

## Qualification Unit

This unit forms part of a regulated qualification.

**Unit Title:** Equine Biomechanics

**Unit Reference Number:** F/651/7460

**Level:** Five (5)

**Credit Value:** 20

**Minimum Guided Learning Hours:** 60

The primary aim of this unit is to introduce and explain:

- Terminology used in the study of biomechanics;
- Movement patterns and traits associated with equine locomotion
- The dynamic role of biological tissues and adaptations of musculoskeletal tissues to forces;
- The biomechanics of musculoskeletal breakdown and repair;
- Gait analysis equipment available for equine locomotion studies;
- The biomechanics of the equine foot and the importance of foot balance in relation to the long-term soundness of the horse.

Learning Outcome (The Learner will):	Assessment Criterion (The Learner can):	
1. Understand the biomechanics of equine locomotion	1.1	Interpret terminology used in equine biomechanics
	1.2	Analyse equine locomotion and gait
	1.3	Explain the dynamic role of the muscles, tendons and ligaments in relation to equine biomechanics
	1.4	Discuss extrinsic factors which affect locomotion, e.g. effects of surface.
	1.5	Analyse current research in equine biomechanics

2. Understand uses and methods of gait analysis	2.1	Examine the merits of gait analysis
	2.2	Evaluate photo-instrumentation methods of recording equine locomotion
	2.3	Evaluate computer motion analysis systems
	2.4	Discuss the use of force plates to measure hoof-ground interaction
3. Understand the biomechanical effects of exercise and exercise-induced injuries	3.1	Describe musculoskeletal adaptations and failures associated with the biomechanics of exercise
	3.2	Analyse the importance of foot balance in relation to the long-term soundness of the horse
	3.3	Discuss the role of the farrier in the care of the performance horse

### Indicative and Mandatory Content

<b>LO1</b>	<p><b>AC 1.1</b> Could include terminology in the study of equine biomechanics, anatomical nomenclature, meanings of words and theories relating to equine biomechanics, Newton's Laws, dynamic role of biological tissues, adaptations of musculoskeletal tissues to forces, biomechanics of musculoskeletal breakdown and repair.</p> <p><b>AC 1.2</b> Could include sequence of footfalls, moments of flight and traits associated with walk, trot, canter and gallop. Definitions of named gaits according to equestrian sports' governing bodies, variance from prescribed definitions of gait commonly observed within equestrian disciplines.</p> <p><b>AC 1.3</b> Could include an introduction to kinematics – equine dynamics, characterising a force, force and injury.</p> <p><b>AC 1.5</b> Could include current and emerging interests and developments within equine biomechanics. Significant findings of recent research. Implications relating to current practices and potential future influences and application.</p> <p><b>MC1</b> Learners <b>must</b> include an explanation of locomotory-respiratory coupling.</p>
<b>LO2</b>	<p><b>AC 2.2</b> Could include the merits of equine gait analysis.</p> <p>Such as gait analysis equipment available for equine locomotion studies, recent published equine biomechanics research, 2D and 3D gait analysis systems, treadmill, photo-instrumentation, accelerometers/inertial measurement units, emerging use of artificial intelligence in gait analysis systems, equine kinetic research – ground reaction forces.</p> <p>Could also include the effects of exercise: define the equine back in terms of mechanical analogues, suspension bridge theory, loaded beam theory, bow and string theory, how muscles work together in chains to support mass and locomotion, relationship between the horse's stride and respiration rates – why</p>

	<p>and how this occurs.</p> <p><b>MC2</b> Learners <b>must</b> include methods of analysing joint angle changes and electrical activity in muscle.</p>
<b>LO3</b>	<p><b>AC 3.1</b> Could include biological tissues: loads experienced by tendons during normal locomotion, tendon adaptation, adaptation of ligament, bone loading, bone adaptation, bone fractures, monotonic fractures, fatigue failure, muscle functions, development of tension, effects of training.</p> <p><b>AC 3.2 and AC 3.3</b> Could include biomechanics of the equine foot: importance of foot balance in relation to the long-term soundness of the horse, role of the farrier in the care of the performance horse. Assessing foot balance, hoof/pastern axis and dorso-palmar balance, medio-lateral balance, ground surface of the foot, pair symmetry of hooves and limbs, non-contact of hooves and limbs. Shoeing, corrective shoeing, barefoot trimming.</p>