

# Level 2 Fitness Instructor – Anatomy and Physiology for Exercise

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|----------------------|--|
| Full Name (Capitals) |  |
| Course Start Date    |  |
| Course Location      |  |
| Tutor Name           |  |

## Statement of Achievement

Assessor, by signing this statement of unit achievement you are confirming that all learning outcomes, criteria and range statements have been achieved under specified conditions and that the evidence gathered is authentic.

This statement of unit achievement table must be completed prior to claiming certification.

| Section                                                                                             | Pass/Refer | Assessor Full Name | Assessor Signature |
|-----------------------------------------------------------------------------------------------------|------------|--------------------|--------------------|
| Understand the structure and function of the circulatory system                                     |            |                    |                    |
| Understand the structure and function of the respiratory system and skeleton (and joints)           |            |                    |                    |
| Understand the muscular system                                                                      |            |                    |                    |
| Understand the life-course of the musculoskeletal system and its implications (special populations) |            |                    |                    |
| Understand energy systems and their relation to exercise                                            |            |                    |                    |
| Understand the nervous system and its relation to exercise                                          |            |                    |                    |

|                   |  |               |  |
|-------------------|--|---------------|--|
| Learner Name      |  | IQA Name      |  |
| Learner Signature |  | IQA Signature |  |
| Date              |  | Date          |  |

## Understanding the structure and function of the circulatory system

Q1

Tick which statement is true from the two following statements.

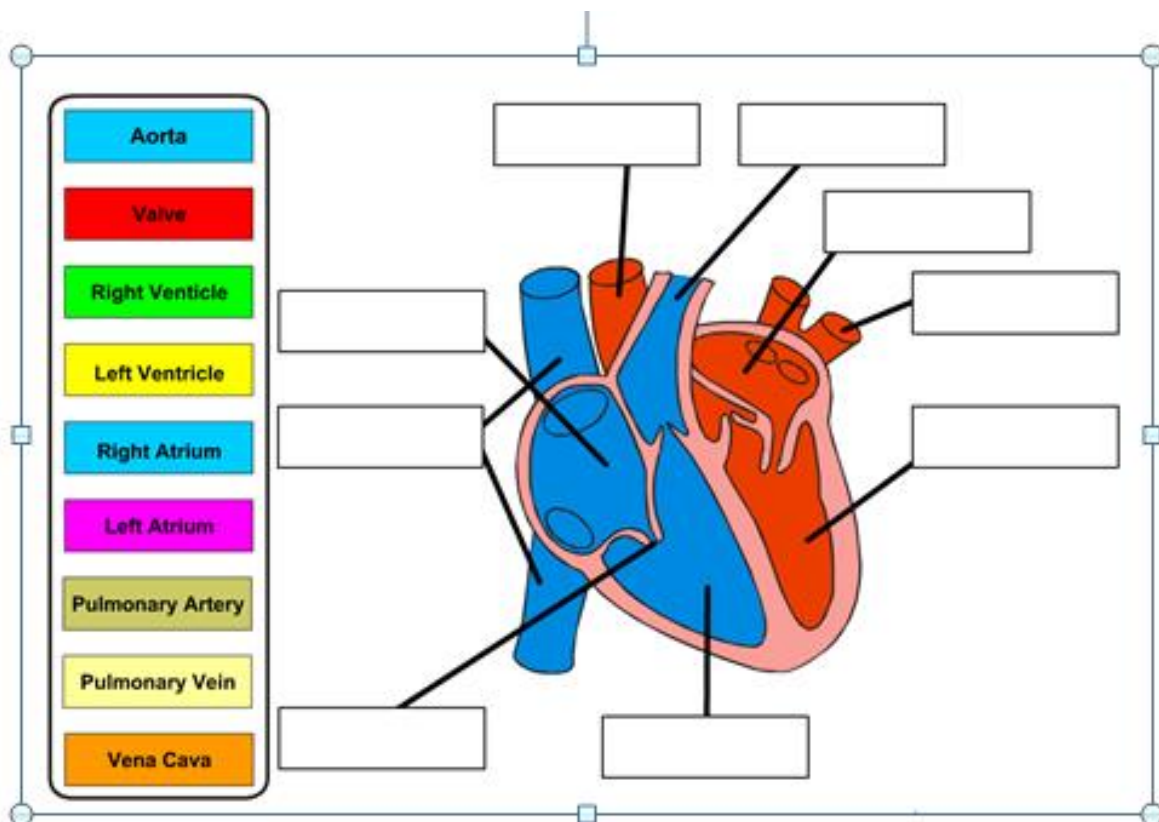
|                                                                 | Tick one |
|-----------------------------------------------------------------|----------|
| The heart is located on the left-hand side of the chest cavity  |          |
| The heart is located on the right-hand side of the chest cavity |          |

Q2

Describe the main function of the heart.

Q3

Complete the diagram by identifying the different chambers and major blood vessels of the heart



Q4

Using all the answers given in the previous question complete the flow table of blood through the heart. You must provide a description of the functions of each of the structures.

Learner Guidance:

- You must describe where it receives blood from and transports it to
- Identify whether it carries oxygenated or deoxygenated blood

| Structure        | Function                                                             |
|------------------|----------------------------------------------------------------------|
| Pulmonary Vein   | Major vein that carries oxygenated blood from the lungs to the heart |
| Left Atrium      |                                                                      |
| Left Ventricle   |                                                                      |
| Aorta            |                                                                      |
| Working Muscles  | Oxygenated blood is delivered to the working muscles                 |
| Vena Cava        |                                                                      |
| Right Atrium     |                                                                      |
| Right Ventricle  |                                                                      |
| Pulmonary Artery |                                                                      |

Q5

Describe the role of the valves in the heart.

Q6

Describe systemic circulation.

Q7

Describe pulmonary circulation.

Q8

Describe two differences between the structure of arteries and veins

Q9

Describe two differences between the function of arteries and veins

Q10

Describe the role of capillaries.

Q11

Describe one feature of a capillary that enable them to perform their role.

Q12

Define the following terms.

|                    |  |
|--------------------|--|
| Blood Pressure     |  |
| Systolic Pressure  |  |
| Diastolic Pressure |  |
| Hypotension        |  |
| Hypertension       |  |

Q13

According to the NHS what range of blood pressure would be classified as normal?

|  |
|--|
|  |
|--|

Q14

According to the NHS, at what reading or higher would classify as high blood pressure?

**Pass/Refer**

**Understand the structure and function of the respiratory system**

Q1 Describe where in the body the lungs are located.

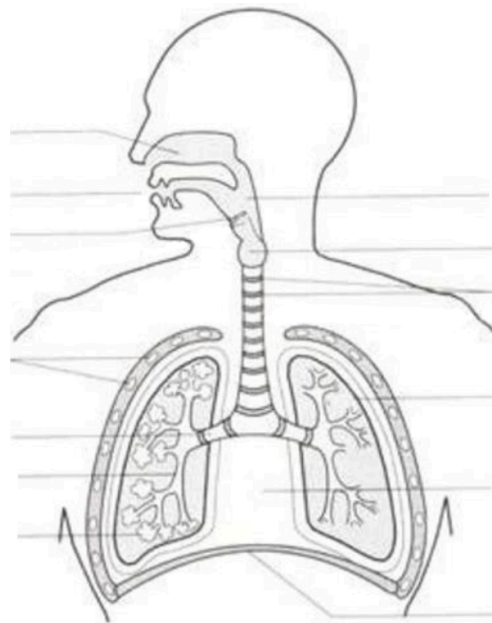
Q2

Describe the function of the lungs.

Q3

Complete the diagram below by filling in the boxes and identifying the different structures of the respiratory system.

Diaphragm  
Lung  
Pharynx  
Bronchiole  
Bronchus  
Ribs  
Mouth  
Alveolus  
Nasal Cavity  
Rings of Cartilage  
Space occupied by the heart  
Larynx  
Epiglottis



Q4

Using some of the answers given in the previous question complete the flow table of air through the respiratory system. You must provide a description of the functions of each of the structures.

| Structure    | Function |
|--------------|----------|
| Nasal Cavity |          |
| Pharynx      |          |
| Larynx       |          |
| Epiglottis   |          |



|            |  |
|------------|--|
| Bronchus   |  |
| Bronchiole |  |
| Alveolus   |  |
| Diaphragm  |  |

Q5

Identify two major muscles involved in respiration.

Q6

Where in the lungs does gaseous exchange take place?

|  |
|--|
|  |
|--|

Q7

Describe the movement of oxygen and carbon dioxide in the lungs during gaseous exchange.

|  |
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**Pass/Refer**

**Understand the structure and function of the skeleton**

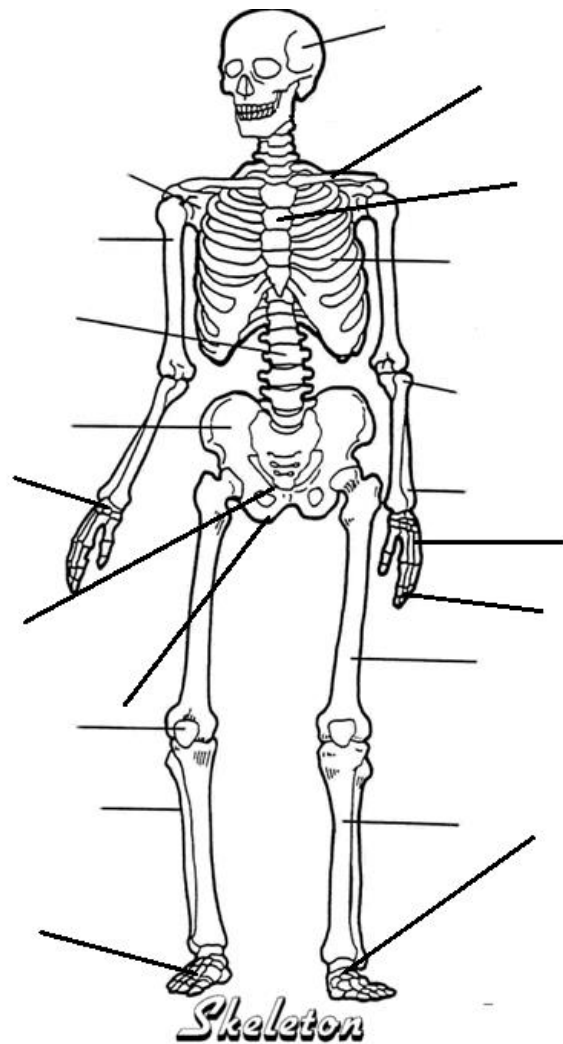
Q1

Describe the five functions of the skeleton.

| Function | Description |
|----------|-------------|
|          |             |
|          |             |
|          |             |
|          |             |
|          |             |

Q2 Correctly label the skeleton, use all the bone:

Cranium  
Clavicle  
Ribs  
Sternum  
Humerus  
Radius  
Ulna  
Scapula  
Ilium  
Pubis  
Ischium  
Carpals  
Metacarpals  
Phalanges  
Femur  
Patella  
Tibia  
Fibula  
Tarsals  
Metatarsals  
Vertebral Column



Q3

Identify three bones that are part of the axial skeleton

|  |
|--|
|  |
|  |
|  |

Q4

Identify four bones that are part of the appendicular skeleton

|  |
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|  |
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|  |

Q5

There are five different classifications of bone, complete the table below by providing an example and explaining its function.

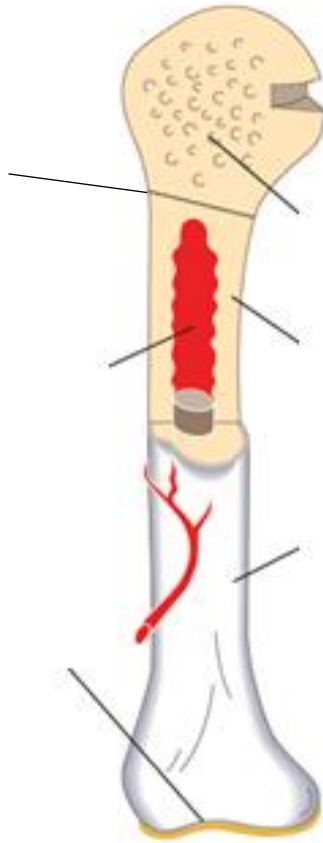
- Learner Guidance: Explain requires more analysis to demonstrate your understanding of the topic, short paragraph.

| Type of bone | Example | Function |
|--------------|---------|----------|
|              |         |          |
|              |         |          |
|              |         |          |
|              |         |          |
|              |         |          |

Q6

Identify the structure of a long bone by labelling the diagram.

Learner guidance: use structures of the long bone found on question 7 on the next page



Q7

For each of the structures of the long bone you have labelled in the previous question, complete the table below to explain their structure in more detail.

| Structure           | Explanation |
|---------------------|-------------|
| Medullary Cavity    |             |
| Articular Cartilage |             |
| Spongy Bone         |             |
| Compact Bone        |             |
| Periosteum          |             |
| Growth Plate        |             |

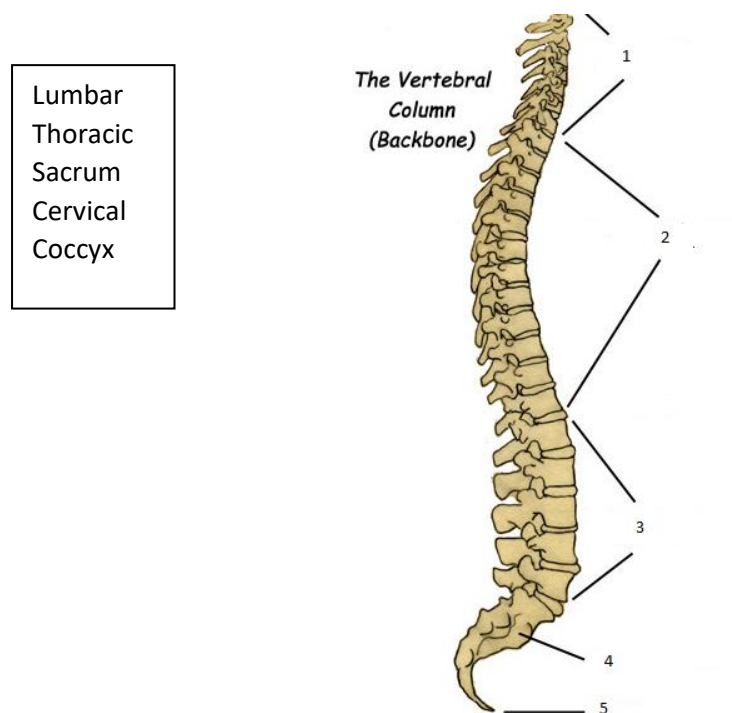
Q8

Explain the five stages of ossification (bone growth).

|   |  |
|---|--|
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |

Q9

Label the different sections of the spine using all the sections in the box below.



Q10

From the different sections labelled in the previous question, describe the potential ranges of motion of each section.

| Section | Potential Ranges of Motion |
|---------|----------------------------|
|         |                            |
|         |                            |
|         |                            |
|         |                            |
|         |                            |

Q11

Describe what is meant by the term 'neutral spine'.

|  |
|--|
|  |
|--|

Q12

Which area of the spine would you expect to see the following natural curves?

Kyphotic

|  |
|--|
|  |
|--|



Lordotic

Q13

Describe how a Lordotic spine affects the normal shape of the spine.

Q14

Describe how a Kyphotic spine affects the normal shape of the spine.

Q15

Describe how Scoliosis of the spine affects the normal shape of the spine.

Q16

Describe how pregnancy can affect the normal shape of the spine.

**Pass/Refer**

**Understand joints in the skeleton**

Q1

Complete the table below of the different classification of joints, include the potential movement available at each.

| Classification of joint | Location of joint | Potential movement of joint |
|-------------------------|-------------------|-----------------------------|
|                         |                   |                             |
|                         |                   |                             |
|                         |                   |                             |

Q2

Describe the structure of the synovial membrane.

|  |
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|  |
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Q3

Describe the structure of the articular cartilage.

|  |
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|  |
|--|

Q4

Describe the six different types of synovial joints and state the range of motion available at each.

Q5

What joint actions are possible at the following joints?

Elbow

Spine    Learner guidance: name at least 3 joint actions

Hip    Learner guidance: name at least 4 joint actions

Q6

Describe each of the following joint actions and provide an example of a joint where it can occur.

Extension

Abduction

Plantar Flexion

**Pass/Refer**

**Understand the muscular system**

Q1

Complete the table below.

| Different types of muscle tissue | Main characteristics | Main role |
|----------------------------------|----------------------|-----------|
|                                  |                      |           |
|                                  |                      |           |
|                                  |                      |           |

Q2

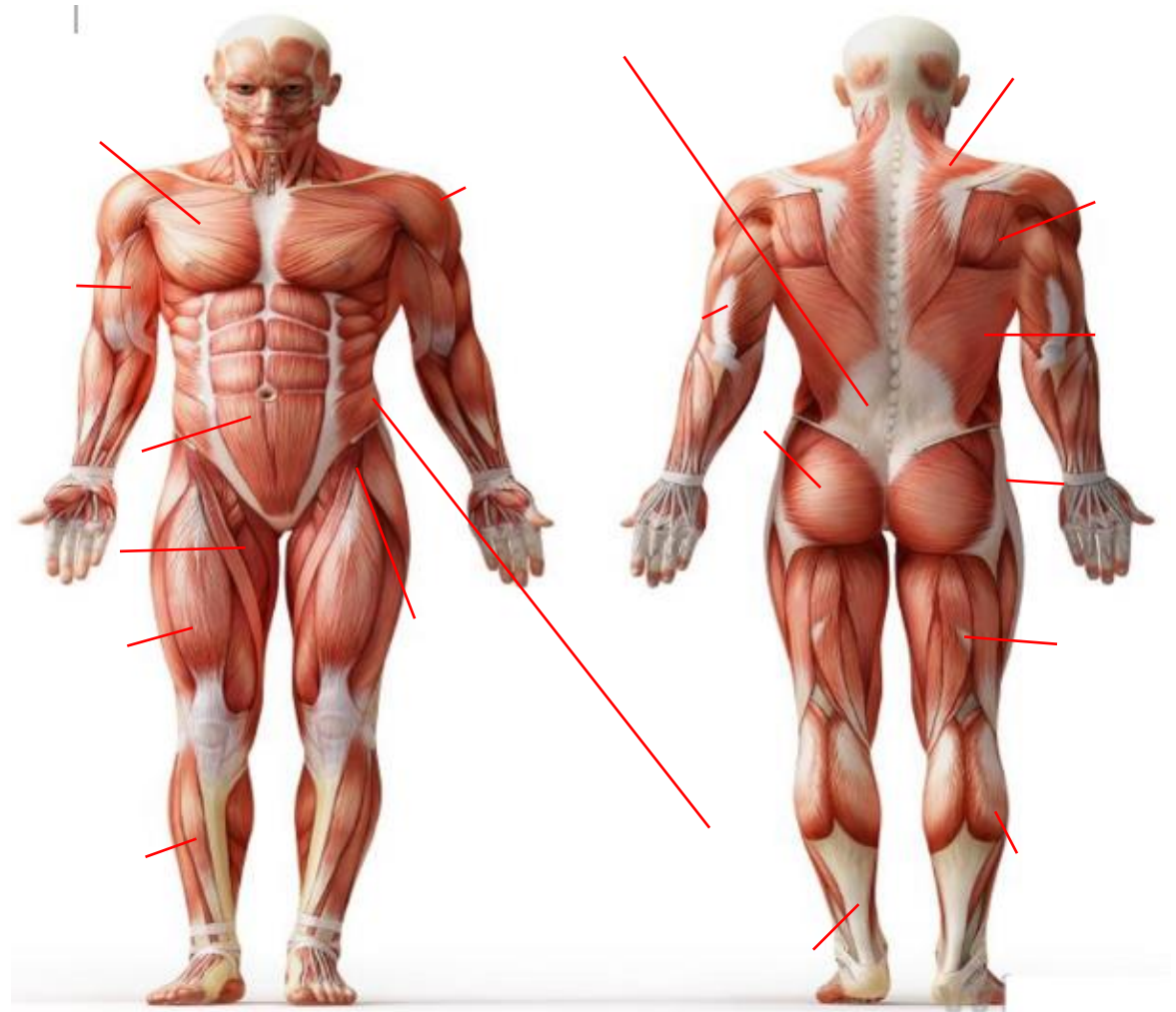
Complete the table below by describing the main structural points of a skeletal muscle.

| Structure    | Description |
|--------------|-------------|
| Muscle Fibre |             |
| Fascicle     |             |
| Fascia       |             |
| Sarcomere    |             |
| Myofibril    |             |

Q3 Label the skeletal muscles using the muscles from the list below, and identify what joint action each one allows.

Learner guidance: when describing joint actions please identify the limb/body part moving

| Muscle to locate  | Action it allows     |
|-------------------|----------------------|
| Rectus Abdominis  | Flexion of the spine |
| Pectoralis Major  |                      |
| Deltoids          |                      |
| Tibialis Anterior |                      |
| Biceps Brachii    |                      |
| Obliques          |                      |
| Soleus            |                      |
| Gastrocnemius     |                      |
| Teres Major       |                      |
| Gluteus Maximus   |                      |
| Triceps Brachii   |                      |
| Trapezius         |                      |
| Erector Spinae    |                      |
| Latissimus Dorsi  |                      |
| Hamstrings        |                      |
| Quadriceps        |                      |
| Abductors         |                      |
| Adductors         |                      |
| Hip Flexors       |                      |



Q4

Describe the structure of the pelvic floor muscles.

Q5

Describe two functions of the pelvic floor muscles.

Q6

Describe an concentric muscle contraction.

Q7

Describe an eccentric muscle contraction.



Q8

Describe an isometric muscle contraction.

Q9

Identify the joint action occurring in a barbell bicep curl during the concentric phase.

Q10

Identify the joint action occurring in a barbell bicep curl during the eccentric phase.

Q11

Complete the table below by identifying three different muscle fibre types and their main characteristics.

| Muscle fibre types | Characteristics |
|--------------------|-----------------|
|                    |                 |
|                    |                 |
|                    |                 |
|                    |                 |
|                    |                 |
|                    |                 |
|                    |                 |
|                    |                 |
|                    |                 |

**Pass/Refer**

**Understand the life-course of the musculoskeletal system and its implications for special populations exercise**

Q1

Describe two physical changes, and their implications for exercise, when training young people (in the 14-16 age range)

Leaner Guidance: Think about what effect training can have on tendons, ligaments, muscles, joint and bone mineral density changes.

|  |
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Q2

Describe two physical changes, and their implications for exercise, when training older people (50 plus age range)

Leaner Guidance: Think about what effect training can have on tendons, ligaments, muscles, joint and bone mineral density changes.

Q3

Describe two physical changes, and their implications for exercise, when training antenatal and postnatal women.

Leaner Guidance: Think about what effect training can have on tendons, ligaments, muscles, joint and bone mineral density changes.

**Pass/Refer**

**Understand energy systems and their relation to exercise**

Q1

What does ATP stand for?

Q2

Describe what the role of carbohydrates, fats and protein are in the production of energy.

Q3

Explain the use of the creatine phosphate (CP) or phosphocreatine system during exercise.

Learner Guidance

- Include what nutrients or compound the energy system will use to resynthesis energy
- Explain the types of activity/exercise that the energy system will fuel.

Q4

Explain the use of the lactic acid system/anaerobic system during exercise.

Learner Guidance

- Include what nutrients or compound the energy system will use to resynthesis energy
- Explain the types of activity/exercise that the energy system will fuel.

Q5

Explain the use of the aerobic system during exercise.

Learner Guidance

- Include what nutrients or compound the energy system will use to resynthesis energy
- Explain the types of activity/exercise that the energy system

**Pass/Refer**

**Understand the nervous system and its relation to exercise**

Q1

Describe three roles and functions of the nervous system.

Q2

Describe the principles of muscle contraction.

Learner Guidance – What are the role of nerves in muscle contraction? Think about nerve impulses

Q3

Describe the 'all or none' law.

Learner Guidance – Think about motor unit recruitment

Q4

Describe what determines whether or not a contraction takes place within a motor unit.

Q5

Describe two adaptations that occur in the neuromuscular system with regular exercise that improves motor fitness.

**Pass/Refer**

## Assessor Feedback



## Assessor Feedback