

Edexcel GCE

Physical Education  
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Mark Scheme (Results)

## Exercise and Training

1. (a) **Stretching can be used to improve the range of movement at a joint. Name and describe four different ways of stretching.** (8)

NB. Active & passive stretching must be linked to either static, ballistic, dynamic or PNF stretching.

1. Static
2. Take a muscle to its limit and hold
3. Ballistic
4. Use momentum to forcibly stretch a muscle
5. Dynamic
6. Taking a joint in a controlled manner through the full range of movement
7. PNF
8. Stretch, contract, relax
9. Active
10. The athlete performs the stretch
11. Passive / partner assisted
12. Partner assists in the stretching process.

- (b) (i) **Define the terms *agonist*, *antagonist*, *fixator* and *synergist*.** (4)

1. Agonist - Primary muscle responsible for movement / active muscle at the active joint
2. Antagonist - passive muscle at the active joint
3. Fixator - provides stability at the point of origin of the agonist.
4. Synergist - Provides stability at the point of insertion / for the body.

- (ii) **Using a sporting example name the muscles that are performing each of the four roles listed in (b)(i) during a biceps curl.** (4)

Bicep Curl

1. Agonist - Biceps
2. Antagonist - Triceps
3. Fixator - Deltoid
4. Synergist - radial flexors / rectus abdominals.

- (c) (i) **Elite endurance athletes often use altitude to improve performance. Explain why altitude training is considered to be of benefit and describe the adaptations likely to occur.** (6)

Max of 4 for adaptations

1. At altitude the lower partial pressure / reduced O<sub>2</sub> means it is harder for the body to work aerobically / body becomes more efficient at working with less oxygen.
2. Desirable to prepare at altitude if competition is at altitude.
3. It is easier to induce a hypoxic state / easier to overload.

Reasons

4. Improved rate of O<sub>2</sub> transportation to the muscle
5. Aerobic benefits can be obtained quicker / improved VO<sub>2</sub>max / Bradycardia
6. Improved vascularisation of the muscles / > capillarisation
7. Increase in RBC / >haemoglobin level
8. Increase myoglobin count / level
9. Increase density of mitochondria
10. Potentially an increase in alveoli coverage.

- (ii) **Identify other ways in which an athlete might seek to achieve similar results.** (3)

1. Blood doping / transfusion
2. EPO / rhEPO
3. Aerobic training
4. Hypoxic tents / chambers

**(Total 25 marks)**

2. (a) (i) **Identify the physiological responses that occur during a warm up.** (6)

1. Increased SV / Q / HR / venous return
2. Increased Ventilation rates
3. Increased Production of adrenaline
4. Heat generation
5. Increased speed of metabolic processes.
6. Increased Speed of nerve impulse / reactions
7. Increased Muscle elasticity
8. Increased Range of movement/secretion of synovial fluid
9. Process of Vascular shunting begins.
10. Process of thermo regulation begins

(ii) **For each response identified in your answer to (a)(i), describe the benefit provided to the body.** (6)

1. Increased speed of O<sub>2</sub> delivery / CO<sub>2</sub> removal
2. Increased pressure gradient / greater %age of diffusion / greater gaseous exchange
3. Increased strength of ventricular contractions / dilation of blood vessels
4. Increased speed of energy metabolism / Faster production of energy
5. Greater rate of energy production
6. Muscles are able to generate greater force
7. Reduced risk of injury / greater force generated
8. Greater movement potential leading to ease of movement / reduced risk of injury, consistency of skill execution.
9. Delivers blood to the areas in most need / working muscles.
10. Decreased risk of overheating.

- (b) Fartlek and Interval training are used by athletes to improve performance.
- (i) Identify the main characteristics of both types of training. (4)

Interval

1. Work : rest ratio and repeat.
2. Can be used to develop anaerobic or aerobic benefits / flexible
3. Can be very specific to an athletes needs ie adaptability of W : R

Fartlek

4. Training intensity varies during the duration.
5. Can be very sport specific.
6. Avoids the monotony of continuous training.

- (ii) Describe an interval training session for a sprinter and identify the specific objective of the session. (3)

Maximum of 2 marks for correct application of the mode of training.

1 mark for the correct / appropriate training for the objective identified.

eg

Interval training for a sprinter

1. Maximal sprints of 60m lasting 10 seconds with 60 seconds recovery / 1 : 6
2. Repeat 3 times per set with 3 sets performed.
3. Objective being to improve anaerobic performance.

- (c) Athletes use *macro cycles*, *meso cycles* and *micro cycles* in order to plan their training effectively. (6)  
Explain the three types of training cycle and using practical examples apply them to a training programme for a games player.

No marks for the example but a maximum of 3 marks if no example is given.

1. Macrocycles looks at the training period as a whole e.g. the complete year.
2. Mesocycles looks at a period within the macro cycle, e.g. pre season or an 8 week block.
3. Microcycles looks at individual training sessions or small groups of training sessions.

e.g. football.

4. The Macro season runs from the end of the season in May up to pre season in late June / early July and includes the entire season. This involves a build up of fitness, maintenance of fitness and recovery.
5. The meso cycles are Pre season, Season / competitive period, off season / recovery.
6. The Micro cycles involved in early pre season would be designed to rebuild aerobic fitness and muscular endurance.

(Total 25 marks)

3. (a) (i) Explain the benefits of performing an effective cool down. (3)

1. Prepares the body for a less active phase
2. Aids / speeds recovery
3. and so helps to improve performance through more frequent training.
4. Reduces the risk of blood pooling / dizziness
5. Reduces the risk of muscle soreness

(ii) Describe a cool down for a named activity and identify the objective for each phase. (3)

No named sport = no marks.

Basketball

1. Continuous / aerobic activity such as running
2. For approx 15 minutes of a decreasing intensity
3. Aim being to maintain elevated circulation to the working muscles / delivery of oxygen rich blood / removal waste.
4. Stretching
5. Maintain / improve muscle elasticity
6. Aid removal of bi / waste products
7. Encourage a faster recovery

(b) (i) Define the following movements within the specific context of the body. *Flexion, extension, abduction, circumduction, rotation and adduction.* (6)

Flexion

1. Decreasing the angle of a joint

extension

2. Increasing the angle at a joint a

abduction

3. Movement away from the midline of the body

circumduction

4. Movement in a circular direction

rotation

5. Movement around a pivotal point

adduction

6. Movement towards the midline of the body

- (ii) **Select three of the types of movement listed in (b)(i) and using a sporting example for each, name the joint involved and the prime mover.** (9)

Sporting example must specifically relate to the named joint, simply identifying a skill scores no marks.

Flexion

1. preparation when Kicking in football
2. Knee
3. hamstrings

Extension

4. Boxing/ throwing a punch
5. Elbow
6. Triceps

Abduction

7. Gymnastics / crucifix balance
8. Shoulder
9. Deltoid

Circumduction

10. Swimming / butterfly arm action
11. Shoulder
12. Deltoids

Rotation

13. Cricket / batting stance
14. Pivot / neck
15. Sternocleidomastoid

Adduction

16. Golf down swing
17. Shoulder
18. Deltoid / pectorals

- (c) **Explain how oxygen delivery to the working muscles increases during exercise.** (4)

1. Increased SV
2. Increased >HR
3. Increased in ventilation (ve)
4. Vascular shunting will take place
5. Vasodilation and vasoconstriction of blood vessels.

(Total 25 marks)

4. (a) (i) Name and describe the characteristics of the three types of joint in the body. (6)

1. Freely moveable / synovial.
2. Joint structure allows a wide range of movement
3. Synovial fluid and hyaline cartilage facilitate friction and relative pain free movement.
4. Slightly moveable / cartilaginous
5. Bones joined by pads of white fibrous cartilage
6. Cartilage allows a small degree of movement as a consequence of its elastic quality. / Also acts as a shock absorber.
7. Immoveable / fibrous joints
8. Bones are held in position by strong fibrous joints.
9. No movement is possible.

(ii) Using examples identify how the three different types of joint play a role within sport. (6)

1. Freely moveable / synovial
2. eg the movement potential of the ball and socket joint at the shoulder allows the tennis serve to be performed.
3. Cartilaginous joint
4. eg the joints of the vertebrae individually allow limited movement so that when arching your back to serve in tennis there is little risk of dislocation / injury.
5. Fibrous joints prevent movement
6. eg the fused nature of the cranium allows blows to the head while maintaining protection of the brain.

(b) (i) Identify two contrasting sporting events and name the most appropriate fitness test for each event. (4)

Max of 2 if the events are not contrasting.

1. Long jump
2. Standing sergeant jump
3. Marathon
4. NCF multistage shuttle test

(ii) Define the terms *validity* and *reliability* within the context of fitness testing. (2)

1. Validity is whether a test actually measures what it sets out to measure
2. Reliability is whether the test can be repeated without variables other than the fitness of the athlete affecting the result.



(iii) Using the terms validity and reliability explain why the fitness tests in your answer to (b) (i) are the most appropriate tests for these events. (4)

1. Standing sergeant jump is valid because it measures the explosive power in the legs which is directly appropriate to long jump.
2. It is reliable because the protocol enables the test to be performed in a clinical environment, or similar
3. NCF multistage shuttle test is valid because it measures the VO<sub>2</sub>max with specific reference to a runner.
4. It is reliable because the protocol enables the test to be performed in a clinical environment, or similar.

(iv) Fitness tests measure a specific component of fitness. Explain why a named fitness test may not be appropriate for an athlete even though it measures the correct component? (3)

Long jump

1. Requires power
2. Test being the hand grip dynamometer
3. Not appropriate because of validity eg it measures the power in the hand / forearm as against that of the legs which is required by a long jumper.

(Total 25 marks)

**TOTAL FOR PAPER: 25 MARKS**