

# Level 3 Personal Trainer – Anatomy and Physiology for Exercise and Health


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 heart and circulatory system and its relation to exercise and health			
Understand the musculoskeletal system and its relation to exercise			
Understand postural and core stability			
Understand the nervous system and its relation to exercise			
Understand the endocrine system and its relation to exercise and health			
Understand energy systems and their relation to exercise			

Learner Name		IQA Name	
Learned Signature		IQA Signature	
Date		Date	

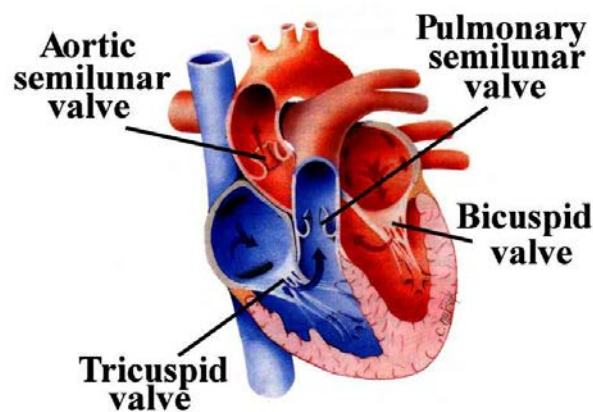
To pass this unit all questions must be answered correctly. If you answer a question incorrectly you will be asked to reattempt and resubmit that question.

Learner Guidance:

Pay close attention to the wording of each question:

- Identify: Label a diagram, can be a one-word answer
- Describe: Provide a short one to two-line description
- Explain: Requires more analysis to demonstrate your understanding of the topic, short paragraph.

**Understand the heart and circulatory system and its relation to exercise and health**



Q1 Explain the function of each of the heart valves labelled in the diagram above.

Learner guidance: this questions continues onto the next page

Q2

Describe what is meant by the term coronary circulation.

Q3

Explain the effect that atherosclerosis has on the structure and function of arteries.

Q4 Explain the short term effects of blood pressure during exercise.

Learner guidance: short term = during exercise

Q5 Explain the long term effects of exercise on blood pressure.

Learner guidance: long term = 3 months of exercise

Q6

Explain what is meant by the Valsalva effect.

Q7 Explain two benefits of cardiovascular endurance or aerobic training.

Learner guidance: this questions continues onto the next page

Q8

Explain two risks of cardiovascular endurance or aerobic training.

Q9

What are the NHS guidelines for the following categories of blood pressure and associated health risks:

Normal

Hypertension

**Pass/Refer**

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

Q1

Explain the following structures that together make up individual muscle fibre:

Nucleus

Mitochondria

Myofibrils

Cell walls

Learner guidance: please describe the structure of the sarcolemma

Q2

Describe the sliding filament theory and how myofilaments work together to bring about muscle contraction.

Q3

What type of muscle fibre responds best to strength training?

Q4

What effect will strength training have on the size of the muscle and explain why?

Q5

What type of muscle fibre responds best to cardiovascular endurance training?

Q6

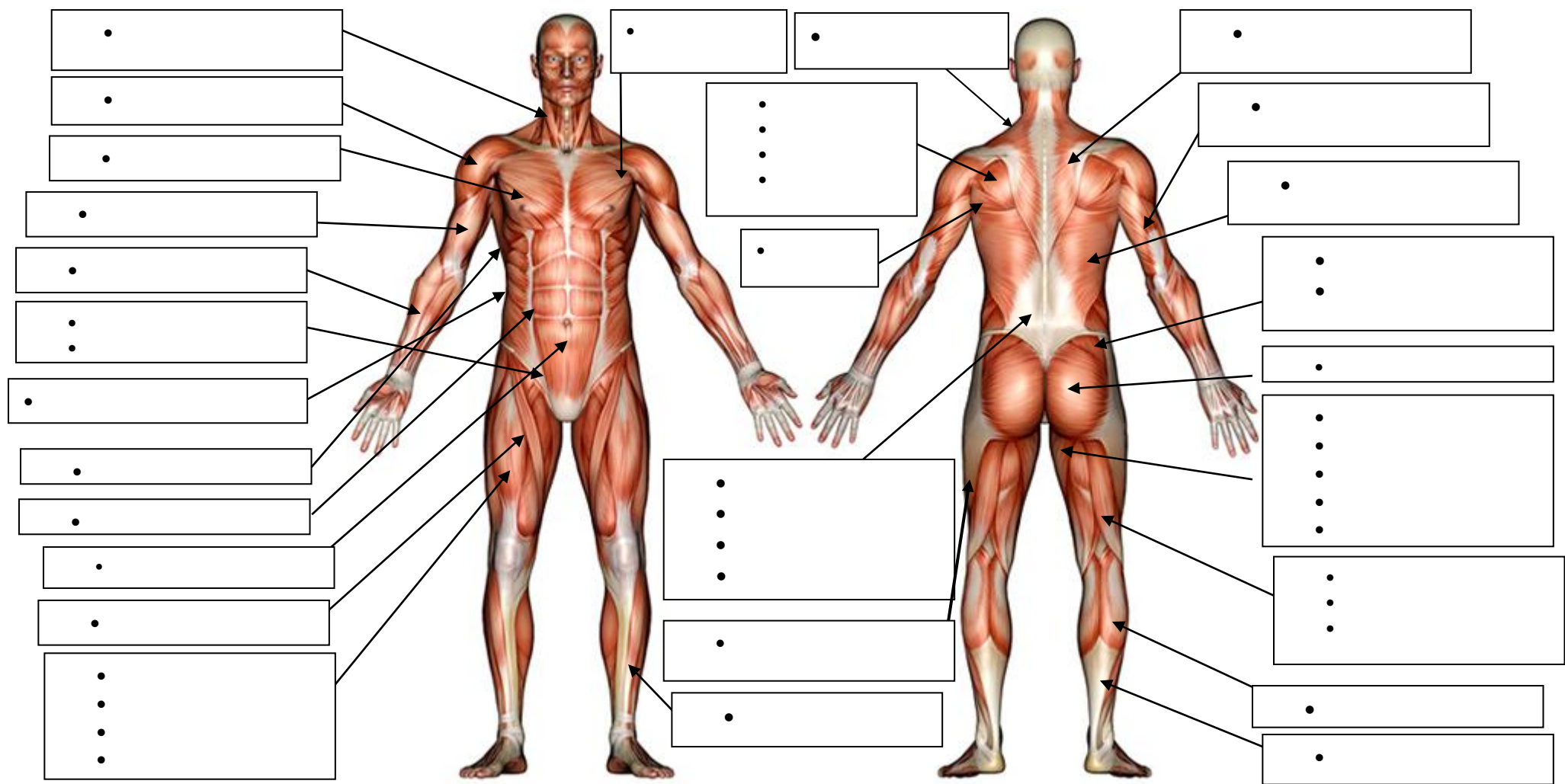
What effect will cardiovascular endurance training have on the size of the muscle and explain why?



Q7 Please use the following table to label the muscle diagram below.

Learner guidance: some muscles will be grouped together e.g. the four quadriceps

<ul style="list-style-type: none"> <li>• Adductor Brevis</li> <li>• Vastus Intermedius</li> <li>• Pectoralis Minor</li> <li>• Pectoralis Major</li> <li>• Iliacus</li> <li>• Psoas Major</li> <li>• Serratus Anterior</li> <li>• Gracilis</li> <li>• Adductor Magnus</li> <li>• Rectus Femoris</li> <li>• Brachioradialis</li> <li>• Vastus Medialis</li> <li>• Pectineus</li> <li>• Tibialis Anterior</li> <li>• Tensor Fascia Latae</li> <li>• Sartorius</li> <li>• Transversus Abdominis</li> <li>• Rectus Abdominal</li> <li>• Adductor Longus</li> <li>• Biceps Brachii</li> <li>• Vastus Lateralis</li> <li>• Sternocleidomastoid</li> <li>• External &amp; Internal Obliques</li> </ul>	<ul style="list-style-type: none"> <li>• Levator Scapulae</li> <li>• Deltoid</li> <li>• Infraspinatus</li> <li>• Iliocostalis</li> <li>• Latissimus Dorsi</li> <li>• Longissimus</li> <li>• Spinalis</li> <li>• Gastrocnemius</li> <li>• Gluteus Medius</li> <li>• Soleus</li> <li>• Trapezius</li> <li>• Subscapularis</li> <li>• Teres Major</li> <li>• Gluteus Maximus</li> <li>• Triceps Brachii</li> <li>• Glutues Minimus</li> <li>• Supraspinatus</li> <li>• Bicep Femoris</li> <li>• Erector Spinae</li> <li>• Seminembranosus</li> <li>• Teres Minor</li> <li>• Semitendinosus</li> </ul>
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Q9

Identify the origin and insertion and joint actions possible for each of the following muscles.

Muscle	Pectoralis Minor
Origin	
Insertion	
Joint Actions	

Muscle	Infraspinatus
Origin	
Insertion	
Joint Actions	

Muscle	Gluteus Maximus
Origin	
Insertion	
Joint Actions	

Muscle	External Oblique
Origin	
Insertion	
Joint Actions	

Muscle	Rectus Femoris
Origin	
Insertion	
Joint Actions	

Muscle	Semimembranosus
Origin	
Insertion	
Joint Actions	

Muscle	Iliacus
Origin	
Insertion	
Joint Actions	

Muscle	Subscapularis
Origin	
Insertion	
Joint Actions	

Muscle	Quadratus Lumborum
Origin	
Insertion	
Joint Actions	

Muscle	Tensor Fascia Latae
Origin	
Insertion	
Joint Actions	

Muscle	Gluteus Medius
Origin	
Insertion	
Joint Actions	

Muscle	Adductor Magnus
Origin	
Insertion	
Joint Actions	

Q10

Identify three anatomical planes and two different exercises that occur in each.

1.	Exercise
	1.
	2.

2.	Exercise
	1.
	2.

3.	Exercise
	1.
	2.

Q11

Complete the table below to analyse the movements of certain exercises.

Exercise	Joint(s) moving	Joint action(s) concentric	Agonist(s)	Antagonist(s)	Synergist (s)
Leg Extension					
Bench Press					
Lateral Raise					

Q12

Complete the table below by describing the different motion/movements available at the following joints/joint and the potential risk of injury.

	Describe range of movement (small/medium/large)	Joint actions possible	Potential risk of injury
Hip			
Ankle			
Shoulder			

Q13

Describe the role of the sacrotuberous ligament at the pelvic girdle.

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Q14

Describe the role of the sacroiliac ligament at the pelvic girdle.

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Q15

Identify the muscles that act across the sacroiliac joint and describe the role they have in 'force closure'.

**Pass/Refer**

**Understand postural and core stability**

Q1

Describe the structure and function of the two longitudinal ligaments of the spine.

Q2

Describe the structure of two of the stabilisation muscles of the spine.

Learner Guidance: Muscles that located in the inner unit of the core.

Q3

What are the roles of these two muscles?

Q4

When the core is not functioning properly to stabilise the spine describe the changes in the inner and outer unit muscles.

Q5

Explain how high levels of abdominal adiposity can effect posture and movement efficiently.

Q6

Identify the two different postural deviations and explain a potential problem linked to each.



Q7

Explain how a 'kyphotic' posture can affect function and movement efficiently.

Q8

If you are training an experienced client what core exercises would you include in a session and explain why.

Q9

From the exercises explained above what are the potential injury/aggravation of problems to your client?

Q10

There are three main forms of stretching, complete the table below by explaining the benefits, risks and when you might use these stretches.

Type of stretch	Benefits of this type of stretching	Risks of this type of stretching	When might you use this type of stretching
Active static stretching			
Passive static stretching			
Dynamic stretching			
Proprioceptive Neuromuscular Facilitation (PNF)			

**Pass/Refer**

## Understand the nervous system and its relation to exercise

Q1

Describe the specific role of the central nervous system (CNS).

Q2

Describe the specific role of the peripheral nervous system (PNS) including somatic and autonomic.

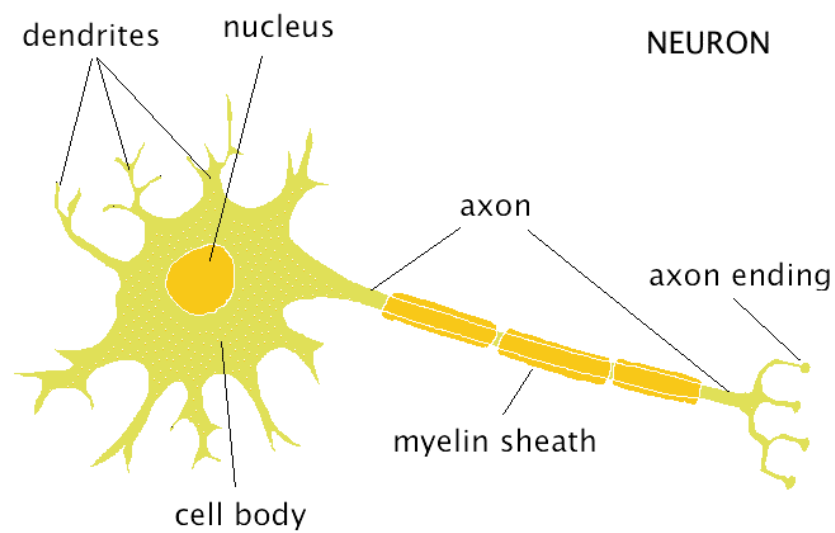
Role

Somatic

Autonomic

Q3

Describe the structure of a motor neuron.



Cell Body (Soma)

Nucleus

Axon

Dendrites

Q4

Describe the role of a motor neuron.

Q5

Describe the role each of the following structures have in transmission a nervous impulse:

Axon terminals

Neurotransmitters



Q6

Explain the role of a motor unit.

Q7

Describe the 'all or none' principle.

Q8

Explain how the number of muscles fibres innervated by a motor neuron impacts on the types of movements created.

Learner guidance: think large (gross) and small (fine) movements

Q9

Explain the function of muscle proprioceptors.

Q10

Explain the function of the stretch reflex.

Q11

Explain reciprocal inhibition and its relevance to exercise.

Q12

Explain what adaptations to the nervous system have taken place to bring about the following benefits:

Learner guidance: think of adaptations that take place in the motor neurons and motor units

Improvement in balance and coordination

Improvement of power

**Pass/Refer**

**Understand the endocrine system and its relation to exercise and health**

Q1

Describe the functions of the endocrine system.

Q2

Identify six hormones, what gland produces each hormone and explain the function of each.

Hormone	Gland where hormone is produced	Hormone functions

**Pass/Refer**

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

Q1

Identify what energy system would predominantly be used during a set of 4 reps on the chest press and explain why.

Q2

Identify what energy system would predominantly be used during a 100 metre sprint and explain why.

Q3

How does the type of an exercise performed dictate what energy system is used?

Q4

How does the intensity of an exercise performed dictate what energy system is used?

Q5 Identify the by-product of the creatine phosphate system and its significance in muscle fatigue.

Learner guidance: this is a two part question

Q6 Identify the by-products of the lactate system and its significance in muscle fatigue.

Learner guidance: this is a two part question

Q7 Identify the by-products of the aerobic system and its significance in muscle fatigue.

Learner guidance: this is a two part question

Q8 What type of intervals will have the greatest effect on increasing creatine phosphate and ATP stores?

Learner guidance: explain what intensities, timings and rest periods you will be using

Q9

What effect do anaerobic sprint intervals have on fuel (glycogen) utilisation?

Q10 What factors will dictate the effect long slow duration exercise has on fuel (glycogen) utilisation?

Learner guidance: consider the variables of F.I.T.T. and identify the main factors for fuel utilisation

**Pass/Refer**

## Assessor Feedback



## Assessor Feedback

