



Fortify Sample Exam A

PHYSICAL EDUCATION

Full Solutions

Section A

1	B
2	C
3	C
4	C
5	D
6	B
7	A
8	B
9	A
10	B
11	A
12	C
13	A
14	A
15	B

Section B

Question 1a.

One of the following:

- the major muscles groups used
- joint actions
- types of muscular contractions
- speed of muscular contractions

Question 1b.

One of the following:

- muscular endurance: the player passed the ball 18 times, therefore requires the ability to perform repeated contractions.
- agility: the player dodged 9 times, which requires a quick change of direction
- aerobic power: the play went for 10 minutes, therefore the aerobic energy system would be the dominant energy system so being able to produce energy in the presence of oxygen would be beneficial.
- muscular power: the player did 18 passes, which require a combination of speed and strength to execute effectively.
- reaction time: the player dodged 6 times, which requires the player to respond quickly to the play.

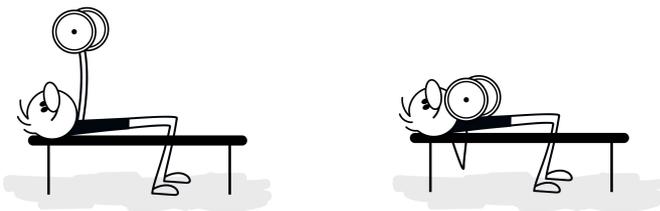
Marking Guide

- 1 mark for identification of fitness component
- 1 mark for referencing the data
- 1 mark for explaining how the fitness component is beneficial relevant to data used

Question 1c.

A possible example is:

Bench press: lying on a weight training bench, the athlete pushes a weight or barbell upwards over their chest.



Question 2

A high-scoring response could be:

Cardiac output is equal to stroke volume multiplied by heart rate. (1 mark) Stroke volume is the amount of blood ejected from the left ventricle per beat, and remains constant from submaximal to maximal exercise as it is at its maximal capacity. Heart rate increases, and therefore so does cardiac output as the muscles require more oxygen which is transported through the blood. (1 mark)

Question 3a.

One of the following:

- Cue words: Reciting key phrases that trigger a reaction to ensure focus on important aspects
- Controlled breathing: Slow breaths to focus on what is important and prevent over arousal.
- Imagery/ visualisation: visualising himself bowling successfully to increase confidence and refocus
- Positive self talk: Saying phrases like “you can do it” to increase confidence and refocus

Question 3b.

A high-scoring response could be:

The English Cricket team will receive lots of publicity and there are increased role models for the children to look up to (1 mark) so they play cricket to try and be like them (1 mark).

Question 3c.

One of the following:

- Access to coaching and facilities: There are less good cricket grounds and coaches, therefore it is harder for people who like cricket to play and improve compared to in other countries.
- Peers: If cricket is not a popular sport, they are less likely going to play it with their friends and family, therefore will develop other sport specific skills and be more likely to continue those sports.
- Politics: Professional cricketers require world class facilities as well as coaches and even scholarships, and if it is not a popular sport, the government and councils are going to put money into other sports so it is harder for cricket players to become professional.

Question 4a.

ATP-PC energy system.

Question 4b.

One of the following:

- 11 reps instead of 10
- Swimming 11m instead of 10m
- Swimming the 10m in a faster time

Marking Guide:

- 1 mark for only changing one variable
- 1 mark for changing appropriate amount, more than 2% and less than 10%

Inappropriate answers include reducing the rest as this could change the dominant energy system.

Question 4c.

Two of the following:

- To determine team positions
- To increase motivation
- Determine strengths and weaknesses
- Mental toughness
- Talent identification
- Assess cardiovascular risk
- Selection criteria

Question 4d.

Informed consent or Physical Activity Readiness Questionnaire (PAR-Q).

You **must** say informed, consent will not get the mark.

Question 4e.

A high-scoring response could be:

The 30 second Wingate Test is a suitable choice for the team.

Physiological: the athletes are state level and therefore have the physical capacity to push themselves to the max to get an accurate result. However, they are swimmers and this test and is conducted on a bike so the test is not specific. Tests measures anaerobic capacity which is important for swimmers. Additionally, it is an anaerobic test and they have completed an anaerobic training session, it is suitable.

Sociocultural: They are in a state team, therefore will have the facilities and finances available for them to participate in this lab test.

Psychological: The athletes are state level so they will have the motivation to complete the test to the best of their ability. People are able to watch and support squad members which will help push them, however they are not competing at the same time as their teammates which might make them push harder.

Marking Guide:

- 1 mark for saying suitable selection
- 1 mark for discussing a physiological reason
- 1 mark for discussing a sociocultural reason
- 1 mark for discussing a psychological reason
- 1 mark for making reasons specific to state team

Question 5a.

A high-scoring response could be:

As most of the players have not played before, they are in the cognitive stage of learning (1 mark.) Therefore, they are trying to focus on what the skill is, and the environment should be closed (1 mark) so can they focus on learning the skill in a predictable environment and not have to worry about defenders, weather conditions such as wind that make it more complicated and overwhelming (1 mark).

Question 5b.

A high-scoring response could be:

Increases the heart rate, warms up muscles and prepares the whole body for exercise in order to reduce risk of exercise. Prepares athletes psychologically for training.

Question 5c.

A high-scoring response could be:

Augmented feedback is required as the athletes are cognitive learners they have not got any error detecting or correcting abilities, therefore need to be told by others.

Question 5d.

A high-scoring response could be:

Practice shooting with a lighter ball which should make it easier to get the ball in the hoop which will increase confidence. As it is lighter, it will take longer for their arms to fatigue, so they are able to practice for longer using the correct technique.

Other acceptable answers may include:

- play a 3 vs 2 game
- playing in 1/3 of the court
- playing on different surface
- using shorter hoops, wider hoops etc.

Marking guide:

- 1 mark for suggesting a constraint based drill
- 1 mark for suitable outcome

Question 5e.

A high-scoring response could be:

*Newtons third law states that for every action there is a an equal and opposite reaction (1 mark.)
When the ball is bounced on the ground, the ground exerts an equal force that bounces the ball back to the hand. (1 mark)*

Question 5f.

A high-scoring response could be:

Associative (1 mark).

As skills are similar from handball and basketball, e.g, throwing, defending, Jason will already have a basic understanding of the skills required.

Question 5g.

A high-scoring response could be:

The Law of Diminishing Returns. (1 mark) A beginner will show more rapid improvement as they are further away from their genetic potential than someone who is advanced as they are closer to their genetic potential. (1 mark) As the team have not been playing very long, they show more rapid improvement, scoring 14 more goals, compared to Jason who only scored 3 more goals. (1 mark)

Question 6a.

Two of the following:

- Increase their base of support by standing with their feet wide apart
- Lower their centre of gravity by bending their knees
- Increase friction by wearing rugby boots that will increase grip

Question 6b.

A high-scoring response could be:

Cooksley has a greater mass than most players, and as momentum is equal to mass \times velocity, he will have a higher momentum than players moving similar speeds to him. (1 mark). This means that when they collide, the players will move in his direction as he has the greater momentum (1 mark).

Question 7a.

A high-scoring response could be:

Matthew undertook an anaerobic training program. (1 mark)

Matthew showed the most improvement in the 1-repetition maximum bench press test, where he improved for lifting 40 kg to 45 kg. This is a test that measures muscular strength, which is improved through anaerobic training methods. (1 mark) Matthew's aerobic power, which is tested through the Coopers 12 minute run test decreased as he got 70 metres less in the post test. (1 mark)

You **cannot** get full marks if data is not used. Can mention muscular power instead of muscular strength.

Question 7b.

Cardiovascular adaptations include:

- Increased thickness of the left ventricle wall. This allows for more forceful contractions.

Possible muscular adaptations include:

- Increased PC stores: which allows the ATP-PC system to be dominant for a longer duration, allowing the athlete to work at a higher intensity for a longer duration as the ATP-PC energy system has the fastest rate of ATP resynthesis.
- Increased glycolytic enzymes: more enzymes that help breakdown glucose anaerobically means that energy will be produced at a higher rate therefore the Matthew will be able to work at a higher intensity.
- Increased ATPase: ATP can be broken down and resynthesised at a faster rate, allowing Matthew to work at a higher intensity for longer.
- Increased tolerance to metabolic by-products: Matthew will be able to continue working at higher intensities for longer when he is fatigued.
- Increased glycogen stores: The anaerobic glycolysis energy system can be used for a longer period of time, allowing Matthew to work at higher intensities for longer.

Marking Guide:

- 1 mark for description of adaptation
- 1 mark for the affect on performance

Question 8a.

Third class lever

- Axis: Shoulder
- Force: Arm muscles
- Resistance: Golf club

Question 8b.

A high-scoring response could be:

The momentum before the club hits the ball is equal to the momentum after the collision (club hitting the tee) (1 mark). The momentum before the collision is equal to the momentum of the club (equal to its mass times velocity) and the momentum of the ball (which is stationary). When the ball is hit, momentum is transferred to the ball. After the collision, momentum is equal to the momentum of the ball plus the momentum of the club (which is stationary). (1 mark) The velocity of ball will be greater than the velocity of the stick before the collision as the ball has a lighter mass. (1 mark)

Question 8c.

A high-scoring response could be:

A ten year old is smaller and has less strength than an adult. (1 mark) A smaller club will have a shorter resistance arm (1 mark), therefore less force is required to swing the club so it is easier for younger golfers. (1 mark)

Question 8d.

A high-scoring response could be:

At the start of exercise, all energy systems will contribute to energy production. (1 mark) For the first ball, the ATP-PC energy system will be dominant as it has the quickest rate of ATP resynthesis. (1 mark) However, there is limited PC stores and as there is no rest, the anaerobic glycolysis energy system will be dominant after 5 balls. (1 mark) Due to fatiguing by-products from the anaerobic glycolysis system, the aerobic energy system will become dominant from around the 15 ball mark. (1 mark) Polly's first ball travelled 112m and her last ball only travelled 96m. (1 mark) This is because the ATP-PC energy system was dominant for the first shot, and it has a faster rate of energy production so more force will be produced and the ball will travel further, where as the aerobic energy system will be dominant for the last ball, and it has a much slower rate of energy production due to a more complex breakdown, therefore less force will be produced and the ball will travel a shorter distance. (1 mark)

Marking guide:

- 1 mark for all energy systems contribute
- 1 mark for ATP-PC energy system
- 1 mark for anaerobic glycolysis energy system
- 1 mark for aerobic energy system
- 1 mark for explanation of affect on distance
- 1 mark for use of data

Question 9a.

A high-scoring response could be:

Carbohydrate loading increases the amount of muscle glycogen stores (1 mark), allowing carbohydrates to be used as the main fuel source for longer and delaying the point where fats become the main fuel source, which take longer to break down, therefore causing Sarah to run slower.(1 mark)

Question 9b.

A high-scoring response could be:

Working muscles require more oxygen during exercise for ATP resynthesis (1 mark) and oxygen is transported through haemoglobin in the blood, so blood vessels vasodilate to working muscles so there is an increased amount of blood to the working muscles (1 mark). Vasoconstriction occurs to non vital organs during exercise to reduce the amount of blood transported there as it is needed at the muscles (1 mark).

Question 9c.

One of the following:

- consuming carbohydrates immediately after completion of exercise: restores muscle glycogen levels quicker which will help her recover to her pre race levels quicker, allowing her to train again sooner.
- consuming proteins: promotes muscle growth and repair. This allows her to recover quicker so she will be ready to train sooner.
- consuming carbohydrates with protein: allows for carbohydrate to be absorbed quicker, leading to a quicker recovery. It also helps for muscles repair.

Marking Guide:

- 1 mark for describing strategy
- 1 mark for how this optimises recovery.

NOTE: Nutritional strategy does not include hydration strategies.

Question 10a.

A high-scoring response could be:

At the five minute mark, Eric's heart rate increases from approximately 150 bpm to 165 bpm. (1 mark) He will be in oxygen deficit as he has had to increase his intensity so the oxygen demand exceeds the oxygen supply. (1 mark) This means that the anaerobic glycolysis energy system will have to increase its contribution to energy production until there is sufficient oxygen in the muscles to meet energy demand aerobically. (1 mark)

Question 10b.

A high-scoring response could be:

Eric's heart rate remains elevated for increased blood flow and oxygen consumption to the muscles. (1 mark) This helps remove waste products and restoring nutrients to prevent the affect of Delayed Onset Muscles Soreness (DOMS). (1 mark)

Question 10c.

Two of the following:

- concentration of oxidative enzymes
- size and number of mitochondria
- blood volume
- cardiac output
- muscle fibre type (slow twitch fibres)
- age
- gender

Question 10d.

Possible sessions could be either a fartlek, continuous or long interval session.

Specificity: sport should be running (1 mark)

Duration: 20 mins+ (1 mark)

Intensity: 70-85% Max Heart Rate (1 mark)

A high-scoring response could be:

A 25 minute run at 80% Max Heart Rate.

Question 10e.

A high-scoring response could be:

He could use a training diary/log, phone app, smart watch or heart rate monitor to monitor his training.

Question 10f.

A high-scoring response could be:

Eric is able to work at higher intensity aerobically. (1 mark) This allows him to run at a faster pace without producing fatiguing byproducts that will slow him down. (1 mark)

Question 11a.

A high-scoring response could be:

Athlete 1 undertook an aerobic session as their blood lactate levels did not increase much, only from 1.9 to 3.5mmol/L, meaning that their energy was mainly produced aerobically as they were working at or below their lactate inflection point. On the other hand, Athlete 2's blood lactate levels rose considerably from 2.1 to 9.8mmol/L, thus they were working above their lactate inflection point as there was a significant contribution from the anaerobic glycolysis system, where glucose is broken down to lactate and hydrogen ions in the presence of no oxygen. Athlete 1 still had a contribution from the anaerobic glycolysis system as their lactate levels rose from 1.9 to 3.5 mmol/L.

Marking guide:

- 1 mark for use of data
- 1 mark for discussing a similarity
- 2 marks for discussing a difference (1 mark for referencing each athlete)

NOTE: As the question says compare and contrast, a similarity **AND** difference must be stated to get full marks.

Question 11b.

A high-scoring response could be:

Athlete 2, as they have undertaken an anaerobic training session as seen by the higher rise in lactate levels. (1 mark) As they produced more lactate, they would be more used to training with high amounts of lactate (1 mark), therefore will be better at maintaining a high intensity despite having high levels of lactate. (1 mark)

Question 11c.

A high-scoring response could be:

Thinner tyres create less friction between bike and surface, which allows the bike to go faster. Thicker tyres create more friction between the surface and bike, which provides more grip and stability for the mountain biker so they are less likely to fall off.

Marking Guide:

- 1 mark for thinner tyres equals less friction AND thicker tyres equals more friction
- 1 mark for affect on performance on road bikes
- 1 mark for affect on performance mountain biking

Question 12a.

A high-scoring response could be:

Aerobic Power: Mark got a fair result on the Coopers 12-minute run, which measures aerobic power. This is important due to the long duration of volleyball games (20+ minutes.) It is also useful in recovery between high intensity efforts. (1 mark)

Anaerobic Capacity: He got a below average result on the Phosphate recovery test, which measures anaerobic capacity. This is important for being able to perform repeated high intensity bouts. (1 mark)

Flexibility: Mark got a poor result on the sit and reach test, which measures flexibility, therefore he needs to improve it to reduce the risk of him getting injured. (1 mark)

Question 12b.

A high-scoring response could be:

Mark accelerated for the first 30m, with his speed increasing from 0m/s to 8.67m/s. (1 mark) Mark's accelerated out of the blocks well, with his acceleration highest over the first 10m as there is the biggest difference in speeds over the 10m interval. (1 mark) As speed was almost constant from 30-40m, staying at 8.67-8.68m/s, there is almost no acceleration. (1 mark) He reached maximum speed of 8.68m/s at 40m. (1 mark) Mark decelerated over the last 10m, his speed dropping from 8.68 to 7.92m/s. (1 mark) It would be recommended for Mark to improve on his anaerobic capacity, which would help him maintain his speed and not decelerate over the last 10m (1 mark).

Marking Guide:

- 1 mark for use of data throughout answer
- 1 mark for referring to distances throughout answer