



Units 3 and 4 Physical Education

Practice Exam Solutions

Stop!

Don't look at these solutions until you have attempted the exam.

Any questions?

Check the Engage website for updated solutions, then email practiceexams@ee.org.au.

Section A – Multiple-choice questions

Question 1

The correct answer is D.

Question 2

The correct answer is C. Note that answers A and B are incorrect as children are considered to have cognitive limitations, whereas older adults are considered to have memory limitations.

Question 3

The correct answer is B. When muscle contract, the veins are squashed together and the blood in them is forced towards the heart (this is the muscle pump). During inspiration, the veins in the abdomen and thorax are emptied and blood flows towards the heart (this is the respiratory pump). Venoconstriction reduces the capacity of the venous system, forcing blood towards the heart.

Question 4

The correct answer is C.

Question 5

The correct answer is A.

Question 6

The correct answer is C. Stroke volume is a measure of how much blood the heart ejects with each beat.

Question 7

The correct answer is B. Carbohydrates should make up around 55-60% of your diet. Carbohydrates are stored as glycogen which is the body's preferred source of fuel during exercise. Fats should make up 25-30% of your diet. Fats are the main source of fuel at rest and during prolonged submaximal exercise. Protein should make up 10-15% of your diet. It is used to build and repair muscle tissue.

Question 8

The correct answer is A. Glycolysis is the breakdown of glycogen. Aerobic glycolysis is the breakdown of glycogen to produce ATP, carbon dioxide, water and heat. Anaerobic glycolysis is the breakdown of glycogen to produce lactic acid, lactate, hydrogen ions and ATP.

Question 9

The correct answer is B. Short-interval training would result in anaerobic adaptations, such as an increase in fast-twitch muscle fibre concentration. An increase in myoglobin would result from aerobic training. Myoglobin is present in muscle cells. It transports oxygen from the blood to the mitochondria.

Question 10

The correct answer is D.

Question 11

The correct answer is D. An increase in diastolic filling time means blood has more time to enter the heart, and therefore more blood enters the heart. Increased left ventricular volume means more blood enters into the left ventricle, and therefore more blood is ejected from the left ventricle.

Question 12

The correct answer is B.

Question 13

The correct answer is B. It is the only option that refers to a MUSCULAR response to exercise.

Question 14

The correct answer is D. 400 metre sprinters accumulate lactic acid which is best removed with active recovery.

Question 15

The correct answer is A. B is incorrect because although the total amount of RBC increases with endurance training, the total concentration decreases as there is a large increase in plasma volume.

Section B – Short-answer questions

Marks allocated are indicated by a number in square brackets, for example, [1] indicates that the line is worth one mark.

Question 1a

- The lactate inflection point is the point at which lactate production is equal to lactate removal. [1 mark]
- The lactate inflection point is the point beyond which lactate production exceeds lactate removal. [1 mark]

Question 1b

- Lactate tolerance refers to the body's ability to perform when lactate has accumulated in the blood. [1 mark]

Question 1c

- The LIP refers to the point before lactate begins to accumulate, whereas lactate tolerance is measured after lactate begins to accumulate. [1 mark]
- For lactate tolerance to occur, the LIP must first occur. [1 mark]

Question 1d

- Engage in training sessions just above the athlete's LIP, for example, at around 90% max heart rate. [1 mark]

Question 1e

- A 5000 metre runner. [1 mark]
- A high LIP would allow the 500 metre athlete to maintain a high speed for a longer period of time, whereas the other sprinters would not accumulate extreme amounts lactic acid in their short races. [1 mark]

Question 2a

- Dehydration results in a drop in blood plasma volume, thereby making blood more viscous. [1 mark]
- This results in a decrease in the amount of blood (and therefore oxygen) being delivered to muscles, resulting in slowed energy production (and therefore inability to sustain a required exercise intensity). [1 mark]
- PC is broken down more rapidly than any other fuel to provide energy. [1 mark]
- Therefore, when PC stores are depleted, the body is forced to use other fuels such as glycogen and fats which provide energy more slowly (and therefore the athlete is forced to slow down). [1 mark]
- Hydrogen ion accumulation causes muscles to become acidic. [1 mark]
- The acidic environment slows down enzyme activity, which slows down the breakdown of glucose. Therefore the athlete has to decrease their exercise intensity. [1 mark]

Question 2b

- During training, athletes should drink small amounts of fluid regularly to match fluid losses with fluid intake. [1 mark]
- Immediately after a training session, athletes should drink 1-1.5 litres of water for every 1kg lost. [1 mark]

Question 2c

- Cold shower [1 mark]
- Ice vests [1 mark]
- Hydration [1 mark]

Question 2d

- It maintains a higher oxygen intake which assists in the hastening the removal of lactate. [1 mark]
- It creates a muscle pump which increases the rate of oxygen supply and removal of waste via the circulatory system. [1 mark]

Question 3a

- Health-related fitness components are directly related to good health and physical wellbeing, whereas skill-related components are related to a person's physical performance in motor skills. [1 mark]
- Both influence our ability to engage and perform in physical activity. [1 mark]

Question 3b

- Muscular strength and muscular endurance are health-related fitness components, whereas muscular power is a skill-related fitness component. [1 mark]
- Muscular strength refers to the maximal force that can be generated by a muscle or muscle group in one maximal effort, [1 mark] whereas muscular endurance involves repeated contractions over a longer period of time. [1 mark]
- Muscular power is different in that it involves exerting a force more rapidly. [1 mark]

Question 3c

	Muscular strength	Muscular power	Local muscular endurance
Sets	3 - 6	3 - 6	3 - 6
Repetitions	1 - 6	3 - 6	15 - 25
Speed	Slow	Fast	Medium
Recovery	2 - 3 mins	2 - 3 mins	1 min
Predominant energy system	ATP/PC	ATP/PC	Anaerobic glycolysis

Question 3d

- Joint structure – different joints allow for different ranges of motion. [1 mark]
Body and muscle temperature – increased temperature increases elasticity and decreases stiffness of muscles. [1 mark]
- Age – flexibility changes throughout growth and development and peaks in mid to late twenties. [1 mark]
- Gender – depending on the joint being measures, there is generally different flexibility between males and females. [1 mark]

Question 4Creatine phosphate replenishment

Recovery time (seconds)	Percentage of restored muscular creatine phosphate (%)
30	70
60	75
150	97
180	98

Question 5a

- EPOC occurs to repay the oxygen deficit that occurs at the start of exercise. [1 mark]
- It helps to remove the lactic acid that accumulated during oxygen deficit when the body had to rely on the anaerobic energy systems. [1 mark]

Question 5b

- Perform a warm-up before starting an exercise bout. [1 mark] *This means that the body will rely more upon the aerobic energy systems and so anaerobic by products will not build up.*
- Engage in a long-term aerobic training program [1 mark] to increase the capacity of the cardiovascular system. *This means the body will be more efficient in removing wastes and so less oxygen will be required at the end of exercise.*

Question 6a

Myoglobin exists in muscle cells, where it transports oxygen from haemoglobin to mitochondria. [1 mark]

There would have been an increase in Tom's myoglobin concentration. [1 mark]

Question 6b

- Tom would have an increase ventilatory efficiency, [1 mark] meaning that the amount of oxygen required to breathe is less.
This is because Tom's respiratory muscles have become more efficient in using oxygen and so more oxygen is available to be delivered to the working muscles. [1 mark]
- Tom would have increased pulmonary diffusion. [1 mark]
- Tom would have a greater alveolar-capillary surface area and so oxygen is transferred more readily between the lungs and the capillaries. [1 mark]

Question 6c

- VO₂ max is the maximum amount of oxygen that can be used in one minute during maximal exercise. [1 mark]
- It is possible to train above your VO₂ max. VO₂ max refers to the capacity of the aerobic system, but the anaerobic systems can be used to supply more energy, enabling us to train above our VO₂ max. [1 mark]

Question 7a

- Sam's ventilation rate would have increased, as both her tidal volume and respiratory rate would have increased to cope with the increased energy demand. [1 mark]
- There would be an increased alveolar-capillary diffusion rate as a higher concentration of CO₂ is being produced in her body. [1 mark]

Question 7b

- Sam's cardiac output would have increased, as both her stroke volume and heart rate would have increased. [1 mark]
- Sam's venous return would also have increased as a result of the muscle pump and respiratory pump. [1 mark]
- Sam would have experienced a redistribution of blood flow as blood was redirected towards the working muscles. [1 mark]

Question 7c

- Sam would have increased motor unit recruitment as the brain increases the messages sent to activate motor neurons in the working muscles. [1 mark]
- Sam would have decreased energy substrates as ATP is quickly used up to produce energy. [1 mark]

- Sam would also have increased lactate due to anaerobic production of ATP. [1 mark]

Question 8a

- At an individual level, Miss Johnson targets psychological factors (e.g. motivation) by educating the children about the benefits of physical activity. [1 mark]
If the children understand how engaging in handball will benefit them, they will be more likely to want to join in. [1 mark]
- On an interpersonal level, Miss Johnson provides the children with social support by putting them into teams. [1 mark]
- The children will be more excited to exercise as they have classmates to exercise with, making it more fun. [1 mark]
- In regards to the physical environment, Miss Johnson supplies the teams with a ball and an area. [1 mark]
- Ensuring that the children have equipment readily available enhances their ability to engage in the program. [1 mark]
- At an organisational policy level, Miss Johnson has secured class time in which the children can exercise. [1 mark]
- As it is part of the school day, children will have the time to engage in the program. [1 mark]

Question 8b

- The program is likely to be successful because it targets all four levels of the SEM, meaning it incorporates many factors that positively influence physical activity engagement. [1 mark]

Question 8c

- Miss Johnson could give prizes to the weekly competition winners. [1 mark]
- Miss Johnson could get professional European handball players to come and show the students cool tricks and skills. [1 mark]

Question 9

Games analysis method	Advantage	Disadvantage
HR monitoring	1. Relatively inexpensive (1 mark)	1. Only provides information on one dimension of physical activity (1 mark)
Direct observation	1. Provides rich data on several dimensions of physical activity (1 mark)	1. Time consuming (1 mark)
Digital recording	1. Data can be archived and shown to athletes (1 mark)	1. Technology used may be expensive (1 mark)

Question 10a

- Zara could use progressive muscle relaxation. [1 mark]
- She should progressively tense and relax her major muscle groups, working from head to toe. [1 mark]

Question 10b

- Decreased ability to metabolise glucose for energy. [1 mark]
- Increased levels of circulating stress hormones. [1 mark]
- Decreased activity of HGH essential for tissue repair, therefore increasing risk of injury. [1 mark]
- Increased moodiness/perceived exertion. [1 mark]

Question 10c

- Eliza could use mental imagery. [1 mark]
- She should picture herself winning the regatta and celebrating with her friends afterwards in order to motivate herself to do well. [1 mark]

Question 11a

- WADA publishes the code each year which outlines banned substances and methods. [1 mark]
- WADA aims to protect athletes' fundamental right to participate in drug-free sport [1 mark] and ensures an accepted and coordinate approach to anti-doping programs at a national and international level. [1 mark]
- ASADA's roles include detection, deterrence and enforcement of doping free sport in Australia. [1 mark]

Question 11b

- The substance or practice has the potential to enhance or enhances sport performance. [1 mark]
- The substance or practice represents actual or potential health risk to the athlete. [1 mark]
- The substance or practice violates the spirit of sport described in the Code. [1 mark]

Question 11c

2 benefits: [1 mark each]

- Increased muscle bulk, power and strength
- Increased aggression
- Increased speed of recovery

2 side effects: [1 mark each]

- Dependence
- Depression
- Testicular atrophy
- Male breast enlargement
- Higher LDL cholesterol

Question 11d

2 benefits: (1 mark each)

- Mask fatigue
- Increased alertness/aggression
- Improved muscle reaction
- Improved anaerobic performance

2 side effects:

- Anxiety
- Restlessness
- Cardiac arrhythmia
- Dependence

Question 12a

- It is a measure of the difference in oxygen concentration between the arterioles and the venuoles. [1 mark]
- It indicates how much oxygen the muscles are extracting from the blood. [1 mark]

Question 12b

- It increases during exercise [1 mark] as the muscles need to extract more oxygen from the blood as they need to use the oxygen to create energy to meet the increased demand of physical activity. [1 mark]