

Movements of bones occur at joints. Terms of movement are therefore applicable to joints, not bones (e.g., flexing bones tends to break them!). Ranges of motion are limited by the bony architecture of a joint, related ligaments, and the muscles crossing that joint. Specific directions of movement can be clearly delineated, and ranges of motion measured, by reference to the anatomical position.

**Extension** of a joint generally means straightening it. In the anatomical position, most joints are in relaxed extension (neutral). In relation to the anatomical position, movements of extension are directed in the sagittal plane. Extreme, even abnormal extension is called *hyperextension*. At the ankle and wrist joints, extension is termed **dorsiflexion**.

**Flexion** of a joint is to bend it or decrease the angle between the bones of the joint. Movements of flexion are in the sagittal plane. At the ankle joint, flexion is also called **plantar flexion**.

**Adduction** of a joint moves a bone toward the midline of the body (or, in the case of the fingers or toes, toward the midline of the hand or foot). In relation to the anatomical position, movements of adduction are directed in the coronal plane.

**Abduction** of a joint moves a bone away from the midline of the body (or hand or foot). Movements of abduction are directed in the coronal plane.

**Circumduction** is a circular movement, permitted at ball and socket, condylar, and saddle joints. Circumduction is characterized by flexion, abduction, extension, and adduction of the joint done in sequence.

**Rotation** of a joint is to turn the moving bone about its axis. Rotation of a limb toward the body is *internal* or *medial rotation*; rotation of the limb away from the body is *external* or *lateral rotation*.

**Supination** is external rotation of the radiohumeral joint in which the hand and wrist are turned palm up. In the foot, supination of the subtalar (talocalcaneal) joint and the transverse tarsal joints (talonavicular and calcaneocuboid joints; see page 40) moves the sole of the foot in a medial direction.

**Pronation** is internal rotation of the radiohumeral joint in which the hand and wrist are turned palm down. In the foot, pronation of the subtalar and transverse tarsal joints rotates the foot in a lateral direction.

**Inversion** turns the sole of the foot inward, elevating its medial border, as a result of supination at the subtalar and transverse tarsal joints and adduction of the forefoot. See Glossary.

**Eversion** turns the sole of the foot outward, elevating its lateral border as a result of subtalar and transverse tarsal joint pronation and forefoot abduction.