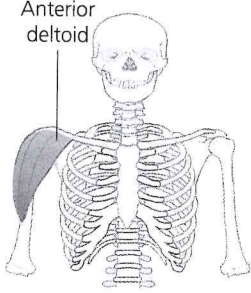
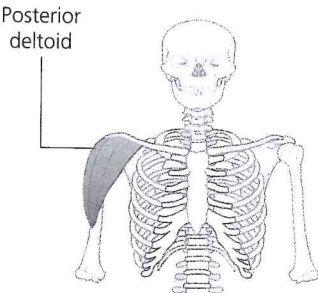
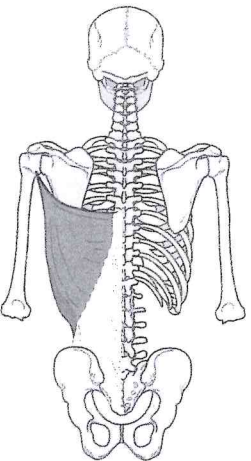
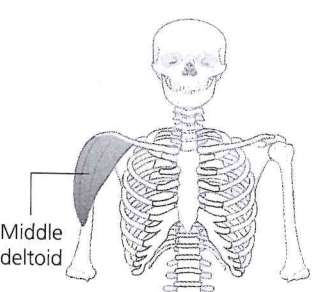
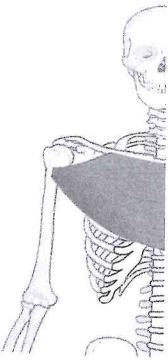
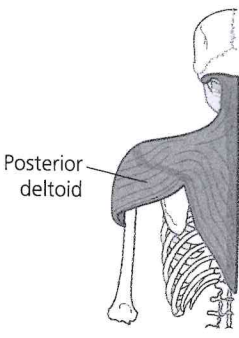
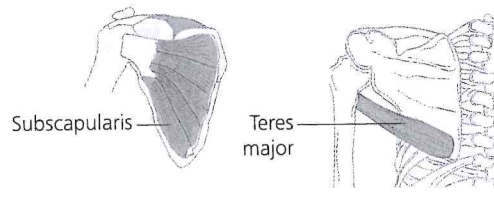
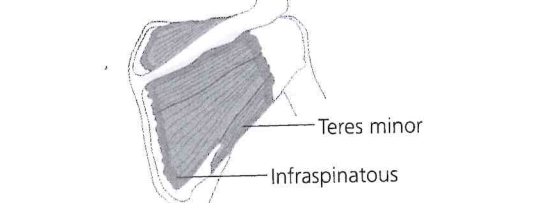



Shoulder

Joint type	Ball and socket joint	
Articulating bones	Humerus and scapula	
Movement	Sagittal plane	
	Flexion	Extension
Agonist muscles	Anterior deltoid 	Posterior deltoid 
Movement	Frontal plane	
	Adduction	Abduction
Agonist muscles	Latissimus dorsi 	Middle deltoid 
Movement	Transverse plane	
	Horizontal flexion	Horizontal extension
Agonist muscles	Pectoralis major 	Posterior deltoid and teres minor 

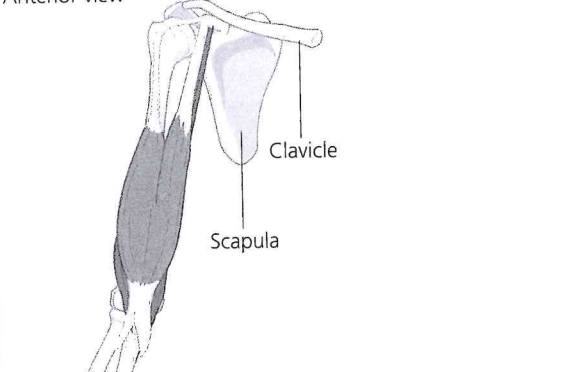
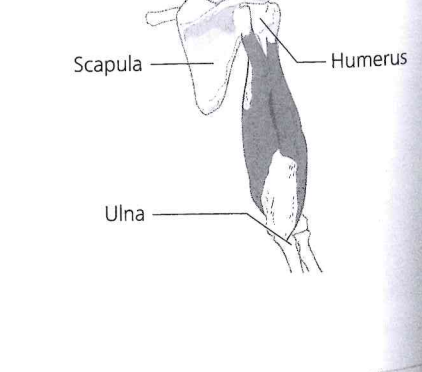
Movement	Transverse plane	
Agonist muscles	Medial rotation	Lateral rotation
	Teres major and subscapularis (anterior view) 	Teres minor and infraspinatus (posterior view) 
Practical application	 <p data-bbox="726 515 1516 616">To mobilise the shoulder joint as part of a warm-up, you may use star jumps. In the outward phase of a star jump, the agonist, the middle deltoid, concentrically contracts to abduct the shoulder joint.</p>	

▲ Figure 1.1.17 The shoulder joint in detail

Study hint

Circumduction can also occur at the shoulder joint – a movement characterised by shoulder circles and arm swings. This is a combination of flexion, extension, abduction, adduction and rotation.

Elbow

Joint type	Hinge joint	
Articulating bones	Humerus, radius and ulna	
Movement	Sagittal plane	
Agonist muscles	Flexion	Extension
	Biceps brachii Anterior view 	Triceps brachii Posterior view 

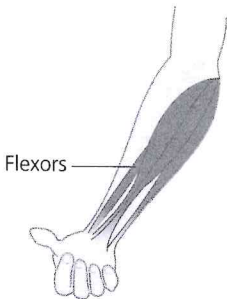
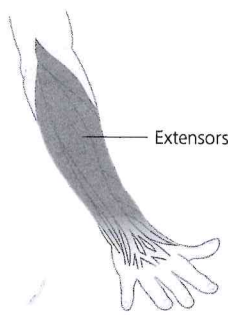
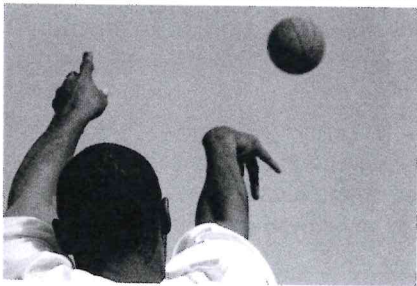
Practical application



The elbow joint is essential for creating power in a netball shot. In the preparation phase, the biceps brachii will concentrically contract to flex the elbow, lowering the ball. In the execution phase, the triceps brachii concentrically contracts to extend the elbow joint through a large range of motion to generate a large force to apply to the ball.

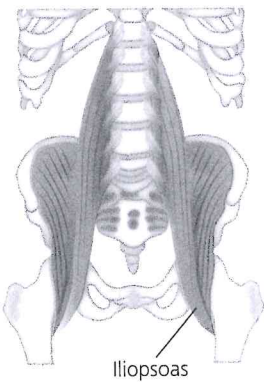
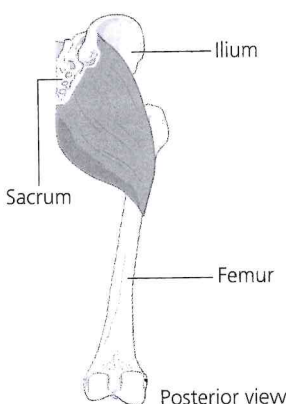
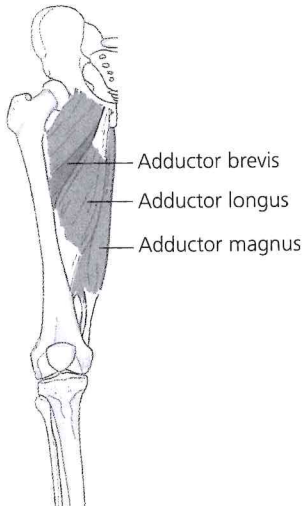
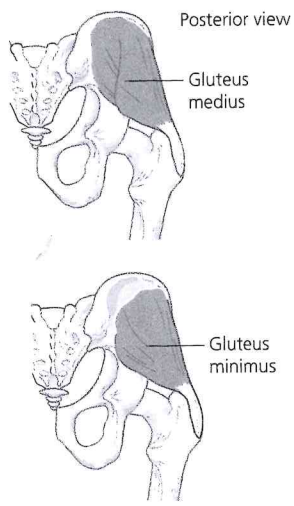

▲ Figure 1.1.18 The elbow joint in detail

Wrist

Joint type	Condyloid joint	
Articulating bones	Radius, ulna and carpals	
Movement	Sagittal plane	
	Flexion	Extension
Agonist muscles	Wrist flexors 	Wrist extensors 
Practical application	 <p>Basketball players concentrically contract the agonist, the wrist flexors, to flex the wrist as the ball is released in a jump shot. This enables backspin to be put on the ball, causing the ball to 'pop up' from the back board rather than roll off.</p>	

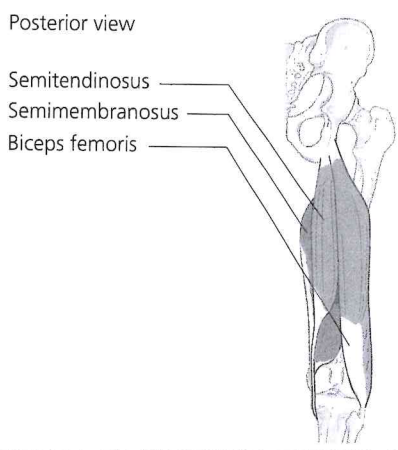
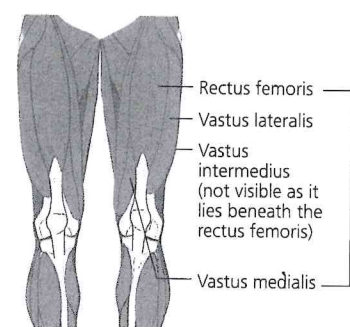

▲ Figure 1.1.19 The wrist joint in detail

Hip

Joint type	Ball and socket joint	
Articulating bones	Pelvic girdle and femur	
Movement	Sagittal plane	
	Flexion	Extension
Agonist muscles	Iliopsoas 	Gluteus maximus 
Movement	Frontal plane	
	Adduction	Abduction
Agonist muscles	Adductor longus, adductor brevis and adductor magnus 	Gluteus medius and gluteus minimus 
Movement	Transverse plane	
	Medial rotation	Lateral rotation
Agonist muscles	Gluteus medius and gluteus minimus	Gluteus maximus
Practical application	 <p>When Olympic weightlifting in the upward phase, the agonist, the gluteus maximus, will concentrically contract to create hip extension while the antagonist, the iliopsoas, co-ordinates the action.</p>	

▲ Figure 1.1.16 The hip joint in detail

Knee

Joint type	Hinge joint
Articulating bones	Femur and tibia
Movement	Sagittal plane
Agonist muscles	<div> <p>Flexion</p> <p>Biceps femoris, semitendinosus and semimembranosus (hamstring group)</p> <p>Posterior view</p>  <p>Semitendinosus Semimembranosus Biceps femoris</p> </div> <div> <p>Extension</p> <p>Rectus femoris, vastus lateralis, vastus intermedius and vastus medialis (quadriceps group)</p>  <p>Rectus femoris Vastus lateralis Vastus intermedius (not visible as it lies beneath the rectus femoris) Vastus medialis</p> <p>Quadriceps group</p> </div>
Practical application	 <p>The knee joint is essential for creating power in a penalty shot in football. Concentrically contracting the biceps femoris flexes the knee joint in the preparation phase. Concentrically contracting the rectus femoris extends the knee joint in the execution phase through a large range of motion to generate a large force to apply to the football.</p>

▲ Figure 1.1.15 The knee joint in detail

Study hint

The quadriceps and hamstring muscle groups are not enough to secure marks in an exam. Learn all of the muscles in each group, although a specific example of one muscle in each group may be enough to gain marks, such as the rectus femoris (quadriceps group) and biceps femoris (hamstring group).

Ankle

Joint type Hinge joint

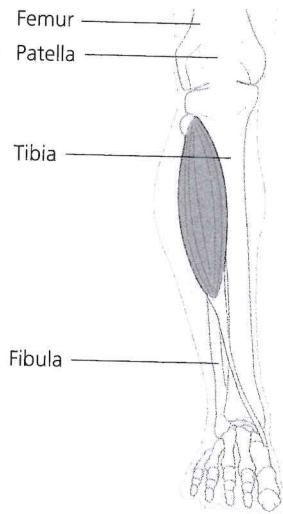
Articulating bones Tibia, fibula and talus

Movement

Agonist muscles

Dorsi-flexion

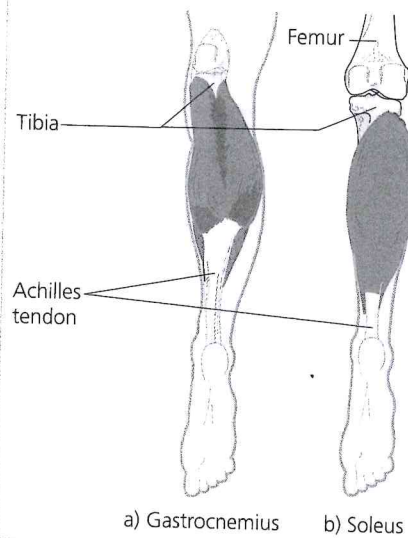
Tibialis anterior



Sagittal plane

Plantar flexion

Gastrocnemius and soleus



a) Gastrocnemius

b) Soleus

Practical application



Contemporary dancers use their feet for shaping bodily movements. Concentrically contracting the gastrocnemius and soleus to plantar flex the ankle joint creates a fully extended finish to the leg in a split leap or rising to the toes to go on pointe.

▲ Figure 1.1.14 The ankle joint in detail

Activity

Fill in the blanks of the following paragraph:
When performing calf raises, an athlete uses the ankle joint. This is a _____ joint. The articulating bones are the _____, _____ and _____. In the upward phase, the movement is _____. The agonist for this action is the _____ and _____. These muscles shorten in length to create the movement. This is known as a _____ contraction.

Study hint

Remember the agonist muscle swaps role to the antagonist for the opposing movement. For example, the agonist for dorsi-flexion is the tibialis anterior, which acts as the antagonist for plantar flexion. The gastrocnemius and soleus is the agonist for plantar flexion but swaps to the antagonist for dorsi-flexion.

	Agonist	Antagonist
Dorsi-flexion	Tibialis anterior	Gastrocnemius and soleus
Plantar flexion	Gastrocnemius and soleus	Tibialis anterior