1. **Name one muscle in the trunk which works to maintain good posture and core stability during the biceps curl. (1 marks)**

1 mark, accept first answer only.

* multifidis /transverse abdominis *I* rectus abdominis *I* (external) obliques *I* (infernal).obliques *I* erector spinae; sacrocrospinalis/. (abdominals on own= TV)
* (rectus.abdominals; abdominus rectus= BOD)
1. **Identify two structures of a synovial joint and describe the role of one during physical performance [3 marks]**

|  |  |
| --- | --- |
| Structure  | Role  |
| 1 Ligaments  | 2 Hold joint in place/join bone to bone  |
| 3 Cartilage (hyaline/articular)  | 4 Prevents wear and tear/friction/ absorb compression  |
| 5 Muscles/tendon  | 6 Provide strength or support/allow greater range of movement  |
| 7 Synovial fluid  | 8 Lubricates/nourishes cartilage/rids joint of waste debris  |
| 9 Pads of fat  | 10 Absorbs shock/protect from wear and tear  |
| 11 Bursae (sacs containing synovial fluid)  | 12 Helps reduce friction  |
| 13 Joint capsule/fibrous capsule  | 14 Stabilise joint  |
| 15 Synovial membrane  | 16 Secretes synovial fluid  |
| 17 Menisci  | 18 Improves fit of the joint  |

**The Role of Muscular Contraction**

* **Explain concentric, eccentric and isometric contraction.**
1. **During the upward and downward phases of a press up. Explain the role of the triceps brachia in both the upward and downward phases of a press up.**



1. **Name the type of contraction occurring at the agonist and give one exercise that could be used to improve the strength in that muscle. [2 marks]**

**Type of contraction** — **concentric**

* Strength exercise — press ups/triceps extensions/dips
1. **What type of muscle contraction is occurring in the biceps brachia during the downward phase of the bicep curl?**

1 mark, accept first answer only.

Eccentric or isotonic eccentric (isotonic on own =TV)

1. **Identify the type of contraction occurring at the agonist and give one exercise that could be used to strengthen the agonist muscle. [2 marks )**
* Type of contraction): concentric
* (Strengthen Exercise): squat/squat thrust/leg press/lunge/bent knee hip extensions.
1. **The figure below shows an athlete performing an Abdominal Curl Sit Up Test, where sit ups are carried out until exhaustion, in time to a series of bleeps on a tape that get closer together after each minute of exercise.**

**Describe and explain the type of muscular contraction occurring in the rectus abdominis and the pectoralis major muscles as the athlete performs this test. (5 marks)**



**(Rectus abdominis) submax 3**

* upward phase, muscular contraction is concentric
* origin of muscle moves towards insertion/points of attachment get closer together
 muscle shortens (under tension)
* downward phase, muscular contraction is eccentric
* origin of muscle moves away from insertion/points of attachment get further away
 muscle lengthens (under tension)
 **(Pectoralis major) submax 3**
* (both phases) muscular contraction is isometric
* muscle is working to keep shoulders (horizontally) flexed / arms across the chest/fixator
* origin and insertion/points of attachment remain the same distance apart
* muscle remains the same length while developing tension

1. Describe the type of contraction taking place at the hip in the downward phase of a squat.

|  |  |  |  |
| --- | --- | --- | --- |
| Type of contraction | Agonist  | Antagonist | Movement  |
| Eccentric contraction | Gluteus maximus | Iliopsoas  | flexion |

1. Describe the type of contraction taking place at the shoulder in the **downward phase** of a wide grip pull up.



|  |  |  |  |
| --- | --- | --- | --- |
| Type of contraction | Agonist  | Antagonist | Movement  |
| Eccentric contraction | Latimus dorsi | Medial deltoid | extension |

1. Describe the movement occurring at the knee in the upward phase



|  |  |  |  |
| --- | --- | --- | --- |
| Type of contraction | Agonist  | Antagonist | Movement  |
| Concentric contraction | Hamstring/ rectus femoris et al | Quadriceps groupSemimembranosus  | flexion |

**Muscle Fibre Types in relation to choice of PA**

1. **A performer's mix of fast and slow twitch muscle fibres is genetically determined. (5 marks)**

**(i) Identify three functional characteristics of slow twitch (slow oxidative) muscle fibres .**

**(ii) Explain how a performer's mix of muscle fibre types might influence their reasons for choosing to take part in particular types of physical activity.**





1. **. In terms of fibre type, the composition of muscle is largely genetically determined and can influence the activities in which people participate.**

 **Identify two structural and two functional characteristics of a slow oxidative muscle fibre.**

 **If a person has a high percentage of slow oxidative fibres what type of physical activity are they more likely to participate in? (5 marks)**

 Fibre type

 **1 mark per point max 2 structural characteristics:**

• fewer fibres per motor neurone;

• more mitochondria;

• more myoglobin;

• more fat stores;

• type of myosin ATPase (slow);

• smaller in diameter.

 **1 mark per point max 2 functional characteristics:**

• high aerobic capacity/low anaerobic capacity;

• slow contractile speed;

• high fatigue resistance;

• low motor unit strength.

 **1 mark per type of physical activity:**

• any related endurance type activity.

1. **A hurdler will have a different muscle fibre type distribution in their hamstrings to that of a marathon runner. Name the three types of muscle fibre found in the body. Explain why the percentage of each muscle fibre type found in the hamstrings of a hurdler is likely to differ from that of a marathon runner. (6 marks)**

**Types of muscle fibre 1 mark if all 3 identified**

* slow oxidative / SO / type I
* fast oxidative glycolytic / FOG *I* type Ila
* fast glycolytic *I* FG / type lIb

**Hurdler v marathon runner**

* hurdler will have a high percentage of fast twitch muscle fibres *I* marathon runner will have a high percentage of slow twitch fibres (opposites apply)

**(hurdler)**

* needs a high speed of contraction (for a fast leg rate)
* needs to develop considerable force (off the blocks) *I* (at take off) for each hurdle / explosive strength *I* power
* needs high anaerobic capacity *I* produce energy without oxygen
* needs large powerful leg muscles
* needs many fibres per motor unit (to develop more force)
* needs high phospho-creatine stores

**(marathon runner)**

* needs a high resistance to fatigue Ito keep going over long distances / endurance / stamina
* needs high aerobic capacity / efficient use of aerobic energy system)
* needs high numbers of mitochondria (to optimise production of ATP)
* needs high numbers of capillaries / allow for efficient gaseous exchange (at the tissue/capillary membrane / in the working muscles)
* needs high levels of myoglobin / efficient transport of oxygen within the muscle
* needs large glycogen stores (to breakdown for energy supply) / needs large tri-glyceride stores
1. **The long jumper would use fast glycolytic fibre type (llb) during the take off phase. Identify the reasons why this fibre type would be used. [2 marks]**
* Fast contraction speed
* High force output/explosive/high power output
* Fast relaxation speed
* High anaerobic capacity
1. **How did the sprinter produce the force and speed of contraction required during the race? [2 marks]**
* These fibres have high contractile speed because of the size of the motor neurone and have highest motor unit strength as they have more fibres in unit
1. **A performer's mix of fast and slow twitch muscle fibres is genetically determined.**

**How might the mix of muscle fibre types determine the success of a performer?**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Accept** | **Do not accept** |
| **Mixed** | People with a mix of muscle fibre types may perform successfully in both aerobic and anaerobic activity or team games (with varying intensities of activity) | Type 1, 2a, 2b (for mix) examples of team games of varying intensities |  |
| **Slow/type 1** | Peope with high/higher proportion of slow twitch or type 1 or SO fibres most likely to perform successfully in aerobic or endurance activities or marathon running or low intensity, long duration activities | Examples of any endurance events that show performer is working aerobically/high resistance to fatigue | Cycling on own = TVRunning on own = TV |
| **fast** | People with high/higher proportion to fast twitch or type 2 or FG or FOG fibres most likely to perform successfully in anerobic or explosive events or long jump or sprinting or throwing events or high intensity, short duration activities | Examples of any explosive events that show performer is working anaerobically/low resistance to fatigue |

1. **The muscle fibre type that would be used during a maximal strength contraction is fast glycolytic (type lib). Give one structural and one functional characteristic of this fibre (3 marks)**

|  |  |
| --- | --- |
| **Structural characteristic**  | **Fast glycolytic (type 11 b)**  |
| 1 Size  | Large  |
| 2 Colour  | White  |
| 3 Glycogen Store  | Large  |
| 4 Sarcoplasmic reticulum development  | Great  |
| 5 Myelin sheath  | Thick  |
| 6 Myosin ATPase activity  | Fast  |
| 7 Motor neurone size  | Large  |
| 8 Fibres per motor neurone  | Many  |
| 9 Phosphocreatine store/ATP stores  | Large/high  |
| 10 Mitochondria  | Few  |
| 11 Capillaries  | Few  |
| 12 Myoglobin stores Low Functional (1 mark sub maximum)  |

|  |  |
| --- | --- |
| **Functional characteristic**  | **Fast glycolytic (type lib)**  |
| 13 Force production  | High  |
| 14 Relaxation time  | Fast  |
| 15 Contractile speed  | High  |
| 16 Fatigue resistant  | Low  |
| 17 Aerobic capacity  | Low  |
| 18 Anaerobic capacity  | High  |

1. **Identify two structural characteristics of muscle fibre types associated with athletes participating in endurance events.**

|  |  |  |
| --- | --- | --- |
|  | **Accept** | **Do not accept** |
| **Small/red** |  |  |
| **Many mitochondria** | More…=BOD |  |
| **High density of myoglobin** | More or large amount of ….=BOD | Haemoglobin |
| **High denstity of capillaries** | More or large amount of ….=BOD |  |
| **Low glycogen stores/low PC stores** | Less…=BOD |  |
| **High triglyceride stores** | More…=BOD |  |
| **High density of aerobic enzymes** | More or large amount of ….=BOD |  |

1. **During sub-maximal (aerobic) exercise the predominant muscle fibre type would be slow oxidative (type 1). Give one structural and one functional characteristic of this fibre types [2 marks]**

1 mark for structure:

* Structural characteristic
* Slow oxidative — type 1
* Size Small
* Colour Red
* Capillaries/blood supply Many
* Mitochondria Many
* Oxidative enzymes High
* Myoglobin content High
* Triglyceride supply High
* Motor neurone size Small
* Myelin sheath Thin
* Myosin ATPase activity Slow
* Sarcoplasmic reticulum development Little
* Phosphocreatine store Low
* Fibres per motor neurone Few
* Glycogen stores Low

1 mark for function:

* Slow to fatigue
* Slow contraction speed
* Lowforce output
* Slow relaxation speed
* High aerobic capacity
* Large amounts of blood need to be circulated around the body during prolonged aerobic exercise.

**Warm up / Cool-down**

* Analyse the effect of a warm up and cool-down on skeletal muscle tissue in relation to the quality of performance of physical activity.
1. **How would a warm up affect the contraction of a skeletal muscle? (3 marks)**



**3marks**

1. **Why should a performer warm up before a training run? (3 marks)**

 **3 marks maximum:**

1. An increase in muscle temperature

2. This allows greater stretch in the muscles/oxygen dissociates from haemoglobin quicker

3. Decreases risk of injury/prevents injury

4. Nerve impulse conduction is quicker

5. Improves muscle contraction speed/faster reaction time/improved
co-ordination of antagonistic pairs

6. Increase in heart rate/respiratory rate/stroke volume/cardiac output

7. This increases blood flow/increased oxygen delivery

8. Increased enzyme activity/hormonal activity

9. More energy available in muscles

10. Blood vessels within the muscle dilate/pre capillary sphincters/
capillaries dilate at muscle

11. Pre capillary sphincters/capillaries constrict at organs/
Redistribution of blood flow from organs to muscles/vascular shunt

12. Reduces blood viscosity