hence many ‘intense’ impulses are sent to relevant muscle groups requiring quick activation.</p>
Speed	<p>Fibre type – fast-twitch fibres can generate greater speeds than slow-twitch fibres.</p> <p>Fibre recruitment – speed relies upon fast-twitch fibres being activated quickly and hence many ‘intense’ impulses are sent to relevant muscle groups requiring explosive efforts.</p> <p>Fibre arrangement/shape – fusiform muscles with low attachment points contribute to speed more than pennate muscles which are stronger.</p> <p>Reaction time – faster reaction times contribute to quicker movements.</p> <p>Range of motion at joints – the greater the range of motion due to increased viscosity/temperatures and low restriction from fat, muscle bulk, scar tissue, the quicker movements can occur.</p> <p>Efficiency of movement – correct techniques ensuring maximum acceleration and summation of force contribute to greatest speed.</p> <p>Heredity – bone/lever length (longer bones are capable of generating greater speed than shorter ones) and ligament/tendon attachment sites (longer and less restrictive attachments) all contribute to greater speed</p>

	development. It should be noted that fast-twitch: slow-twitch ratios are also inherited.
Power	<p>Age – muscular power will tend to peak around 25 years of age and then decline by 1% per year.</p> <p>Gender – males have greater muscle mass than females so will also have greater muscular power.</p> <p>Speed of contraction – greatest power/force generated when both speed of contraction and force of contraction are around 35% of each maximum. Moderate speed and strength will generate maximal muscular power.</p> <p>Fibre type – fast-twitch fibres can generate muscular power quicker than slow-twitch fibres.</p> <p>Fibre recruitment – muscular power relies upon fast-twitch fibres being activated quickly and hence many ‘intense’ impulses are sent to relevant muscle groups requiring explosive efforts.</p> <p>Muscle length – muscles are able to apply greatest power when stretched just past their resisting length coinciding with maximum actin–myosin overlap and cross bridge formation. Movements involving eccentric contractions generate greatest muscular power</p>
Reaction time	<p>Optimal arousal and concentration – both these factors will contribute to quick and appropriate reactions.</p> <p>Number of responses – reaction time is quickest when there is only one possible response. If there are several possible responses, performers must decide which one they are going to use and reaction time is slowed.</p> <p>‘Noise’ – distractions add to reaction time and slow down responses</p>

2 marks

c.

Fitness Component	Fitness Test
Anaerobic capacity	1. Phosphate Recovery test This test challenges the body's ability to resynthesise PC in between each repetition in the test. This test demonstrates the performance decrement over 8 x 7s sprints on 30s. 2. 300m shuttle run test This test measures the ability of the two anaerobic systems to supply high-intensity energy over a short period of time. 3. Running-based anaerobic sprint test (RAST) Requires the calculation of power decline over 6 x 35m sprints, with 10s rest in between each one.
Speed	1. 35m sprint 2. 50m sprint
Power	1. Vertical Jump 2. Standing long jump test
Reaction time	1. Ruler-drop reaction test 2. Online reaction tests

2 marks

- d. 100m – Dominant energy system is the ATP-PC system. Depletion of PC causes an increased contribution from anaerobic glycolysis which has a slower rate of ATP resynthesis.
- 200m – Dominant energy system is anaerobic glycolysis. Accumulation of H⁺ ions as a by-product increases the acidity inside the muscle and impairs muscle contraction rate.

4 marks

Total 12 marks

Question 7 (13 marks)

a. Running, kicking, throwing, catching, striking

3 marks

b. These essential skills enable children to participate more effectively in major games and sports which rely on the skills.

Greater levels of confidence are developed in children who are able to participate effectively in skill-based activities and this leads to greater levels of engagement.

Higher levels of general skill development may translate to enhanced willingness to participate in physical activity and engage in a healthier lifestyle.

2 marks

c. Family- parents and / or siblings

Peers

Coaches / teachers

Role models

Physical Education / sport programs at school

Lack of interest / motivation

Physical injury / disability

Lack of encouragement / support from family friends

Limited physical education / sport opportunities provided at school

4 marks

d. Family- parents and / or siblings- Family members spending time with children working on the various skills or simply playing with them and allowing skills to develop through repetition of practice and copying the role modelling of family members

Peers- Friends encouraging each other to play games or perform in activities where skills are practiced and utilised

Coaches / teachers- Coaches at clubs or teachers at schools spend time on skill development as part of their role/job and in doing so have a vested interest in the development of their team players or students

Role models- Role models have an indirect influence on skill development by performing proficiently in their sporting pursuits and inspiring younger children to be more like them which can lead to practicing more often to achieve this aim

Physical Education / sporting programs at schools- These are designed to target the development of skills in students and provide opportunities for progression of development.

2 marks

- e. Lack of interest / motivation- if children are not interested or motivated to participate they will not develop their motor skills due to lack of practice

Physical injury / disability- injury or disability may prevent children from physically being able to participate in activities aimed at skill development

Lack of encouragement / support from family friends- If opportunities to participate are not readily available within the family unit or a peer group children may not experience skill development

Limited physical education / sport opportunities provided at school- for some children the only physical activity or motor skill opportunities that exist are at school. If these opportunities are also lacking the students will be deprived of further opportunities to experience skill development.

2 marks

Total 13 marks

Question 8 (19 marks)

a.

i. The ability to maintain equilibrium whilst stationary (static) or moving (dynamic).

ii. Base of support – the greater the base of support, the greater the equilibrium.
Centre of gravity – by lowering one’s centre of gravity, balance is increased.
Core stability – greater core stability leads to improved balance.

iii. Stork balance stand test
Standing balance test

1 + 4 + 2 = 7 marks

b.

i. Biomechanics is -the study of mechanical principles that govern human movement --
the science of human movement

ii. Kinetics
Kinematics

1 + 2 = 3 marks

c. An athlete would use cryotherapy which is cold treatment such as an ice pack/wrap on the injury. It causes vasoconstriction of blood vessels surrounding the injury and therefore helps to reduce swelling and inflammation. It should be performed immediately after the injury occurs.

3 marks

d. An athlete would spend time in a hyperbaric chamber which has a higher concentration of oxygen inside. This means that there is more oxygen available for the athlete to breathe in and deliver to the muscles to aid recovery.

2 marks

e.

- Positive self-talk: The use of words of encouragement and motivation to oneself which can be in the form of specific phrases or words. E.g. You can do this.
- Mental imagery: Visualising your own performance and playing that performance back through in your mind. Visualising the perfect performance, visualising winning or achieving your goal as a form of motivation or to get 'in the zone'.
- Breathing control: Being aware of your own breathing and using slow and deep breaths as a means of calming your nerves and reducing arousal levels. An elevated breathing rate may be used to increased arousal levels.
- Biofeedback: The use of a machine to monitor and provide feedback when heart rate increases as a sign of being over aroused. The signal triggers to the athlete so that they are aware of the increased arousal and over time they learn to detect and control their arousal without the use of the machine.

2 marks

Total 19 marks

Question 9 (8 marks)

- a. A GPS can record the movements patterns of players as well as their intensity. It shows their coverage on the oval which can show their movement according to their player positioning and involvement in the game. It can be used to identify the distance they have covered and the intensity they have worked at to make comparisons across the four quarters and between games in the seasons for signs of fatigue/improved fitness.

2 marks

b.

- i. A games analysis is where statistics are recorded from observing a player during a game, either through direction observation or digital recording (video analysis).
- ii. It is important to record skill frequency (and success rate of performing a skill) so that strengths and weaknesses in performance can be identified. Skills that are performed the most frequently in a game can be analysed in terms of the muscles used and the components of fitness that need to be targeted in a training program so that it is specific to the player and their position on the team.

1 + 2 = 3 marks

- c. Long interval training: A period of work followed by a period of rest (which can be an active recovery) using a work to rest ration of 1:1 or 2:1.

Fartlek training: a continuous session for at least 20 minutes where the exercise intensity varies throughout. This is very specific to AFL due to the unpredictable changes in exercise intensity throughout the game.

Continuous training: Maintaining a relatively constant intensity throughout an exercise bout of at least 20 minutes.

2 marks

- d. A fixed load circuit is where you complete a set number of reps at each station before moving on to the next one.

1 mark

Total 8 marks