The EverLearner

National Mock Exams 2024

POWERED BY ExamSimulator

Model Answers
Edexcel A-level PE - Paper 1

This document contains:

- Model answers for the National Mock Exam questions
- Model examples of extended writing

How should schools use these papers?

These model answers are written to support PE teachers and students review the National Mock Exam 2024 and to prepare for the live revision session delivered by James in April 2024. We strongly recommend that students learn these model answers in preparation for the summer exams 2024. The questions posed and the answers provided are based on significant analysis and model BOTH content and skills.

Please, use these model answers in combination with the National Mock Exam paper, mark scheme and the revision session (Tuesday, 30th of April 2024, 16:30-18:00), available via the Edexcel A-level PE Revision page:

https://pages.theeverlearner.com/2024-edexcel-a-level-pe-revision

All questions are taken from ExamSimulator. ExamSimulator is a premium resource available via TheEverLearner.com.

I hope this helps both students and teachers in their exam preparations.

James Simms

The EverLearner

Subject	Physical Education
Course	Edexcel Linear GCE PE Scientific Principles
Time allowed	2 hours 30 minutes

First name	
Last name	
Class	
Teacher	

Title	Edexcel A-level PE Paper 1 Scientific Priciples National Mock Exam 2024

Guidance	• This paper is marked out of 140 marks. • You have 150 minutes (plus additional time for those who have Exam Access Arrangements). • Answer all questions. • A calculator is permitted for this exam. • This paper contains two 15-mark questions and five 8-mark questions. • Good luck.

Total marks	140

1. Define the following movements:
- Adduction.
- Rotation

Adduction is: Adduction is movement towards the midline of the body.

Rotation is: Rotation is the movement of a long bone around its longitudinal axis.

Marks: [2]

2. Summarise **three** different types of contraction and provide a suitable sporting example of each.

Isometric The muscle stays the same length when contracting.

Sporting example A sporting example would be what happens at the rectus femoris during a badminton receiver's ready position

Isotonic concentric The muscle shortens when contracting.

Sporting example A sporting example would be what happens at the triceps brachii during the upwards phase of a push-up

Isotonic eccentric A muscle lengthens when contracting.

Sporting example A sporting example would be what happens at the triceps brachii during the downwards phase of a biceps curl.

Marks: [6]

3. Outline the functions of **four** anatomical structures of the respiratory system.

The nasal cavity warms and moistens the inspired air. The trachea allows air to travel to the bronchi. The bronchus splits air into left and right passageways to the lungs. The alveoli allow for gaseous exchange to occur.

Marks: **[4]**

4. Summarise the vascular shunt mechanism.

Blood is redistributed to match the increased demands for oxygen in some areas of the body. Vasodilation is when the arteries widen and occurs at working muscles, where more oxygen is needed. Vasoconstriction is the narrowing of arteries and it happens at areas in lower demand of oxygen.

Marks: [4]

5. Outline the process of wave summation **and** its role in controlling the strength of a muscular contraction.

Wave summation is when repeated signals are received without adequate time to fully relax in-between. It uses a greater frequency of impulses, with each following contraction becoming more powerful. This continues until maximal contraction is achieved. It allows a performer to contract a muscle with different levels of force.

Marks: [5]

6. Describe strategies that a coach may encourage their athletes to use in order to speed up the recovery process after physical activity.

Cryotherapy can be used to speed up recovery. It takes place in a chamber set at a very low temperature (below -100°C). A coach could also ensure that an athlete has appropriate rest between training sessions and make sure that they do an active cool-down after training. Cool-down could include gentle jogging.

Marks: [4]

7. Summarise the structural and functional responses of the cardiovascular and respiratory systems when warming up prior to physical activity.

When warming up, a performer will breathe more frequently and tidal volume will increase. Cardiac output also increases due to an increase in heart rate and stroke volume. This leads to an increase in venous return. The athlete would also experience an increase in blood pressure. Vasodilation occurs to increase blood flow to the working muscles. Conversely, vasoconstriction takes place in order to reduce blood flow to areas where less oxygen is required.

Marks: **[6]**

8. Identify the lever system operating at the elbow when throwing a javelin **and** what acts as:
- The fulcrum
- The effort
- The load

Type of lever: It is a first-class lever.

Fulcrum: The fulcrum is the elbow joint

Effort: The effort is the contraction of the triceps brachii

Load: The load is the weight of the arm and the javelin.

Marks: **[4]**

9. Summarise the possible benefits of a named sports supplement to a performer.

Isotonic drinks can improve a performer's levels of hydration. Caffeine can enhance metabolic processes in the body. Sodium bicarbonate allows for a faster recovery after exercise and delays fatigue.

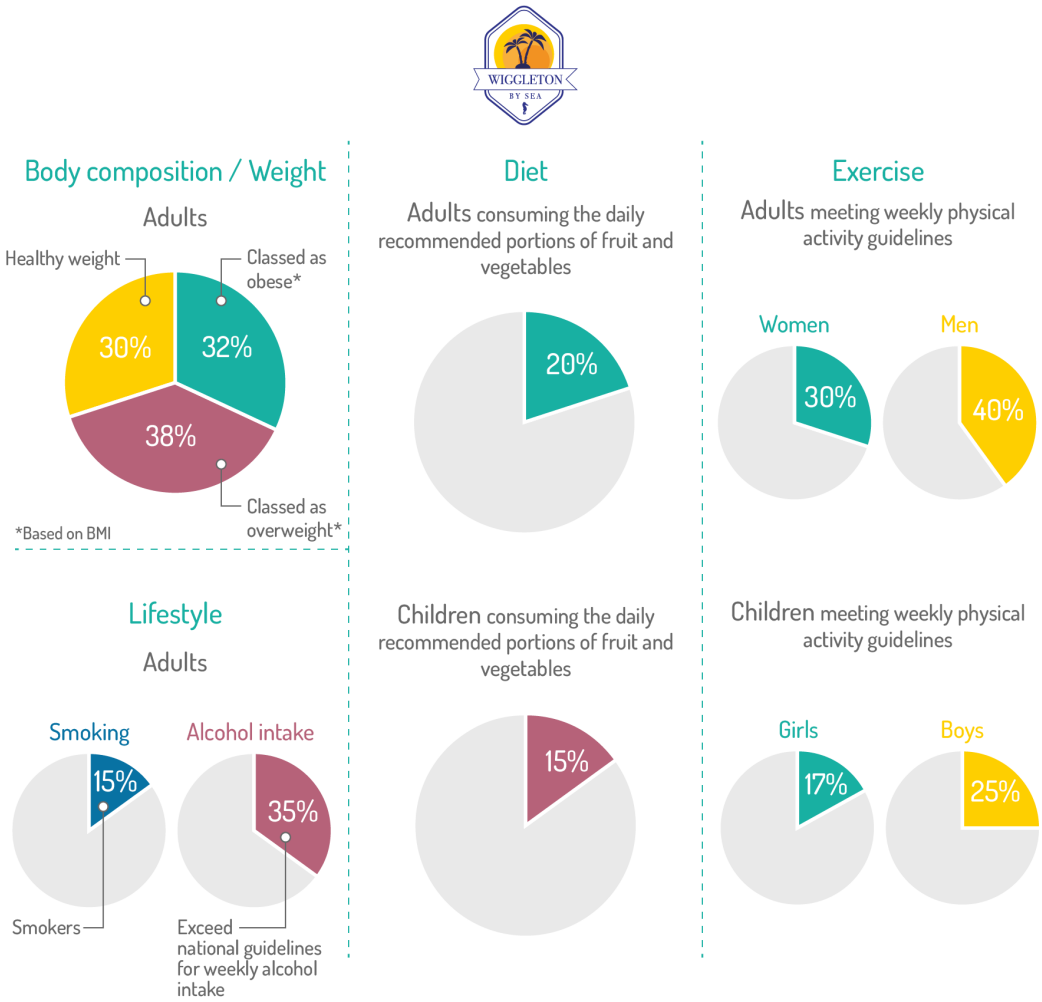
Marks: [3]

10. Analyse the contribution of the anaerobic energy systems in maximising performance.
Use sporting examples to support your answer.

The two anaerobic energy systems are the ATP-PC system and the glycolytic system. The ATP-PC system uses phosphocreatine as its main energy source and lasts for up to 10 seconds in very high intensity activities. The site of reaction is the sarcoplasm and the controlling enzyme for the reaction is creatine kinase. This reaction produces one molecule of ATP for every PC molecule. The glycolytic system uses glycogen as its energy source and lasts for up to three minutes in high intensity activities, but at a lower intensity than the ATP-PC system. The site of reaction is also the sarcoplasm and the controlling enzyme for the reaction is phosphofructokinase (PFK). This reaction produces two molecules of ATP for every glucose molecule. The ATP-PC system is used to power highly explosive movements, such as maximal javelin throws in athletics or tumbles during a gymnastics floor routine. On the other hand, the glycolytic system would be utilised by athletes such as Olympic rowers to maintain repeatedly powerful strokes or in a basketball game during a full press. The ATP-PC system has no by-products, whereas the glycolytic system produces lactic acid as a by-product. Therefore, the ATP-PC system is able to recover rapidly and produce subsequent powerful movements (for example, a badminton player performing smashes in consecutive rallies). The glycolytic system is still capable of producing high-intensity energy and consequently produces more power than the aerobic system. Both anaerobic systems work in unison, with the glycolytic becoming the predominant energy system at the 10-second threshold. However, the exercise intensity will be lower. Games players will utilise both energy systems, as the intensity varies during a game.

Marks: [8]

11. The images below show information about lifestyle factors for people in Wiggleton-by-Sea. Examine the factors and how they could contribute to cardiovascular and respiratory issues.



All of the factors in the table can have a negative impact on both the cardiovascular and respiratory systems. For example, obesity can impair the ability to undertake some physical exercise. According to the data in the table, 32% of adults are classed as obese. This means that they are also at higher risk of developing diabetes and therefore cardiovascular issues such as increased blood pressure or a heart attack. Additionally, smoking can make it more difficult to take part in exercise due to the extra strain on the respiratory system. 15% of adults smoke, so this means damage to the lung tissue and an increased risk of developing lung cancer. The data also shows that 80% of adults do not eat the recommended daily amount of fruit and vegetables. This imbalance in diet can lead to high cholesterol levels, which could lead to heart disease. Similarly, 85% of children are not meeting the daily recommendations for fruit and veg.

This could have health consequences in the future, due to problems from an earlier age with diet and the effect this can have on weight, resulting in future

Marks: [8]

12. Analyse the physiology of all three muscle fibre types and their suitability for different sports.
Use your knowledge and understanding from across the course of study to answer this question.

Marks: [15]

13. Define the term agility and give a sporting example.

Agility Agility is changing direction at speed under control.

Sporting example An example would be dodging a defender in netball.

Marks: [2]

14. Outline the protocol for the Margaria-Kalamen test.

Firstly, the assistant weighs the athlete and records their weight in kilograms. The athlete then warms up. The steps for the test are about 17.5cm high and the 3rd, 6th and 9th steps should be clearly marked. On "Go", the athlete sprints up the steps, three at a time, as quickly as possible, only stepping on the 3rd, 6th and 9th steps. The time is recorded from contact with the 3rd step to contact with the 9th step, and is recorded using a stopwatch. Three trials should be allowed with a recovery period of 2-3 minutes between each trial.

Marks: [5]

15. Define submaximal aerobic fitness.

Submaximal aerobic fitness is the ability to work at a high percentage of VO2 max for prolonged periods of time.

Marks: [1]

16. Using the FITT principle, explain how a performer could improve their aerobic fitness.

Increase the frequency by increasing the number of training sessions during the week. Increase the intensity by training at a higher percentage of their VO2 max. Increase the time of training by increasing the number of repetitions in a set. Consider the type of training by ensuring that it is specific to aerobic fitness. For example, continuous or cross-training would be a suitable type of training.

Marks: [4]

17. Identify **four** examples of sporting injuries.

Cruciate ligament injury, a stress fracture, shin splints and tendonitis.

Marks: [4]

18. Outline Newton's laws of motion.

Newton's first law (the law of inertia) states that an object will remain in motion until an external force acts upon it. Newton's second law (the law of acceleration) states that an increase in the velocity of a moving object is directly proportional to the force applied, and acts in the direction of the external force. Newton's third law (the law of reaction) states that, for every action, there is an equal and opposite reaction.

Marks: [3]

19. Summarise two advantages and two disadvantages of fitness testing.

The advantages of fitness testing are that many tests require little or no equipment and that they can cater for large groups at once. However, submaximal tests can be less accurate and tests are often not specific to sport.

Marks: [4]

20. The table below shows data about a female high jumper who wants to improve her PB.
Identify the most appropriate fitness test for this performer.

Age	Resting HR	Maximum HR	Intensity
Years	BPM	BPM	%
22	54	195	90

The vertical jump test

Marks: [1]

21. Identify the predominant energy system when performing in the high jump.

The ATP-PC system

Marks: [1]

22. Using Karvonen's theory, calculate the high jumper's heart-rate reserve.

Age	Resting HR	Maximum HR	Intensity
Years	BPM	BPM	%
22	54	195	90

Maximum heart rate - Resting heart rate, so 195 - 54 = 141 beats per minute (BPM)

Marks: [2]

23. Using the data in the table, calculate the high jumper's training heart rate.

Age	Resting HR	Maximum HR	Intensity
Years	BPM	BPM	%
22	54	195	90

Anaerobic training threshold 90% of maximum heart rate x heart rate reserve, so 90/100 x 141 = 126.9. 126.9 + 54 (resting heart rate) = 180.9 (181) beats per minute (BPM)

Marks: [2]

24. Outline periodisation.

Periodisation involves macrocycles, mesocycles and microcycles.

Marks: [3]

25. Analyse the factors that affect the horizontal displacement of a shot.

Horizontal displacement of a projectile such as a shot is affected by the velocity of release, height of release and angle of release. The performer should aim to maximise the velocity at the release point by generating greater impulse through preparation phase. They can do this by releasing the shot from the fingertips last to maximise contact time, meaning that the force is applied over a longer period of time and, therefore, resulting in a greater velocity. According to Newton's second law, increased velocity at release will lead to the shot travelling further. Additionally, the athlete should aim to increase the angle of release but only up to the optimal point. This should be just below 45 degrees due to the release height being higher than the landing height. An angle of release significantly lower than 45 degrees will reduce the height of release too much and, therefore, reduce the velocity of the shot. Finally, the performer should also aim to increase the height of release up to the optimal point. The performer can aim to maximise the height of release by fully extending at the elbow and plantarflexing at the ankle. Maximising the height of release will increase the velocity as the shot leaves the fingertips and increase the distance putted. However, if the shot is released too high, then this will reduce the velocity due to the performer stretching too high and reducing the momentum. If the shot is released at a height that is too low, this will reduce velocity due to the shot travelling for less time in the air. Air resistance is irrelevant due to the law of conservation of angular momentum.

Marks: [8]

26. Discuss the use of rehabilitation strategies such as physiotherapy and ice treatments following an injury .

A physio could help an athlete to structure a rehabilitation programme for their recovery. This can include massage alongside a combination of other treatment methods. It does require specialist training, and physio appointments may be expensive in comparison to alternative treatments such as ice baths. However, a physio will be able to advise an athlete on their progress and structure a gradual return to physical activity. Ice treatments can be in the form of an athlete sitting in an ice bath or using a cryotherapy chamber. They can be used to help reduce inflammation from an injury and involves vasodilation and vasoconstriction of the blood vessels to help promote recovery. However, treatments such as cryotherapy are very expensive and, therefore, exclusive to elite athletes. Cryotherapy also requires ongoing sessions for any effects to be seen, so it will be significantly more expensive than physiotherapy and may be less accessible. Ice baths may be a more affordable alternative, as they may be more readily available.

Marks: [8]

27. Examine the ways in which a marathon runner could manipulate their diet before a race and how this would affect their performance.

A marathon runner will need to consider appropriate timings of meals prior to a race, aiming to eat around three hours before the start. They should aim to eat foods with a low glycaemic index to provide them with a slow release of energy, such as pasta or rice. Simple carbohydrates (such as an energy bar) should be eaten around two hours before the race, which will help to top up glycogen stores in preparation for the marathon. Foods with a lower glycaemic index will help the marathon runner to maintain their blood sugar levels throughout the race and maintain a higher intensity for longer periods of time. Carbohydrate loading can be considered in the week leading up to a race. Carbohydrate loading involves endurance-based exercise to deplete glycogen stores. On days two and three, the runner's diet should consist of high amounts of protein and fat. On day four, the runner should repeat endurance-based exercise similar to day one to deplete their glycogen stores further. Finally, days five to seven should involve a diet high in carbohydrate and tapering training. Glycogen loading in preparation for a marathon will give the runner a much larger fuel store for aerobic energy production. Consequently, it will mean that they can delay exhaustion for longer and, therefore, work at a higher intensity for longer and improve their finish time. The marathon runner will be more resistant to fatigue, so they can aim to overtake when necessary during the race and finish in a higher position. It is also crucial that the marathon runner is adequately hydrated before the race, as this will help to prevent a loss of electrolytes, regulate body temperature and maintain blood viscosity. It will also positively impact on concentration during the race and help to prevent cramps from occurring, which could slow the runner down. Adequate hydration levels beforehand will ensure that they begin the race with the required levels of hydration, which assist them in the early stages of the race before reaching hydration points in the race. This will also help to further delay fatigue, allowing them to work for longer at a faster pace.

Marks: [8]

28. Evaluate the use of SAQ and fartlek training for a games player.

SAQ

Fartlek

Both SAQ and Fartlek training can help to improve speed, which is a crucial component of fitness to a games player. Firstly, SAQ training improves speed, agility and quickness, which can be beneficial in games such as hockey and football. It helps to develop the anaerobic energy system, which is used by players during high-intensity periods in a game. Alternatively, Fartlek training involves "speed play" and improves aerobic fitness, which is used to maintain performance for the duration of a game. Fartlek training can improve both aerobic and anaerobic energy systems depending on the intensity and time in training. This could be particularly beneficial for a games player to make training more time-efficient. Due to the nature of Fartlek training, changes in speed can replicate varying game intensities. It can increase a performer's lactate threshold, which means that a netballer, for example, can work at a higher intensity for longer periods in a game. This would have a positive impact on their performance, as they will be able to perform repeated sprints, particularly towards the end of a quarter. However, it could be argued that SAQ will be more beneficial for improving pure speed or agility due to the explosive nature of drills performed in training, alongside multi-direction training as part of SAQ.

SAQ can also lead to improvements in neuromuscular efficiency, so a basketball player would be able to run faster with less effort and beat an opponent to the ball when attempting an interception. Additionally, SAQ training can develop

Marks: [15]

END OF PAPER