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GCE

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Physical Education (6723)

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Mark Scheme (Results)

Edexcel GCE
Physical Education

UNIT 3 (6723) – EXERCISE AND TRAINING

1. (a) (i) Explain why an athlete would warm up prior to exercise. **(3)**

1. **To prepare physically for the activity**
2. **To prepare mentally for the activity**
3. **To reduce the risk of injury**
4. **To improve performance**

(ii) Describe a warm up for a named activity identifying the different stages involved. State the aims of each stage and describe how they are achieved. **(9)**

1 mark for each stage name
1 mark for each stage objective
1 mark for each stage activity.

Hockey

1. **Initial preparation / gross motor activity**
2. **Aim being to elevate HR thus aiding O2 delivery / CO2 removal.**
3. **Increase Localised muscular temperature / decrease chance of injury etc**
4. **Continuous aerobic activity such as running of a gradually increasing intensity.**
5. **Injury prevention / stretching**
6. **Reduce the risk of injury / ensures optimum ROM**
7. **Stretching such as static followed by dynamic stretches.**
8. **Skills practice**
9. **Improve timing / mental preparation**
10. **Skills in isolation / lower intensity.**
11. **Sports Specific**
12. **Complete the preparation / transition to competitive level**
13. **Skills at race pace / match tempo**

(b) (i) When performing a chest pass, movement occurs in the wrist, elbows and shoulder joints. Describe the structure and movement characteristics of the elbow joint. **(5)**

Max of 3 marks for Structure/Movement
e.g. the elbow is a:
1. **synovial hinge and pivot joint.**
2. **It is freely moveable joint where movement is facilitated by**
3. **The production of synovial fluid from the synovial membrane**
4. **Articular / hyaline cartilage eases the movement**
5. **The articulating bones of the humerus, ulna and radius are held in position by a structure of ligaments/articular capsule**
6. **These allow flexion, extension to take place.**
7. **Rotation**

(ii) Identify the types of movement performed that occur at the elbow during the preparation and the execution of the chest pass. **(2)**

e.g for the elbow / hinge joint.

1. **Catching – flexion**
2. **Passing – extension**

(c) (i) Define the terms, anatomical dead space, tidal volume, inspiratory reserve volume. **(3)**

1. **Anatomical dead space is the volume of air taken into the lungs that does not contribute to gases exchange**
2. **Tidal volume is the volume of air inspired and expired per breath**
3. **IRV is the volume of air that can be inspired after a normal / at rest inspiration**

(ii) Explain why athletes rarely target improvements in respiratory capacities in their efforts to improve performance. **(3)**

1. **Only very minimal increases in lung volumes / capacities can be created**
2. **Up to 80% of inspired O2 is breathed out / unused**
3. **This suggests that the body already takes in more O2 than it can utilise**
4. **Consequently the body needs to become better able to utilise what it takes in order to improve aerobic efficiency**

(Total 25 marks)

2. (a) (i) Define the term *flexibility* and identify the **two** main limiting factors. **(3)**

1. **Defined as movement at a joint**
2. **Affected by joint structure**
3. **And muscle elasticity**
4. **age/gender/activity**

(ii) Name and describe **three** different ways of stretching. **(6)**

Maximum of 3 for name and 3 for description.

1. **Static stretching, -**
2. **Take a muscle to its current limit and hold.**
3. **Ballistic stretching, -**
4. **Using momentum to force a muscle beyond its normal ROM**
5. **Dynamic stretching, -**
6. **Stretch the joint and muscles through a controlled range of movement likely to be experienced when performing.**
7. **PNF, -**
8. **Stretch a muscle to its limit, performing an isometric contraction / action when at this point, / stretch, contract relax.**
9. **Active / passive / partner assisted. (should be related to another specific mode of stretching.)**

(b) Identify and define **three** principles of training and explain how you would apply them to a training programme for a sport of your choice. **(9)**

3 x identification
3 x definition
3 x application

Maximum of 6 marks for no named sport.

1. Specificity **2. Training appropriately to your sport.,** **3. e.g. a swimmer training in the pool.**
4. Progression **5. Setting achievable targets / increasing training volume** **6. e.g. an athlete attempting to run the marathon plans to increase their weekly mileage by 5%.**
7. Overload **8. Stressing the body above that which it has become accustomed to** **9. e.g. the marathon runner increasing the intensity of their training runs.**
10. Regression / Reversibility **11. If the training load is not maintained then the athletes level of fitness will begin to revert back to that of pre training** **12. e.g. after injury the athlete may not be able to perform at the same intensity levels.**
13. Thresholds. **14. Frequency / intensity / time / type.** **15. The top class runner may train 5 times a week, at 75% of MHR, for 1 – 2 ½ hrs using both interval and fartlek training.**
16. Variance **17. Using different methods of training to prevent mental and physical plateaus** **18. e.g. a swimmer performing some land based activity such as weight or circuit training.**
19. Over training **20. Not allowing sufficient recovery time** **21. e.g. a shot putter training their upper body everyday.**

(c) (i) Define the terms *cardiac output* and *venous return* and explain their relationship known as *Starlings Law*. **(3)**

1. **Cardiac output is the amount of blood ejected by the heart per minute**
2. **Venous return is the amount of blood returned by the body back to the right atrium per minute.**
3. **Venous return controls Q because the heart can only pump out what it receives – Starlings Law**

(ii) Identify and explain the different mechanisms used by the body to enable venous return. **(4)**

1. **Veno constriction**
2. **Skeletal Muscle pump –**
3. **Muscles contract reducing the space within the muscle which squeezes the vein. This increases the pressure within the vein forcing the blood through the next valve.**
4. **Respiratory pump / Thoracic pressure. –**
5. **During inspiration pressure decreases within the thoracic cavity. This leads to a decrease in pressure within the atria which produces a pressure gradient between the atria and the feeding vessels. Blood is then drawn into the right atrium from the thoracic veins / vena cava.**
6. **Valves –**
7. **Valves prevent blood flowing backwards. As blood flows into the vein the pressure gradually increases which leads to the next valve being forced open.**

(Total 25 marks)

3. (a) (i) Explain how muscles work with bones to provide movement. **(4)**

1. **Muscles are attached to bones by tendons**
2. **Two points of attachment**
3. **Origin is the anchor attachment**
4. **Insertion is the attachment to the bone that moves**
5. **As muscles contract they pull on the bones which they are attached to.**
6. **The point of insertion is pulled towards the point of origin producing movement**

(ii) Figure 1 shows an athlete performing a press up. Name the muscles involved and the roles they fulfil, as the athlete moves from position A to position B. **(7)**

1. **Agonist -**
2. **Pectorals / Deltoids/Triceps**
3. **Antagonist. -**
4. **Latissimus Dorsi / Biceps**
5. **Fixator. -**
6. **Deltoids.**
7. **Synergist -**
8. **Rectus Abdominals**

(iii) Identify the type of contractions performed by the agonist while moving from position A to position B.

(2)

1. **Position A to B - Concentric**

(b) (i) Define partial pressure of O2 and explain why it is lower at altitude than at sea level. **(3)**

1. **Partial pressure is the pressure exerted by a particular / single gas within a mixture of gases**
2. **Partial Pressure is the pressure exerted by O2 in the air and is usually 20kpa at sea level.**
3. **At higher altitudes there is a reduced barometric pressure / the air is less dense and so O2 exerts a lower pp**
4. **e.g. in a litre of air O2 would make up 20% of the total volume and so it would exert a pp of 20kpa**

(ii) Identify the physiological effects this would have on an unacclimatised athlete when first performing at altitude. **(3)**

1. **Reduced aerobic capability/ < $\dot{V}O_2$ max**
2. **Higher HR for a given workload**
3. **> ventilation**
4. **reduced performance for endurance / aerobic activities.**
5. **Reduced rate of diffusion**

(iii) Outline the structural and the functional adaptations that would occur in an endurance athlete as a result of altitude training. **(5)**

Maximum of 3 from either area

Structural

1. **Slight increase in lung capacity**
2. **> myoglobin content**
3. **> mitochondrial density**
4. **vascularisation / capillarisation of the muscle**
5. **> haemoglobin / RBC count**
6. **cardiac hypertrophy**

Functional

7. **Increased aerobic capacity @ altitude / > $\dot{V}O_2$ max**
8. **>SV**
9. **> Q**
10. **> strength of ventricular contractions**
11. **< end systolic volume**
12. **> end diastolic volume**
13. **Lower resting HR for a given workload and at rest / bradycardia**
14. **improved performance**

(Total 25 marks)

4. (a) (i) Muscles can perform *isometric, isotonic* and *isokinetic* contractions.
Describe each type of contraction. **(3)**

1. **(Isometric contractions) – muscle action occurs without noticeable shortening / lengthening resulting in no movement.**
2. **(Isotonic contractions) - muscle action occurs with noticeable shortening / lengthening resulting in movement**
3. **(Isokinetic contractions) – muscle works at a constant speed throughout the whole range of movement.**

(ii) Explain the difference between *eccentric* and *concentric* muscular contractions. Provide a sporting example where the Biceps Brachii performs both types of contraction. Identify each phase of your example. **(5)**

2 marks for the differences / definitions
1 mark for a correct example applied to a specific contraction
2 marks for the correct application of the named muscle to the relevant contraction.

1. **Eccentric – muscle actively lengthens while contracting / acts as a brake / resists gravity.**
2. **Concentric – muscle actively shortens while contracting / opposes gravity.**
3. **e.g when performing a biceps curl (or similar)**
4. **when lifting the weight the muscle performs a concentric contractions**
5. **when lowering the weight the muscle performs an eccentric contraction**
6. **or similar eg.**

(b) (i) Explain the role of fitness testing in an athletes training programme. **(4)**

1. **Is used to identify a base line of fitness levels**
2. **Used to identify strengths and weaknesses**
3. **Used to aid planning of training programmes**
4. **Used to monitor training**
5. **Used to motivate the athlete**
6. **Used to draw comparisons between past fitness levels / other elite or comparable athletes**
7. **measure effects of injury**

(ii) Identify a specific fitness test for a **named athlete** and describe the protocol for the test. **(4)**

Inappropriate test = 0 marks

3 marks for protocol

1. **NCF multistage shuttle test/V02 max test for an aerobic/endurance based athlete**
2. **20 meter space**
3. **Athletes run in time with bleeps from a cassette.**
4. **They must reach each marker cone as the bleep occurs.**
5. **Failure to meet 3 consecutive bleeps signals the end of the test.**
6. **The bleeps occur more frequently as the test progresses.**

(c) (i) Identify and define **three** components of physical fitness. **(6)**

1. <u>Strength</u>

(a) Maximal / absolute
(b) The ability to exert a maximal force once regardless of body weight.
(c) Relative
(d) The ability to exert a maximal force once relative to your body weight.
(e) Dynamic
(f) The ability to exert a significant force repeatedly
(g) Static
(h) The ability to exert a force, - often against an immoveable object, without movement.

2. <u>Endurance</u>

(a) Localised muscular
(b) The ability of a muscle to exert a repeated force over an extended period of time.
(c) Cardiovascular
(d) The ability of the body to supply the working muscles with sufficient O2 / remove CO2.

3. Flexibility
4. The range of movement at a joint.
5. Speed
6. The ability to move the body or specific body parts as quickly as possible.
7. Body composition.
8. The relationship between body fat, bone, muscle tissue.
9. agility
10. Change direction at speed and with control
11. co-ordination
12. Linking movements consistently with skill / precision
13. power
14. Strength x speed
15. reaction time
16. Time taken to identify a stimulus and produce a reaction

17. **balance**
18. **Ability to maintain body position while stationary (static) or while moving (dynamic)**

(ii) For each of the three of the components of physical fitness identified in your answer to question (c)(i) identify a named sport that would benefit from that component. **(3)**

Strength
1. **Maximal / absolute - Rugby**
2. **Relative - Boxing**
3. **Dynamic – 2000m Rowing**
4. **Static - gymnastics**

Endurance
5. **Localised muscular - marathon**
6. **Cardiovascular – 10 000m**
7. **Flexibility - trampolining**
8. **Speed – javelin / arm action**
9. **Body composition.**
10. **Mesomorph – 100m sprint**
11. **Ectomorph – High jump**
12. **Endomorph – Sumo wrestling**

(Total 25 marks)
TOTAL FOR PAPER: 50 MARKS