

ANALYSISGAIT



The Main Tasks of the Gait Cycle

- **(1) Weight acceptance**
 - most demanding task in the gait cycle
 - involves the transfer of body weight onto a limb that has just finished swinging forward and has an unstable alignment.
 - Shock absorption and the maintenance of a forward body progression

- **(2) single limb support**
 - One limb must support the entire body weight
 - Same limb must provide truncal stability while bodily progression is continued.
- **(3) limb advancement**
 - Requires foot clearance from the floor
 - The limb swings through three positions as it travels to its destination in front of the body.

Normal Walking Requirements



- There are (4) major criteria essential to walking.
 - **Equilibrium**
 - the ability to assume an upright posture and maintain balance.
 - **Locomotion**
 - the ability to initiate and maintain rhythmic stepping



Walking Requirements Cont'd



– Musculoskeletal Integrity

- normal bone, joint, and muscle function

– Neurological Control,

- must receive and send messages telling the body how and when to move. (visual, vestibular, auditory, sensorimotor input)



Gait Cycle or Stride



- A single gait cycle or stride is defined:
 - Period when 1 foot contacts the ground to when that same foot contacts the ground again
 - Each stride has 2 phases:
 - Stance Phase
 - Foot in contact with the ground
 - Swing Phase
 - Foot NOT in contact with the ground



NORMAL NECK
POSITION

NORMAL SPINAL
CURVE

SLIGHT THIGH
EXTENSION

LOCKED KNEE

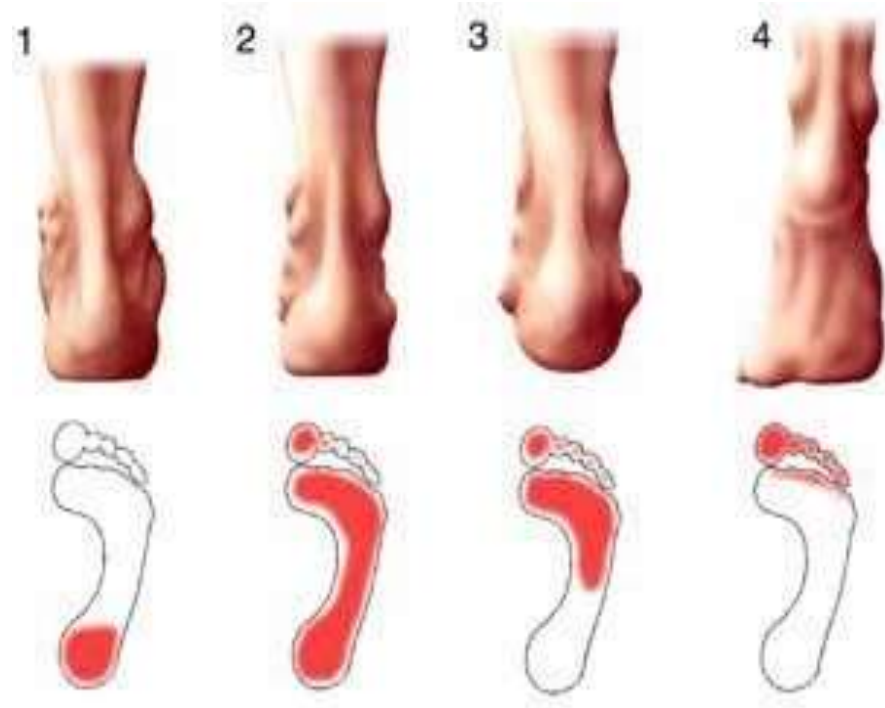
PROPULSIVE
FOOT

ACTIVE LEG
MOTION

NORMAL POSTURE/GAIT

Stance Phase of Gait

- When the foot is contact with the ground only
- Propulsion phase
- Stance phase has 5 parts:
 - Initial Contact (Heel Strike) (1)
 - Loading Response (Foot Flat) (2)
 - Midstance (2)
 - Terminal Stance (3)
 - Toe Off (Pre-Swing) (4)



(Missing Loading Response in picture)

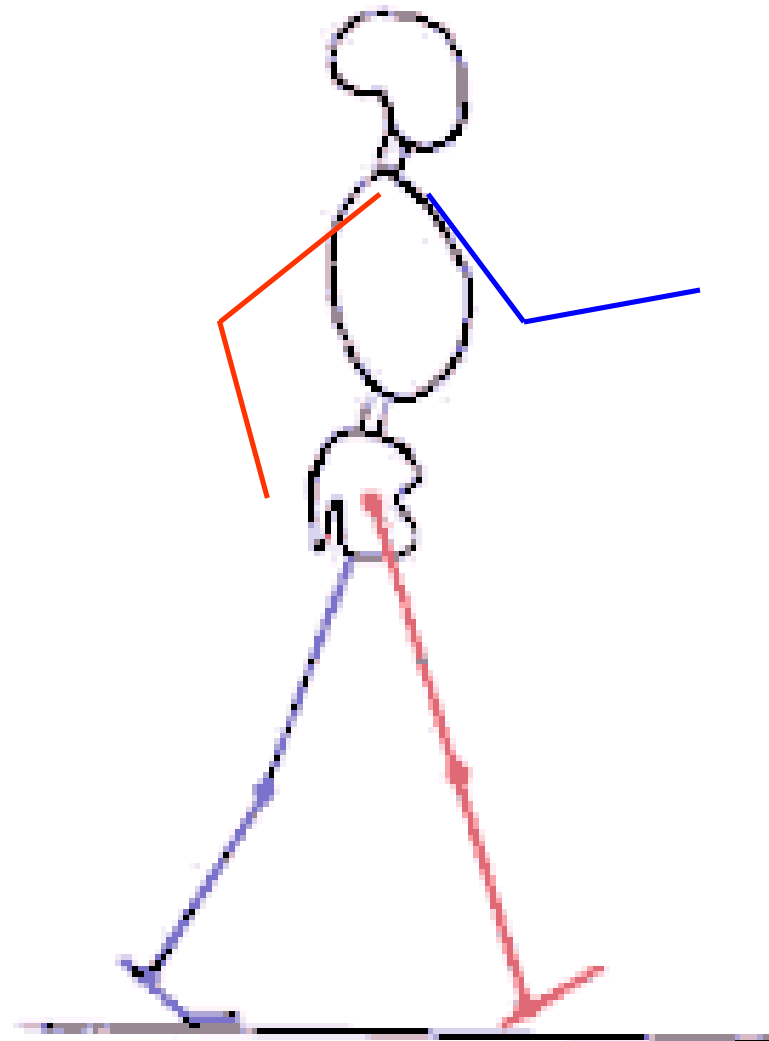
Motions during Stance Phase

- Shoulder flexes
- Pelvis rotates (transverse plane)
- Spine rotates
- Hip extends, IRs Knee **flexes**, extends
- Ankle dorsiflexes , plantarflexes Foot
- pronates, supinates
- Toes flex, extend, flex

Initial Contact

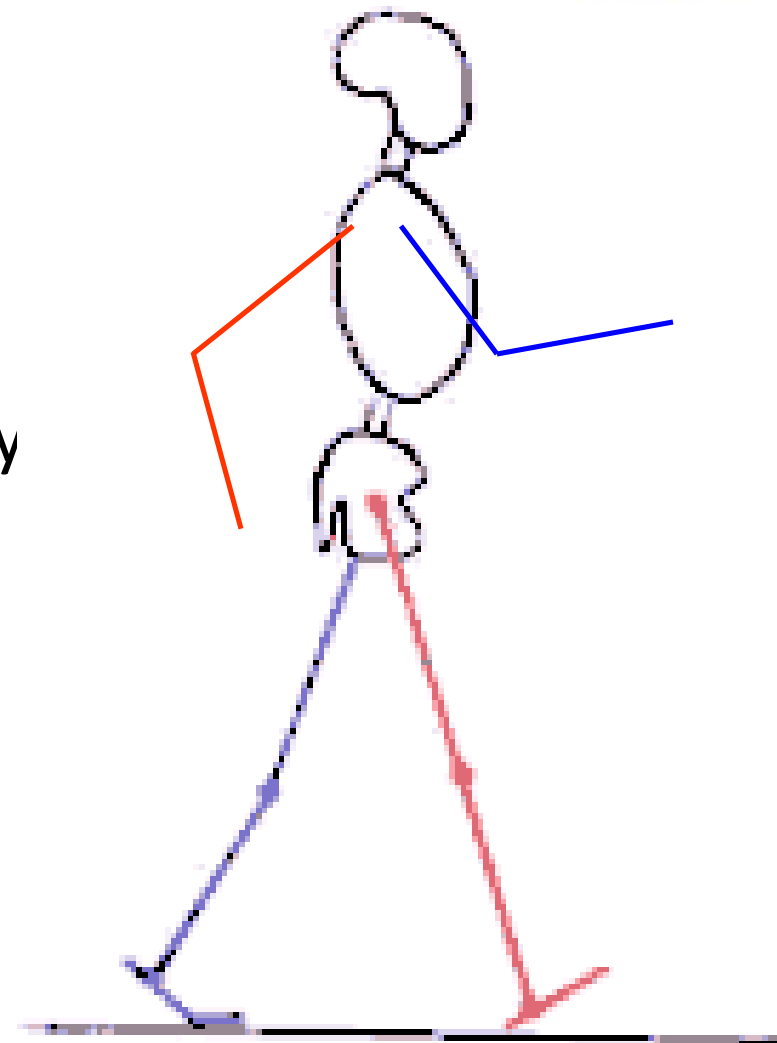
• Phase 1

- The moment when the **red** foot just touches the floor.
- The heel (calcaneus) is the first bone of the foot to touch the ground.
- Meanwhile, the blue leg is at the end of terminal stance.



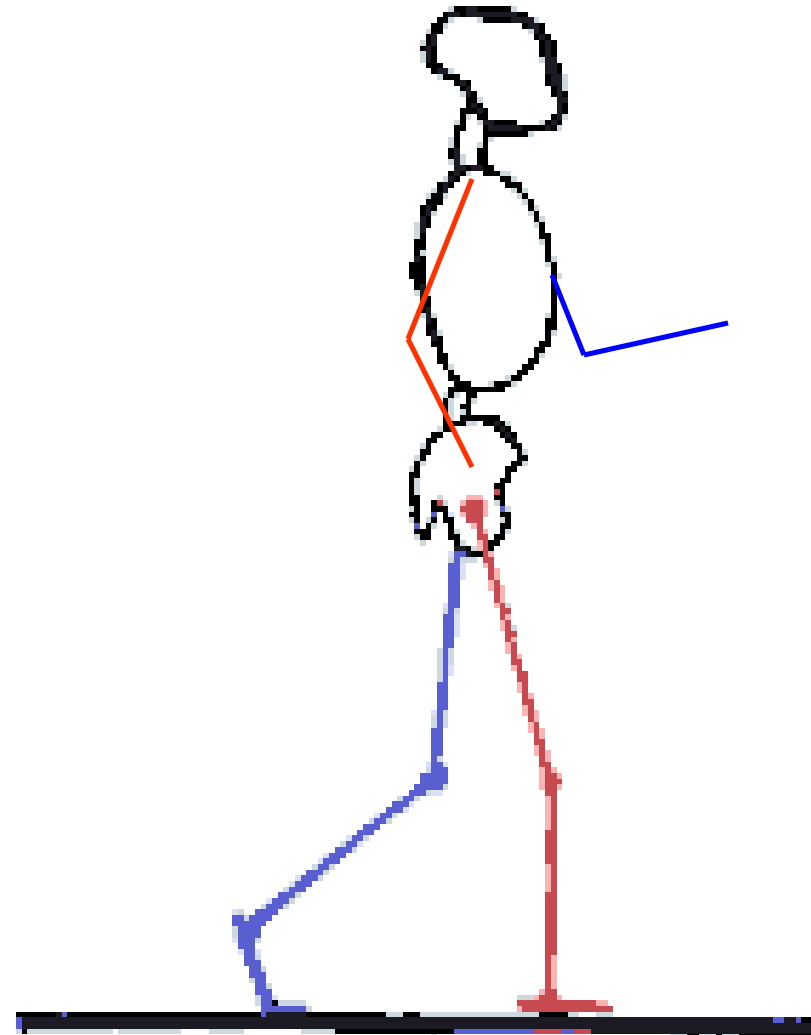
Static Positions at Initial Contact

- FREEZE FRAME POSITIONS
- Shoulder is extended
- Pelvis is rotated left
- Hip is flexed 30 and externally rotated
- Knee is fully extended
- Ankle is dorsiflexed 15
- Foot is supinated
- Toes are slightly extended



Loading Response

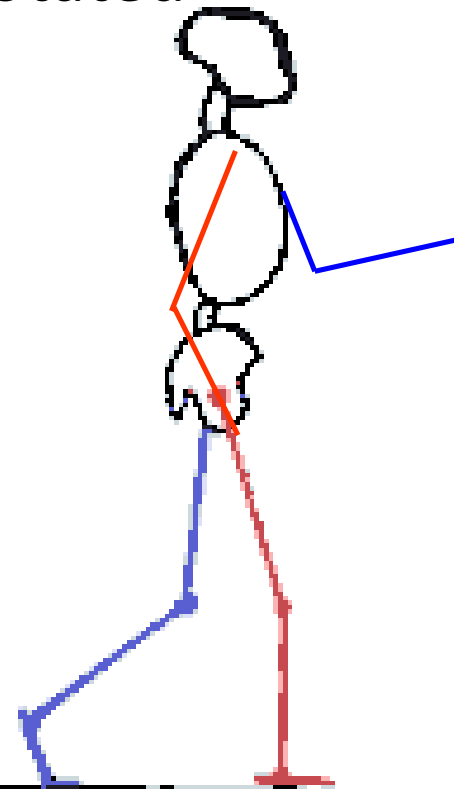
- **Phase 2**
- The double stance period beginning
- Body weight is transferred onto the **red** leg.
- Phase 2 is important for shock absorption, weight-bearing, and forward progression.
- The blue leg is in the pre-swing phase.



Static Positions at Loading Response

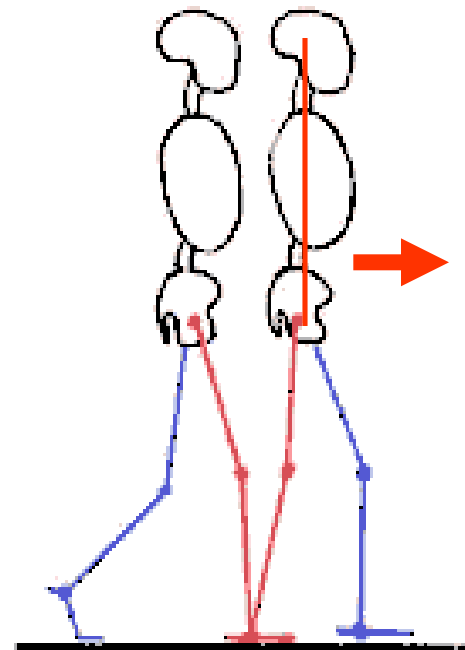


- Shoulder is slightly extended
- Pelvis is rotated left
- hip is flexed 30 and slightly externally rotated
- knee is slightly flexed 15
- ankle is plantarflexing to neutral
- foot is neutral
- Toes are neutral



Midstance

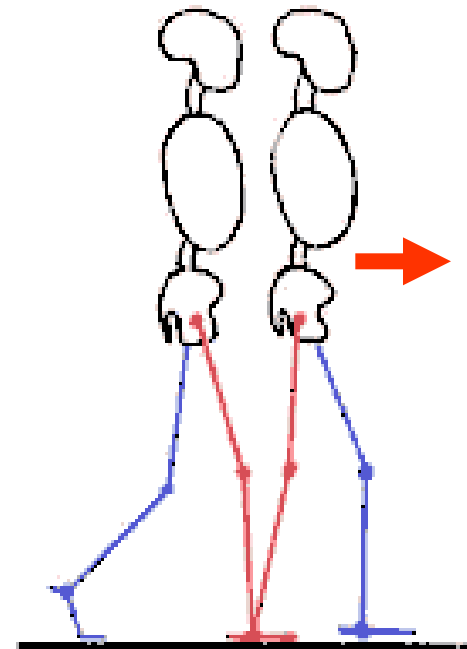
- **Phase 3**
- **single limb support** interval.
- Begins with the lifting of the blue foot and continues until body weight is aligned over the **red** (supporting) foot.
- The red leg advances over the red foot. The blue leg is in its mid-swing phase.



Static Positions at Midstance

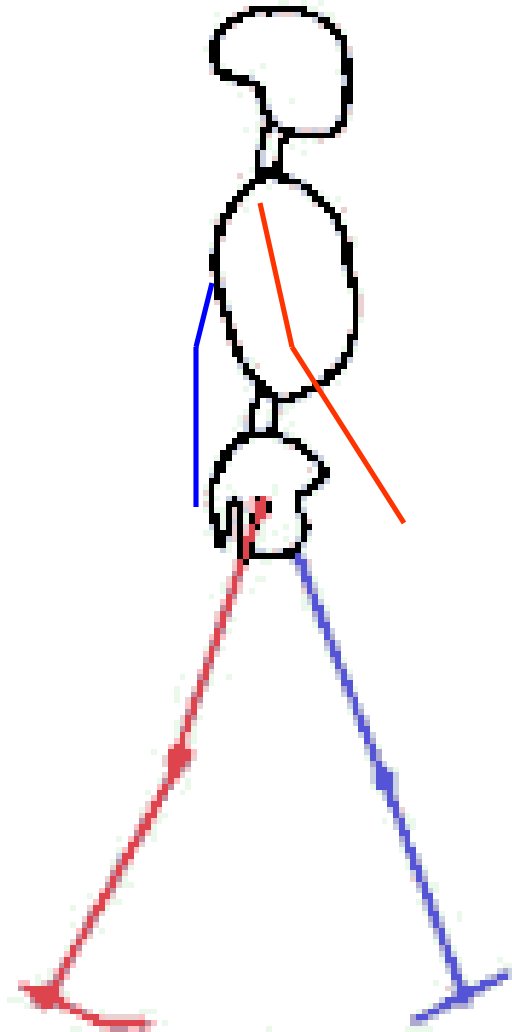


- Shoulder is in neutral
- Pelvis is in neutral rotation
- Hip is in neutral
- Knee is fully extended
- Ankle is relatively neutral
- Foot is pronated
- Toes are neutral



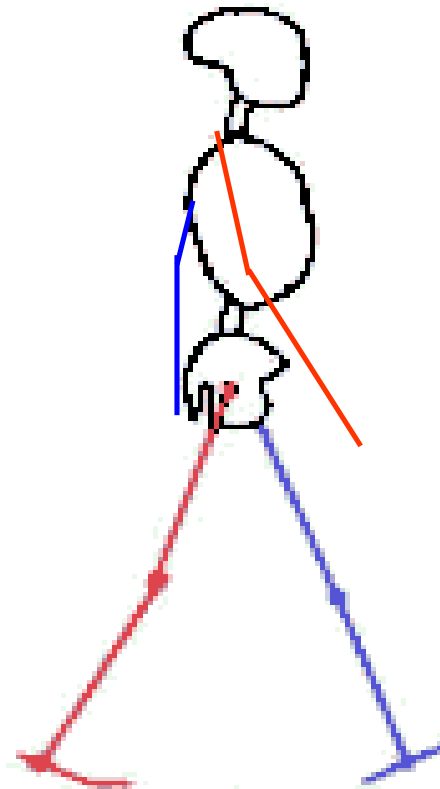
Terminal Stance

- **Phase 4**
- Begins when the **red** heel rises and continues until the heel of the blue foot hits the ground.
- Body weight progresses beyond the red foot



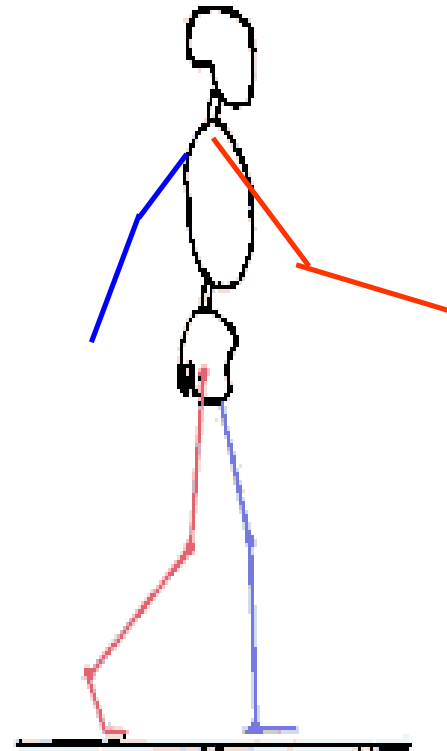
Static Positions at Terminal Stance

- Shoulder is slightly flexed
- Pelvis is rotated left
- Hip is extended and internally rotated
- Knee is fully extended
- Ankle is dorsiflexed
- Foot is slightly supinated
- Toes are neutral



Toe-Off

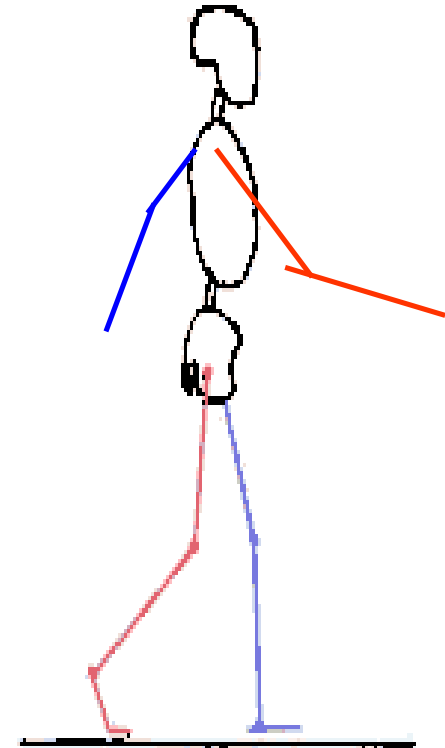
- **Phase 5**
- The second double stance interval in the gait cycle.
- Begins with the initial contact of the blue foot and ends with **red** toe-off.
- Transfer of body weight from ipsilateral to opposite limb takes place.



Static Positions at Toe-Off



- Shoulder is flexed
- Pelvis is rotated right
- Hip is fully extended and internally rotated
- Knee is fully extended
- Ankle is plantarflexed
- Foot is fully supinated
- Toes are fully extended



Stance Phase Characteristics

- During a single stride, there are 2 periods of double limb support (both feet on ground):
 - Loading response (right) & Toe Off (left)
 - Loading response (left) & Toe Off (right)

Swing Phase

- When foot is NOT contacting the ground, it is swinging!
- Limb advancement phase
- 3 parts of swing phase:
 - Initial swing
 - Midswing
 - Terminal swing

Motions during Swing Phase

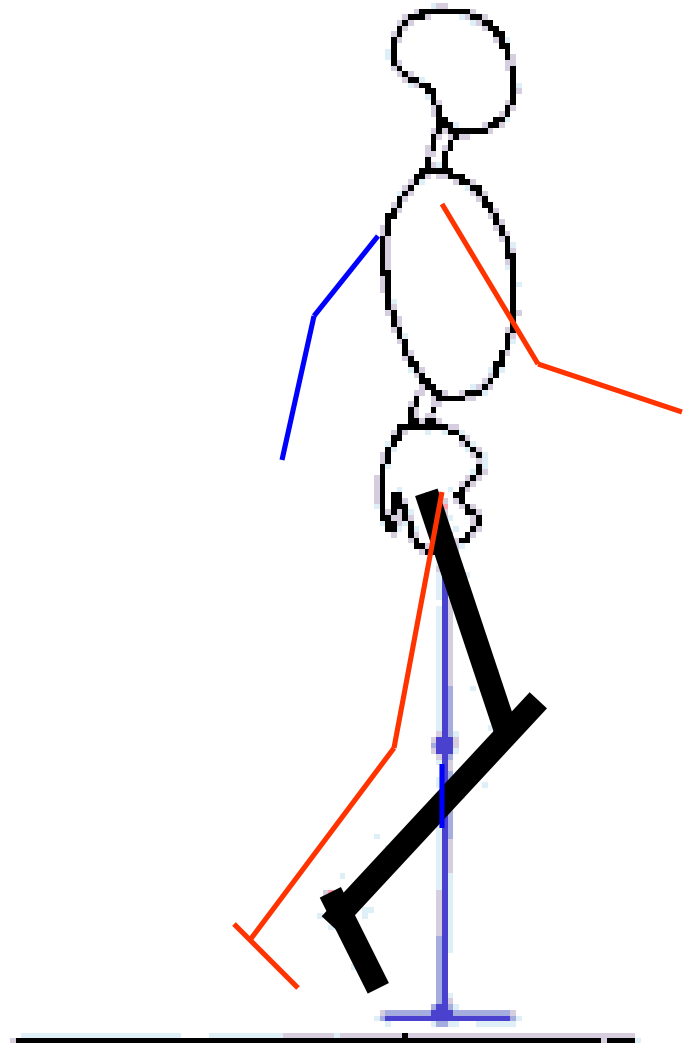


- Shoulder extends
- Spine rotates right
- Pelvis rotates left (passive)
- Hip flexes, ERs
- Knee flexes, then extends
- Ankle dorsiflexes
- Foot supination (inversion)
- Toes extend



Initial Swing

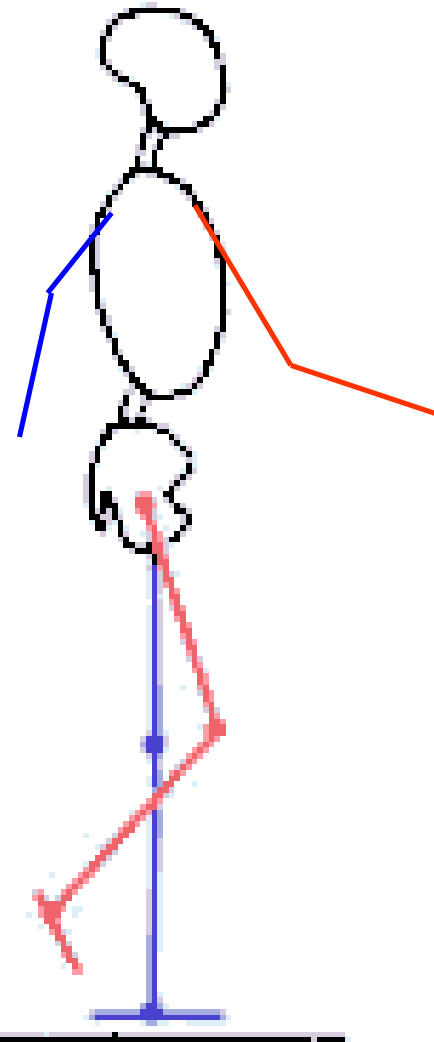
- **Phase 6**
- Begins when the red foot is lifted from the floor and ends when the red swinging foot is opposite the blue stance foot.
- It is during this phase that a footdrop gait is most apparent.
- The blue leg is in mid-stance.



Static Positions at Initial Swing

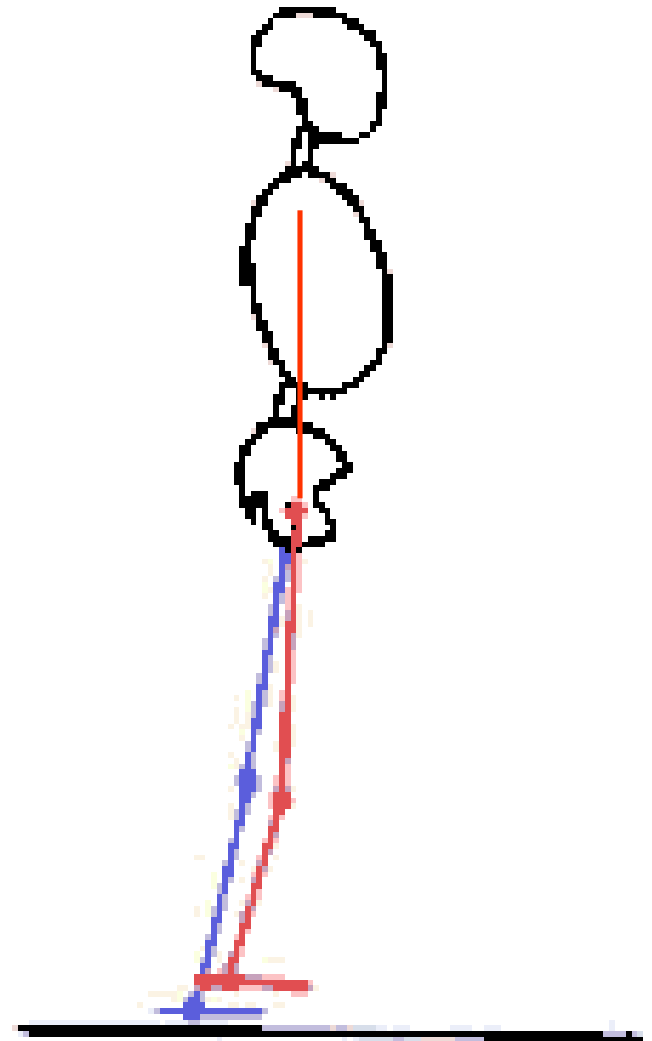


Shoulder is flexed
Spine is rotated left
Pelvis is rotated right
hip is slightly extended
and internally rotated
Knee is slightly flexed
Ankle is fully plantarflexed
Foot is supinated
Toes are slightly flexed



Midswing

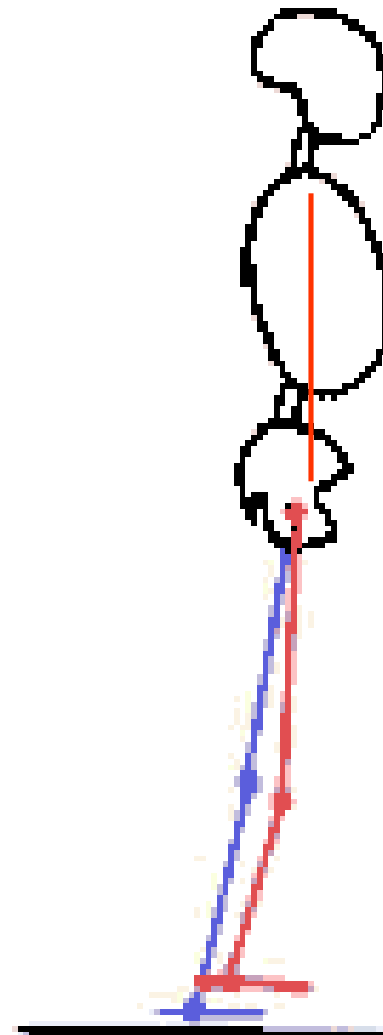
- **Phase 7**
- Starts at the end of the initial swing and continues until the red swinging limb is in front of the body
- Advancement of the red leg
- The blue leg is in late mid-stance.



Static Positions at Midswing

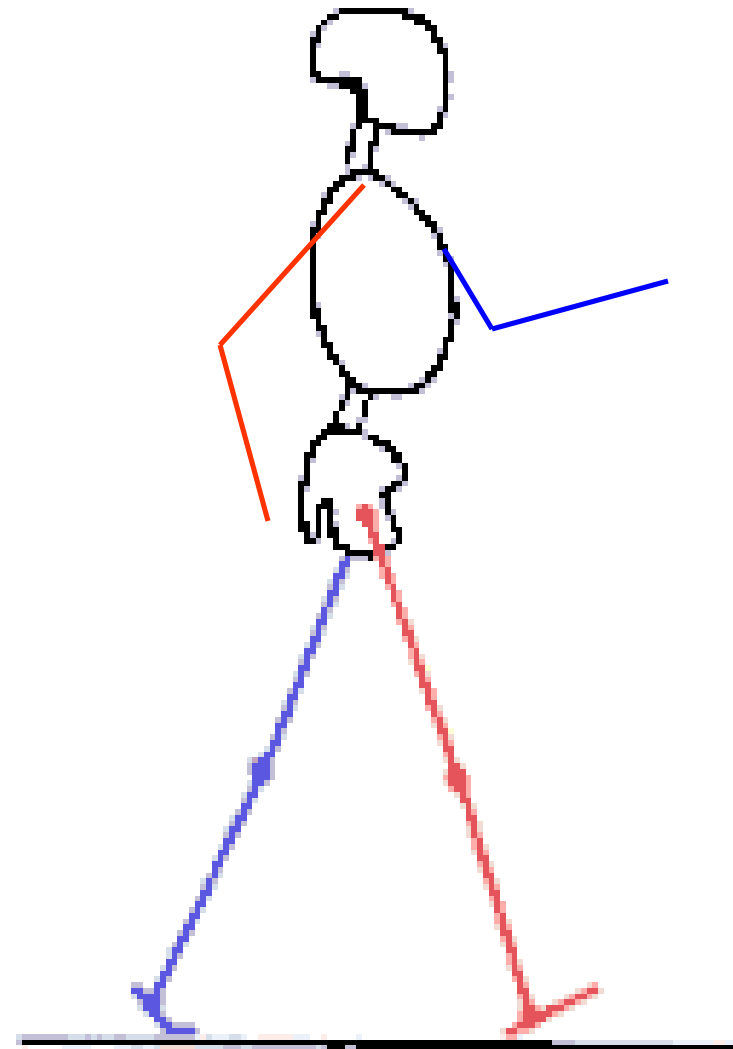


- Shoulder is neutral
- Spine is neutral
- Pelvis is neutral
- Hip is neutral
- Knee is flexed
- Ankle is plantarflexed to neutral
- Foot is neutral
- Toes are slightly extended



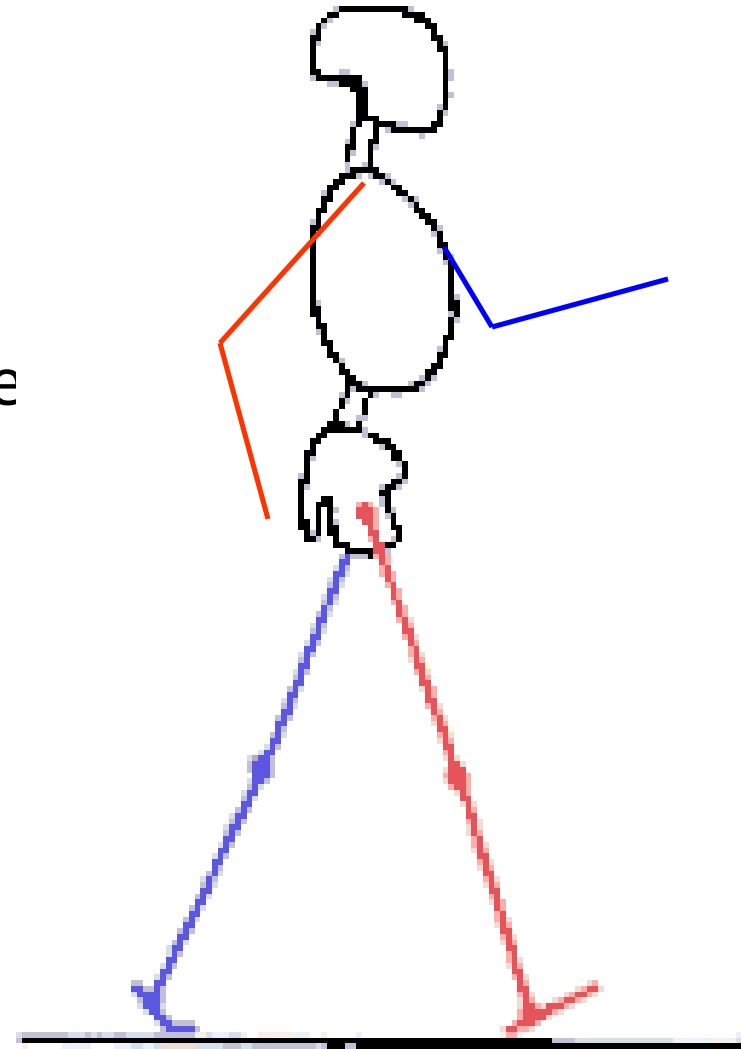
Terminal Swing

- **Phase 8**
- Begins at the end of midswing and ends when the foot touches the floor.
- Limb advancement is completed at the end of this phase.



Static Positions at Terminal Swing

- Shoulder is extended
- Spine is rotated right
- Pelvis is rotated left
- Hip is flexed and externally rotate
- Knee is fully extended
- Ankle is fully dorsiflexed
- Foot is neutral
- Toes are slightly extended





Thank You

