

Mark Scheme (Results)

January 2007

GCE

AS GCE Physical Education (8536)
6723

Exercise and Training

- 1 (a) Warming up is said to improve performance. (8)

Identify four physiological responses to a warm up and state how each improves performance.

Max of 4 for responses
4 marks for 4 responses
4 marks for appropriate application

Responses followed by benefit:

Response	How it aids performance
1. Increased SV / Q / HR /CO ₂	2. Increased speed / quantity of O ₂ delivery
3. Increased Ventilation rates	4. Increased pressure gradient / greater %age of diffusion / greater gaseous exchange 5. increased CO ₂ removal
6. Increased Production of adrenaline	7. Increased strength of ventricular contractions 8. increased metabolic rate
9. Heat generation	10. Increased speed of energy metabolism / Faster production of energy / Reduced risk of injury through increased muscle elasticity / increased force of contraction.
11. Increased Speed of nerve impulse / reactions	12. Muscles are able to generate greater force / faster rate of ATP production
13. Increased Muscle elasticity	14. Reduced risk of injury / greater force generated / Increased Range of movement
15. Process of Vascular shunting begins	16. Increased O ₂ & glucose delivery / Greater rate of waste removal
17. Process of thermo regulation begins	18. Decreased risk of overheating
19. Increased production of synovial fluid	20. Increased and ease of ROM

- (b) Differing shapes of fibre arrangements of skeletal muscle have different characteristics. (6)

Identify two different classifications of fibre arrangement and describe their predominant characteristics.

Fibre shape / arrangement	Characteristics
1. Fusiform / Parallel	2. Fibres are attached to tendons at either end of the belly / fibres run the length of the muscle 3. Extensive range of movement / considerable fibre shortening 4. faster speed of contraction / relatively powerful
5. Uni pennate	6. Fibres are attached to one side of a central tendon.
	7. Limited range of movement / fibres do not shorten. 8. Very much but relatively powerful
9. Bi pennate	10. Fibres are attached to both sides of a central tendon
	11. Greater limitation of range of movement / fibres do not shorten very much. 12. Powerful
13. Multi pennate	14. Fibres are attached to both sides of several tendons
	15. Very little potential for fibre shortening. 16. Very powerful.
17. Circular	18. Fibres attach around a circular tendon
19. Convergent	20. Muscle belly is wider at one end and <i>converges</i> at a narrower end. 21. Generates great force 22. Relatively smaller range of movement.

- (c) (i) Explain what is meant by isotonic, isometric and isokinetic contractions. (3)
1. Isotonic contractions involve the muscle actively changing length / providing movement.
 2. Isometric contractions involve a contraction where the muscle length does not change and so there is no movement.
 3. Isokinetic - the speed of contraction is constant throughout the range of motion.
- (ii) Name and explain the two types of isotonic contraction (4)
1. Eccentric
 2. Concentric contractions.
 3. Eccentric contractions involve the muscles actively lengthening / performing a braking action
 4. While concentric contractions involve the muscles actively shortens.
- (d) Describe the main characteristics of a continuous training session. (4)
1. Long distance / long duration / aerobic training
 2. Medium to low intensity.
 3. constant intensity / Working at a given HR / training intensity
 4. No rest periods
 5. Boring / time consuming
 6. Associated with repetitive stress injuries.

(Total 25 marks)

- 2 (a) (i) Describe and explain an appropriate cool down for a named activity. (6)

Max of 2 for stages.

1. Performed post activity / Continuous activity such as jogging of a decreasing intensity.
2. Stretching
3. Maintain elevated O₂ delivery to the working muscles.
4. Aid with the removal of waste products.
5. Slowly reduce cardiac and ventilatory rates
6. Assist in repair of muscles and so reduce the effect of DOMS.
7. Minimise the effect of blood pooling.
8. Aids venous return
9. Maintain / increase muscle elasticity
10. Further aid the removal of waste products.

- (ii) Explain how a cool down can help future performance. (2)

1. It aids / speeds up recovery.
2. Minimises post activity discomfort
3. The faster the recovery stage the quicker that an athlete can train again.

- (b) Identify the **three** skeletal muscle fibre types and a method of training suited to each. For each training method identified explain **one** structural adaptation. (9)

1. Type 1 / slow twitch.
2. Continuous training .
3. Encourages > levels of vascularisation / myoglobin etc.
4. Type IIa / FOG
5. Fartlek / Interval / Circuit / Weight training.
6. Encourages type IIb and type I fibres to take on type IIa characteristics.
7. Type IIb /FTG
8. Interval / Weight training.
9. Increased levels of ATP / muscle glycogen / fibre hypertrophy.

Allow any appropriate method of training.

- (c) Identify **four** types of movement, other than flexion or extension, and define their characteristics. (8)

1. Plantar flexion
2. Pointing the toes
3. Dorsiflexion
4. Raising the toes
5. Inversion
6. Moving the sole of the foot inwards at the ankle
7. Eversion
8. Moving the sole of the foot outwards at the ankle
9. Circumduction
10. A circular movement which draws the shape of a cone.
11. Rotation
12. Movement around a pivotal point
13. Abduction
14. Movement away from the midline of the body
15. Adduction
16. Movement towards the midline of the body

And other suitably named and described types of movement.

(Total 25 marks)

- 3 (a) (i) Explain why fartlek training is often considered suitable for a games player. (3)

1. Fartlek training is when the intensity of training or terrain varies during the course of the training session.
2. The intensity of games varies during performance.
3. Therefore the principle of specificity is being applied.
4. Enables athletes to accurately gauge fitness and recovery times relevant to the game.

- (ii) Outline an example of a suitable fartlek training session for a games performer of your choice. (3)

No named game = no marks.

Max of 2 marks for simply identifying three different intensities e.g for a football player.

1. Performs on grass
2. Involves jogging sprinting and walking.
3. All of which resemble a game.

- (b) (i) Define **bradycardia** and explain its benefits. (2)

Definition:

1. Bradycardia is a resting heart rate below 60 bpm.

Benefits:

1. The lower the resting heart rate the greater the range the athlete has in which to train.
2. Reduced blood pressure
3. Increased stroke volume.

- (ii) Identify a type of training likely to lead to bradycardia and explain why it occurs. (3)

Training:

1. Aerobic training / continuous / fartlek training / altitude

Explanation

1. This type of training is by definition for a longer period of time / requires the CVR system to deliver blood / O₂ for an extended period of time.
2. Consequently the heart has to work harder / becomes bigger / stronger / cardiac muscle hypertrophy
3. more efficient / better able to work / deliver the same amount of blood with fewer beats.
4. Increase force of contraction.

- (iii) Explain why not all training will produce bradycardia. (2)

1. Anaerobic / high intensity training is short duration
2. Ventricular myocardium will increase in strength / stronger ventricular contractions
3. But insufficient demand to noticeably increase ventricular size.
4. Improvements in cardiac efficiency may be accompanied by increase in body mass / greater requirement for O₂ delivery / $> Q$ at rest means more O₂ required.

- (c) (i) Name **two** movements possible at the shoulder joint and identify the prime mover for each. (4)

Movements followed by their Prime Mover.

- | | |
|--------|---|
| 1 & 2 | Abduction and (Lateral) Deltoid |
| 3 & 4 | Adduction and Pectorals |
| 5 & 6 | Flexion and (anterior) deltoid |
| 7 & 8 | Extension and (posterior) deltoid. |
| 9 & 10 | Circumduction and the four aforementioned |

prime movers

- | | |
|---------|--------------------------------------|
| 11 & 12 | Rotation and the three deltoid heads |
|---------|--------------------------------------|

- (ii) State the joint type and the structural characteristics of the shoulder joint. You should explain the role of each identified structure. (4)

Must name the joint to qualify for max marks.

1. Synovial ball and socket joint.
2. Humerus, clavical, scapula & shoulder girdle articulate together. (at least 2 named bones to qualify for the mark)
3. Bones held in place by ligaments.
4. Articulating surfaces of bones have a layer of hyaline cartilage to facilitate friction free movement.
5. The joint capsule aids the stability of the joint.
6. Bursae aids with friction free movement.
7. The synovial membrane secretes synovial fluid
8. Synovial fluid reduces friction.

- (d) (i) **Overload** and **overtraining** are both principles of training. Explain each principle. (2)

1. Overload, gradually increasing the training intensity.
2. Overtraining, when insufficient rest is allowed between training sessions.

- (ii) Outline how an athlete would apply their knowledge of **overload** and **overtraining** when training. (2)

e.g.

1. Would apply overload by increasing the training load / intensity every 3rd week.
2. Would apply overtraining by allowing 2 recovery days per week / not overload too frequently / too soon.

(Total 25 marks)

- 4 (a) Identify the main principles of circuit training and provide examples which explain why it is so popular. (6)

1. Training based around performing different exercises in succession at different work stations.
2. Is very adaptable / can be adapted to suit different performers or activities.
3. Can work different body parts or the same body part. / whole body work out
4. Can work on fitness or skill.
5. Can work aerobically or anaerobically.
6. Can be fixed load or Individual load.
7. Can cater for large groups / can be cheap / easy to perform
8. Little opportunity for boredom.

- (b) Cycling and other endurance sports have had to ban athletes for blood doping and or EPO use. (5)
- (i) Explain how both **blood doping** and **EPO** are used by athletes. (5)
- Blood doping
1. The athlete artificially increases their red blood cell volume by either
 2. Removing a pint of their own blood,
 3. Allowing the body to replenish the lost blood
 4. Injecting the removed blood prior to event / injecting someone else's blood.
- EPO
5. EPO is a naturally produced hormone in the kidneys.
 6. The body produces more the greater the level of hypoxia experienced
 7. artificial / man made EPO / rEPO is taken in tablet /drug form
 8. It encourages the bone marrow to produce additional red blood cells.
- (ii) Identify the risks to athletes resorting to blood doping or EPO. (3)
1. Illegal and so if caught will lead to a ban / custodial sentence.
 2. Increased blood viscosity / clotting
 3. Increased risk of heart disease
 4. Increased blood pressure
 5. Increased risk of stroke / heart attack
 6. Increased risk of blood disease / HIV
 7. Kidney damage.
- (c) (i) Explain the terms **validity** and **reliability** within the context of fitness testing. (2)
1. Validity is whether the test actually measures the component of fitness required.
 2. Reliability is whether the test can be accurately replicated / repeated.
- (ii) Identify reasons why the 100m sprint race on the track might not be a suitable test for speed. (4)
1. Not valid
 2. Measures other components such as reaction times, acceleration, anaerobic capacity etc.
 3. The athlete with the greatest speed might not be the quickest 100m runner.
 4. Not reliable
 5. Weather conditions etc may play a part.

- (iii) Name and describe the protocol for a more suitable fitness test for speed. Identify potential criticisms of this test. (5)

Must name the test for full marks.

1 mark for test

Max of 3 marks for protocol

Max of 2 marks for criticism

1. Flying 30m sprint test
2. The athlete begins the test by accelerating up to a cone / marker.
3. When passing the marker the athlete should be at full sprinting speed.
4. The time taken for the athlete to get from the marker to a second marker, 30m away, is recorded.
5. Reliability may be an area of criticism re timing accuracy.

(Total 25 marks)

TOTAL FOR PAPER: 50 MARKS