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GCE

Edexcel GCE

Physical Education (6723)

Summer 2005

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Mark Scheme (Results)

Edexcel GCE
Physical Education (6723)

Unit 3 (6723) – Exercise and Training

1 (a) A standing sergeant jump is a frequently used fitness test.

(i) Identify an athlete for whom this test would be valid. Describe the protocol of this test and name the component of fitness it measures.

(4)

1 mark for correctly chosen athlete
1 mark for correctly identified component of fitness.
2 marks for correct protocol.

1. **A triple jumper**
2. **Power**
3. **Standing upright against a wall / vertical object measure your maximum reach height.**
4. **From standing jump as high as possible marking the wall at the highest point / jump height.**
5. **Subtract the reach height from the jump height.**

(ii) Identify the type of movement that would take place at the knee joint during the preparation and the execution of a sergeant jump.

(2)

1. **Flexion during preparation**
2. **Extension during execution**

(iii) Identify two muscles used in both the preparation and execution of the movement and state the types of contractions that are occurring.

(4)

1. **Quadriceps/hamstrings**
2. **Quadriceps/hamstrings**
3. **Eccentric contraction in preparation**
4. **Concentric contraction in execution.**
5. **isotonic contractions**

(iv) Identify the structures of the knee joint and explain how they assist the movement.

(3)

1. **Ligaments - Prevent lateral movement / provide joint mobility.**
2. **White Cartilage - Reduces / absorbs shock.**
3. **Hyaline Cartilage - aids smooth movement**
4. **Joint Capsule - aids joint support.**
5. **synovial membrane – produces synovial fluid**
6. **bursae – fluid sacks to aid shock absorption**

(b) (i) The cardiac cycle consists of systole and diastole. Explain what is happening during each stage

(4)

Diastole

1. **Heart muscle is relaxed**
2. **Chambers fill up**

Systole

3. **Muscles contract**
4. **Chambers are emptied**

(ii) During intense activity over an extended period of time the number of cardiac cycles per minute would increase.

Which phase of the cycle would speed up the most and why.

(3)

1 mark for correct stage
2 marks for reasons

1. **Diastole**
2. **Need for more frequent heart beats / need to increase HR due to increased demand for O2**
3. **Systole is already occurring quickly / greater scope for increases in Diastole**
4. **Blood returns to the heart quicker / increase in venous return / filling phase is shortened**

(iii) The condition known as bradycardia occurs when the number of cardiac cycles falls below 60 per minute. Outline both the structural and functional adaptations that would be needed in order to incur bradycardia.

(5)

Max of 3 if answer fails to identify whether they are structural or functional

Structural

1. **Increased thickness of myocardia**
2. **Greater size of chambers / Cardiac hypertrophy**
3. **increased vascularisation**

Functional

4. **>strength of ventricular contractions**
5. **An > in end diastolic volume**
6. **An > in SV**
7. **The need for Q to remain constant at rest.**
8. **A < in end systolic volume**
9. **An > in parasympathetic nervous activity.**

(Total 25 marks)

2. (a)

(i) Describe the main concepts of circuit training and identify the benefits associated with it.

(5)

1. **Athletes perform different exercises at different stations.**
2. **Can be quick/easily accessed i.e. home/cheap**
3. **Not boring**
4. **Rapid results**
5. **Enables body parts / systems / skills to be overloaded**
6. **Provides multiple benefits / adaptable /making the training specific**

(ii) Explain how circuit training can be used to benefit two contrasting components of fitness.

(6)

1 mark for naming two components of fitness.
1 mark if the two components contrast.
4 marks for manipulation of circuit training to suit both athletes.
(max of 2 for each circuit)

1. **Endurance athlete**
2. **Power athlete**

For the endurance athlete

3. **longer circuit**
4. **Performing high No. of Repetitions / Working for a long time**
5. **Very little rest between stations.**

For the Power athlete

6. **Fewer Stations**
7. **Perform lower no. of reps / work at each station for a shorter period of time**
8. **allow rest between stations**
9. **Perform several "circuits"**

(iii) Select one component of fitness and describe a circuit, explaining how the principle of overload could be successfully applied.

(6)

3 marks for the circuit
2 marks for applying overload
Max of 1 for vaguely described but appropriate circuit

1. **The endurance athlete.**
2. **20 stations**
3. **working at each station for 1 minute / 20 reps @ 50% of 1RM**
4. **10 seconds rest between stations**

Overload applied by

5. **Timing the duration of the circuit and attempting to perform each circuit quicker**
6. **Increasing the number of stations**
7. **Increasing the number of reps / time at each station / intensity worked at each station.**

(b) Identify and define the 4 lung volumes which when added together provide the Total Lung Capacity (TLC) of an athlete.

(8)

NB no 9 (vital capacity) is a repeat of TV, IRV & ERV

1. **Tidal volume, (TV).**
2. **Amount of air inspired and expired per breath at rest.**
3. **Inspiratory reserve volume, (IRV).**
4. **Amount of air that could be inspired after a normal inspiration at rest.**
5. **Expiratory reserve volume, (ERV).**
6. **Amount of air that could be expired after the completion of a normal expiration breath at rest.**
7. **Residual volumes. (RV).**
8. **Amount of air left in the lungs after the most forceful expiration**
9. **vital capacity**
10. **all volumes minus RV**

(Total 25 marks)

3. (a) Identify the **three** main muscle fibre types and describe the characteristics of each.

(9)

Max of 2 for characteristics of each fibre.

1. **Type I / Slow twitch**
2. **Red in colour**
3. **High myoglobin content**
4. **High density of mitochondria**
5. **Significant capillarisation**
6. **Resistant to fatigue**
7. **relatively slow to contract/ little force generated**
8. **small diameter**

9. **Type IIa / FOG**
10. **Pink in colour/red, white**
11. **High myoglobin content**
12. **Lower density of mitochondria**
13. **Less capillarisation**
14. **High levels of muscle glycogen**
15. **Capable of relatively high intensity / prolonged duration activity.**
16. **faster to contract / more force generated**
17. **larger in diameter**

18. **Type IIb / FTG**
19. **White in colour**
20. **Low myoglobin content**
21. **Low density of mitochondria**
22. **Low level of capillarisation**
23. **High levels of PC & Muscle glycogen**
24. **Produce powerful contractions**
25. **Fatigue quickly**
26. **fast to contract / powerful force generated**
27. **large diameter**

(b)

(i) Describe the main concepts of interval training and explain why it is such a popular method for training.

(3)

1. **W:R**
2. **Repeat**
3. **Is very flexible / adaptable to the activity / event**
4. **Able to complete more work**

(ii) Describe an appropriate interval training session for a specific component of fitness in a named sport.

(4)

Max of 3 if no mention of appropriate sport
1 mark for appropriate component of fitness for chosen sport.
1 mark for appropriate Work time / intensity.
1 mark for approximate recovery time.
1 mark for indication of repeats / number of sets.

(c)
(i) Identify the respiratory muscles and describe the mechanics involved in ventilation at rest.

(5)

2 marks for the muscles.
Max of 4 for the mechanics.

1. **External intercostals**
2. **Diaphragm.**
3. **During inspiration these muscles contract**
4. **to increase the space for the lungs within the thoracic cavity**
5. **PP of O2 within the lungs drops below that in the atmosphere / atmospheric pressure.**
6. **A pressure gradient exists and air rushes into / diffuses into the body.**
7. **During expiration elastic recoil / gravity pulls the muscles back**
8. **the space for the lungs is reduced / pressure within them increases higher than that in the atmosphere**
9. **A pressure gradient exists and air rushes out / diffuses.**

(ii) Explain why additional respiratory muscles are required during intense aerobic activity.

(4)

1. **Insufficient O2 is available for the demand for energy / The body requires more O2**
2. **The contraction of the secondary respiratory muscles during inspiration increases further the space for the lungs / increases the volume of the thoracic cavity.**
3. **The pressure gradient becomes steeper / greater volume of gas defused**
4. **The use of the secondary expiratory muscles enables greater force to be exerted to the lungs / restricts the space / makes the lungs smaller / increases the pressure within / forces more air out.**
5. **The more air forced out of the lungs leads to less being present at the beginning of the next stage resulting in an even greater pressure gradient**

(Total 25 marks)

4. (a)

(i) Explain the term cool down and state when it would be performed.

(2)

1. **Cool down is performed post activity.**
2. **It is a part of a training session designed to prepare the athlete for a less active phase.**
3. **Is used to reduce overall recovery time.**
4. **Is used to reduce potential feelings of unease e.g. blood pooling / cramp / dizziness etc**
5. **To help the athlete physically cool down.**

(ii) Describe how an athlete should perform a cool down.
Explain how this phase of a training session can be described as being *good preparation* for future training.

(4)

Max of 3 for how to perform a cool down

1. **Continuous activity for approx. 10 minutes**
2. **of a gradually decreasing intensity.**
3. **interspersed with stretches to the fatigued / worked muscles.**
4. **can aid muscle elasticity and therefore flexibility**
5. **Although it is performed post activity it enables athletes to recover quicker and so enables them to train more frequently / avoid over training.**

(b) There are different types of strength.

Identify and define different types and provide a sport which each would be suited to each

(9)

Max of 3 for types of strength

1. **Absolute**
2. **Maximum force that can be exerted regardless of body weight / size**
3. **Rugby**

4. **Dynamic**
5. **Ability to exert muscular force repeatedly**
6. **Rowing**

7. **Elastic (similar to power)**
8. **Ability to exert a force quickly**
9. **Jumping**

10. **Explosive**
11. **Ability to exert a maximal force quickly / in one action**
12. **Javelin**

13. **Relative**
14. **Maximum force that can be exerted in proportion to body**
15. **Boxing**

16. **Strength endurance / muscular endurance**
17. **Ability of a muscle resist fatigue while exerting a force**
18. **Marathon running**

19. **Static**
20. **Ability to exert a sustained force without significant**
21. **Gymnastic balance / rugby scrum / tug of war.**

(c) Select two contrasting types of strength and explain how weight training could be manipulated for both.

(4)

1 mark for naming two types of strength.
1 mark if the two types contrast.
2 marks for correct manipulation of weight training

1. **Muscular endurance**
2. **Low weight (50% of 1 RM) & high reps (> 25 reps)**
3. **Absolute strength**
4. **High weight (>90% of 1 RM) & low reps (< 5 reps)**

(d) Identify reasons for a decline in athletic performance as an athlete ages.

(6)

Max of 3 for listing components of fitness

1. **Age can result in a deterioration in Strength**
2. **Age can result in a deterioration speed**
3. **Age can result in a deterioration flexibility**
4. **Age can result in a deterioration cardio vascular / localised muscular +endurance.**
5. **degeneration of the nerves supplying the muscles.**
6. **Extra collagen fibres are laid down between the muscle fibres, which reduces the flexibility of the muscle, with a resultant decrease in efficiency.**
7. **Reduced efficiency / elastin of all tissues with elastic properties**
8. **Injury to joint structure / wear & tear**
9. **Reduced efficiency of synovial membrane**
10. **extra collagen fibres in the cardiac muscle tissue,**
11. **leading to a reduction in cardiac output.**
12. **Maximum heart rate also tends to decline, which reduces the V02 max value of the athlete.**
13. **Extra collagen fibres are also responsible for a reduction in elasticity of lung tissue, which has the effect of further reducing the endurance capabilities of the athlete.**
14. **reduction in bone density with age,**
15. **general stiffening' of the blood vessels,**
16. **cholesterol deposits being laid down in the walls of arteries,**
17. **reduces the blood supply to many organs, and reduces the exercise capacities of the athlete.**
18. **Slower recovery time from training / injury**

(Total 25 marks)

TOTAL FOR PAPER: 50 MARKS