

WALKING AIDS

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AMBULATION WITH ASSISTIVE DEVICES

- Allows some patients who cannot ambulate without an assistive device to ambulate safely



PURPOSE OF WALKING AIDS

- Increase area of support or base of support
- Maintain centre of gravity over supported area
- Redistribute weight-bearing area by decreasing force on injured or inflamed part or limb
- Can be compensate for weak muscles
- Decrease pain
- Improve balance

PREREQUISITES FOR CRUTCHES

- Good strength of upper limb muscles is required.
 - Range of motion of upper limb should be good.
 - Muscle group which should be strong is given below.
- ✓ Shoulder flexor, extensors and depressor
 - ✓ Shoulder adductors
 - ✓ Elbow and wrist extensors
 - ✓ Finger flexors

INDICATIONS FOR AMBULATORY ASSISTIVE DEVICES

- Structural deformity, amputation, injury, or disease resulting in decreased ability to Weight Bearing through Lower Extremity
- Muscle weakness or paralysis of the trunk or Lower Extremity
- Inadequate balance



AMBULATORY ASSISTIVE DEVICE SELECTION

•Dependent upon:

- ✓ Amount of support assistive device offers
- ✓ Coordination required
- ✓ Patients strength, ROM, balance, stability, general condition, and Weight Bearing restrictions



WEIGHT BEARING

- Amount of weight that may be borne on a Lower Extremity during standing or ambulation
- This patient obviously did not learn how to use their crutch in physical therapy. It's on the wrong side and much too tall for him!





- Determined by patient's condition and medical management of that condition
- Changes in weight bearing status are determined by the patient's **physician!**

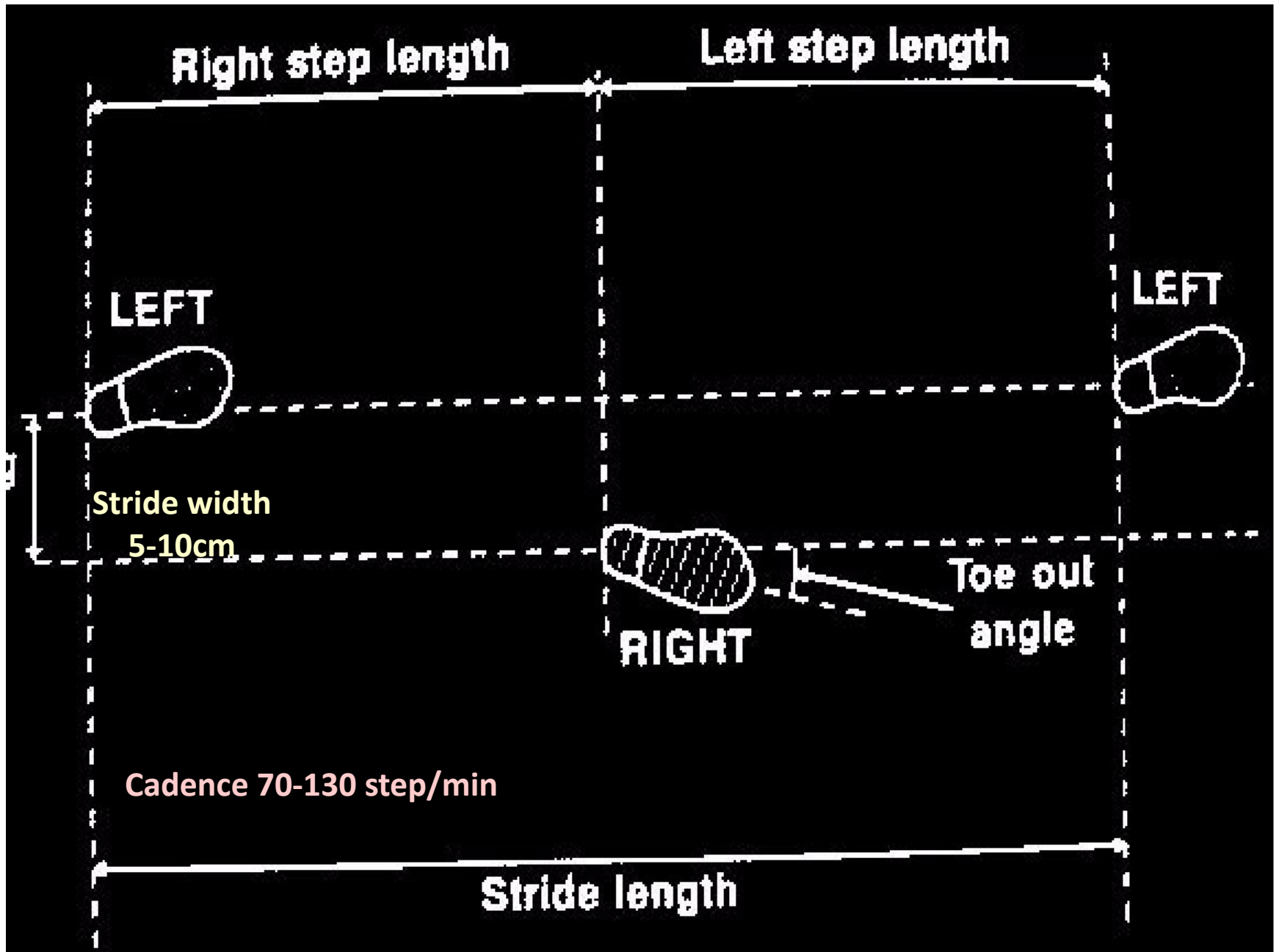


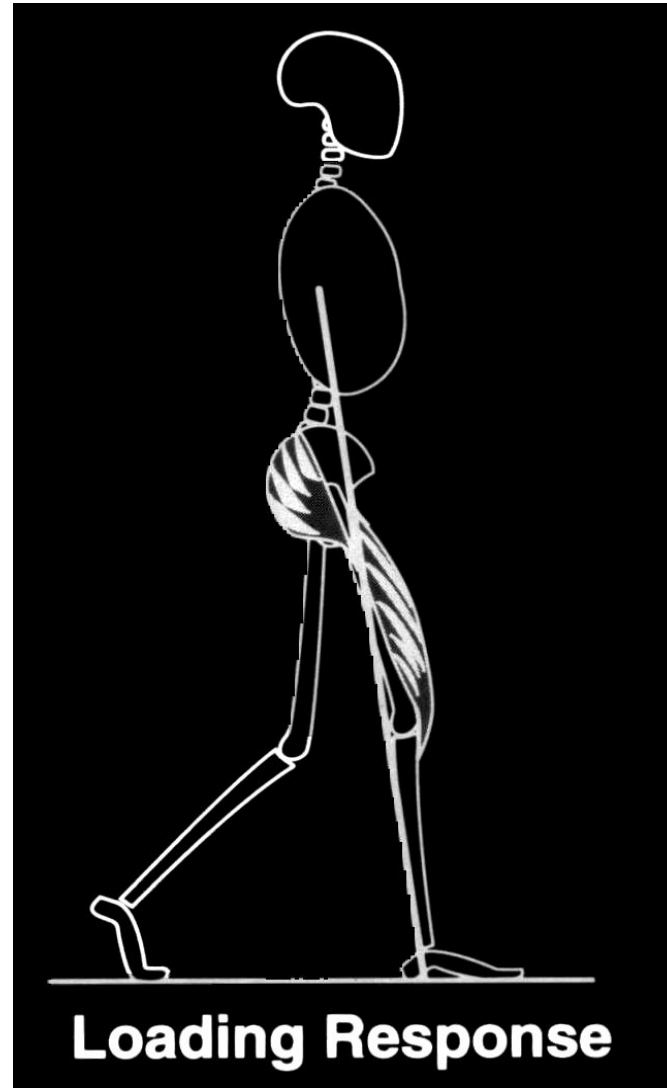
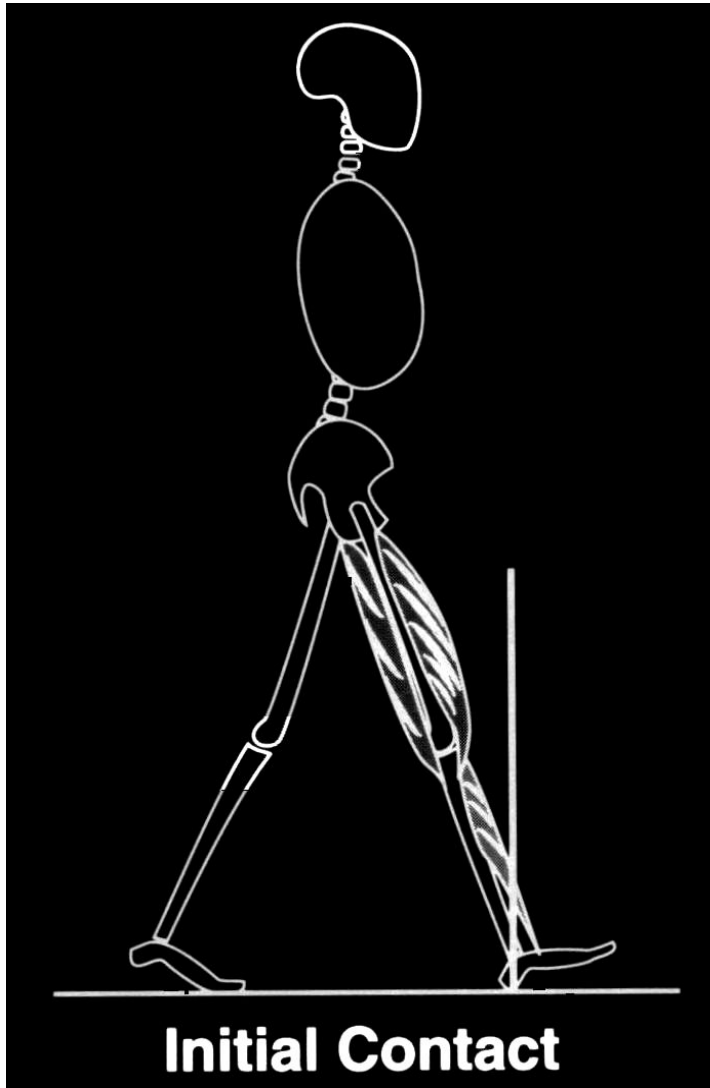
TYPES OF WEIGHT BEARING

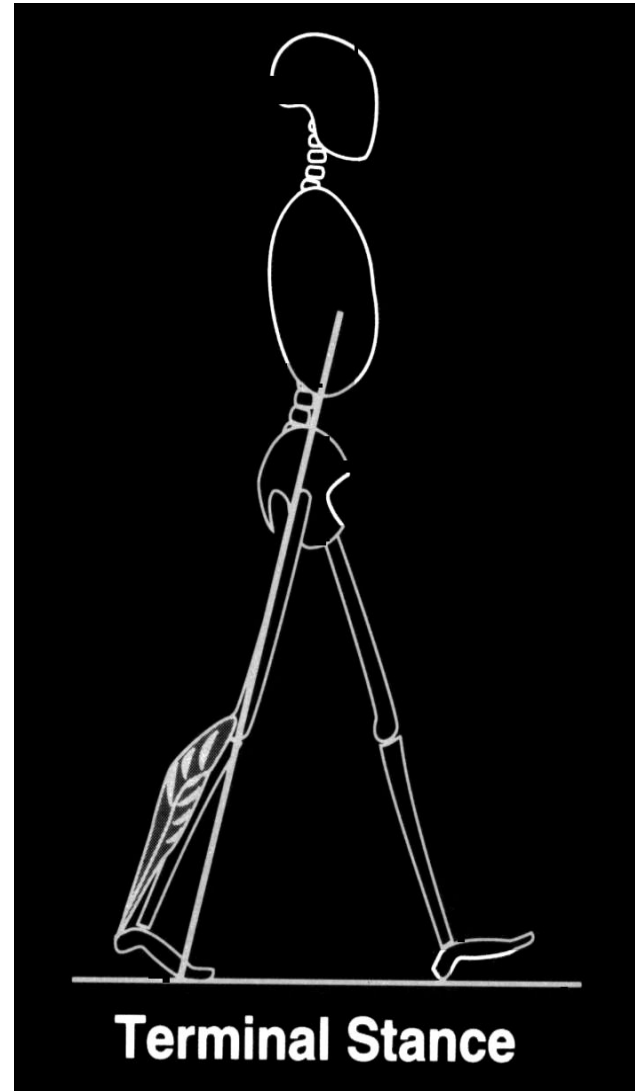
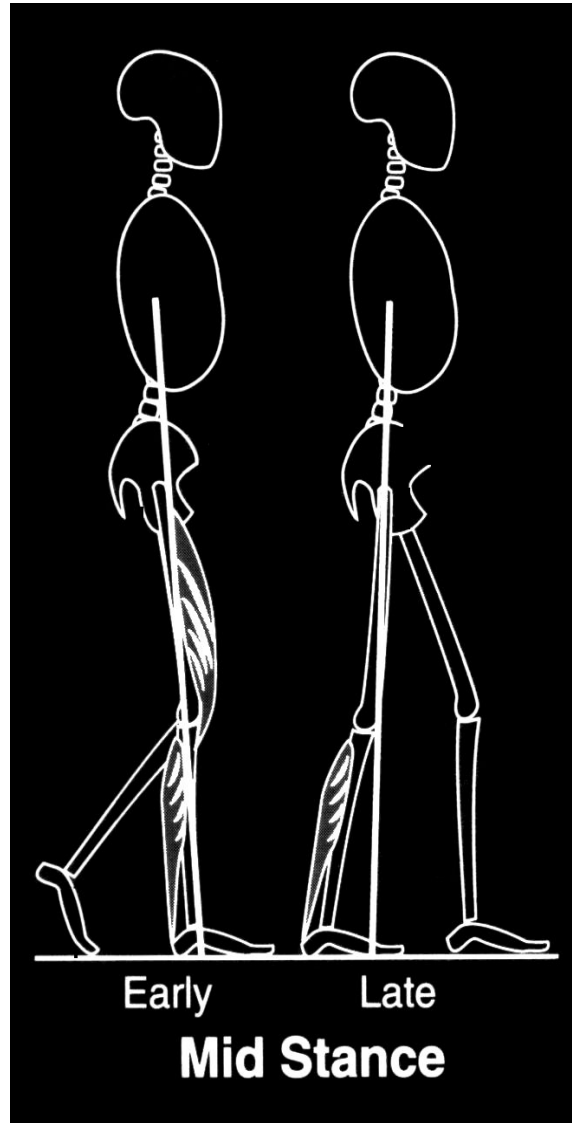
- **Non weight bearing (NWB).** involved Lower Extremity not to be Weight Bearing or touching floor.
- **Toe touch weight bearing (TTWB, TDWB),** Patient can rest toes on the floor for balance, but not Weight Bearing.

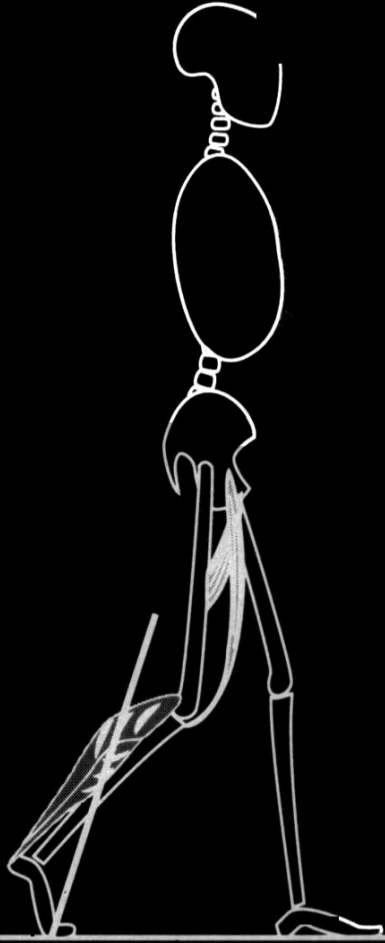
- **Partial weight bearing** (25% PWB = 25% of patient's total body weight is allowed to be transmitted through the involved Lower extremity
- **Weight bearing as tolerated (WBAT)**, patient allowed to place as much or as little weight through the involved Lower extremity, depending on pt. tolerance.
- **Full weight bearing (FWB)**, permitted full weight bearing through involved extremity







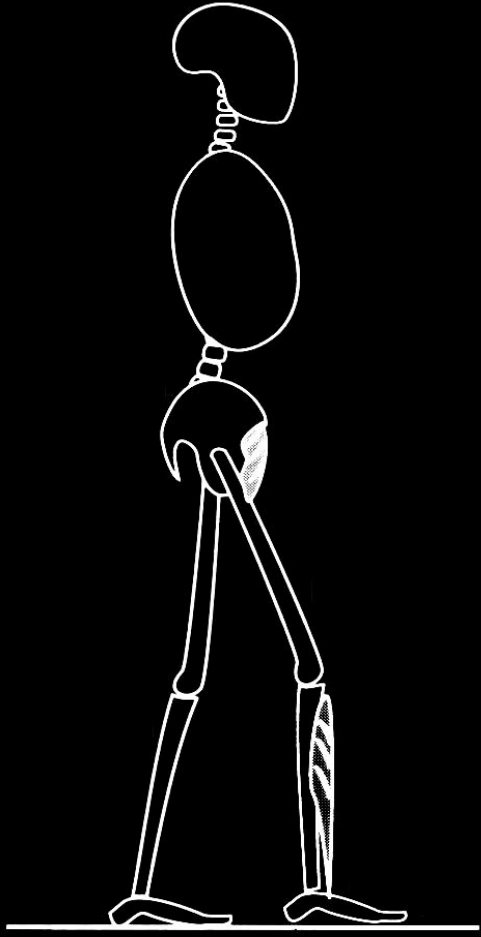




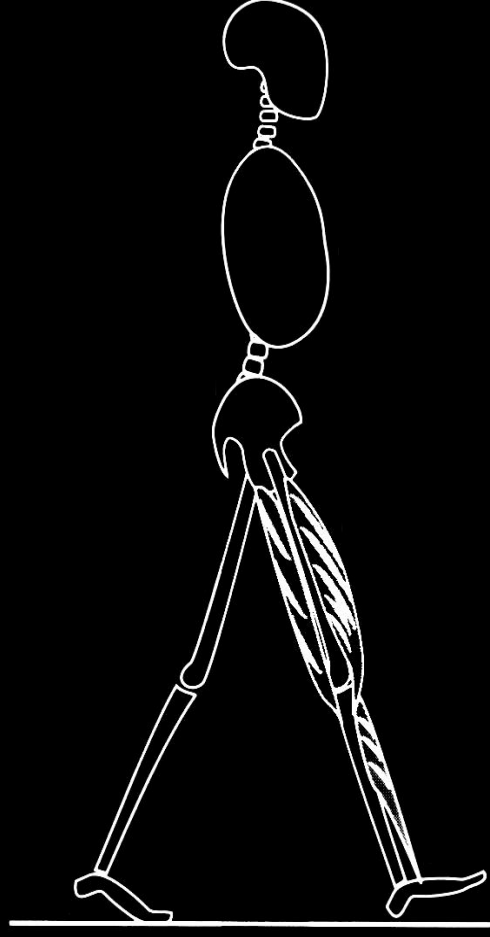
Pre-Swing



Initial Swing



Mid Swing



Terminal Swing

CRUTCHES



□ The main difference between cane and crutches is that a crutch is able to transmit significant forces in the horizontal plane.

□ Body weight transmission with bilateral axillary crutches = 80% of Body Weight, non-axillary crutches = 40-50% of BW

□ Good strength of upper limbs usually required – more weight bearing and propulsion

□ Unilateral non/partial weight bearing e.g. fracture, amputee -> 3-point gait

□ Bilateral partial weight bearing or incoordination/ataxia -> 2 or 4-point gait

□ Bilateral weakness of lower extremities e.g. paraplegia -> swing-to or through gait.



AXILLARY CRUTCHES

- The Axillary pad should rest beneath the apex of axilla and hand grip in slight flexion when weight is not being taken
- When weight is being taken through axillary pad,
- the elbow will go into extension and weight is transmitted down the arm to hand piece
- Compressive radial neuropathies



MEASUREMENTS:

- There are variety of ways it may be in lying and also in standing position.

☐ In Lying it may be with shoes off and with shoes on

1. With shoes off: measure from apex of axilla to the lower margin of medial malleolus
2. With shoes on: 5cm/2 inches vertically down from apex of axilla to a point 20 cm lateral to the heel of shoe.

☐ In standing with shoe off and shoe on method is same.

- 2 inches below the axilla to the 2 inches anterior and 6 inch lateral to the foot in standing position.

NON-AXILLARY CRUTCHES

- Elbow crutch/ Lofstrand /forearm crutches
- Forearm support crutches/gutter crutches/
- platform crutch



Axillary crutch



Lofstrand crutch



Elbow extension (Canadian) crutch



Elbow /LOFSTRAND/FOREARM CRUTCHES

- Single aluminum tubular adjustable shaft, handpiece, forearm piece 2 inches below elbow, forearm cuff anterior opening (hinge)
- Elbow flexion 20 degree
- Can release hand without losing crutch
- Forearm cuff allows patients to use hands without dropping the crutch
- Requires great skill, good strength of Upper Extremity, trunk balance
- Slightly more difficult to use than axillary crutches, but provide more ease of movement
- These crutches are suitable for patients with good balance and coordination with strong arms. Weight is transmitted exactly the same way as for axillary crutches.



Forearm support crutches/gutter crutches/ platform crutch

- They are made of metal with a padded forearm support Platform, Velcro strap an adjustable hand piece and a rubber
- Painful wrist and hand condition or elbow contractures, or weak hand grip
- Platform, velcro strap
- Elbow flexed 90 degrees
- The hand rests on a grip which can be angled appropriately, depending on the user's disability.



GAIT PATTERNS

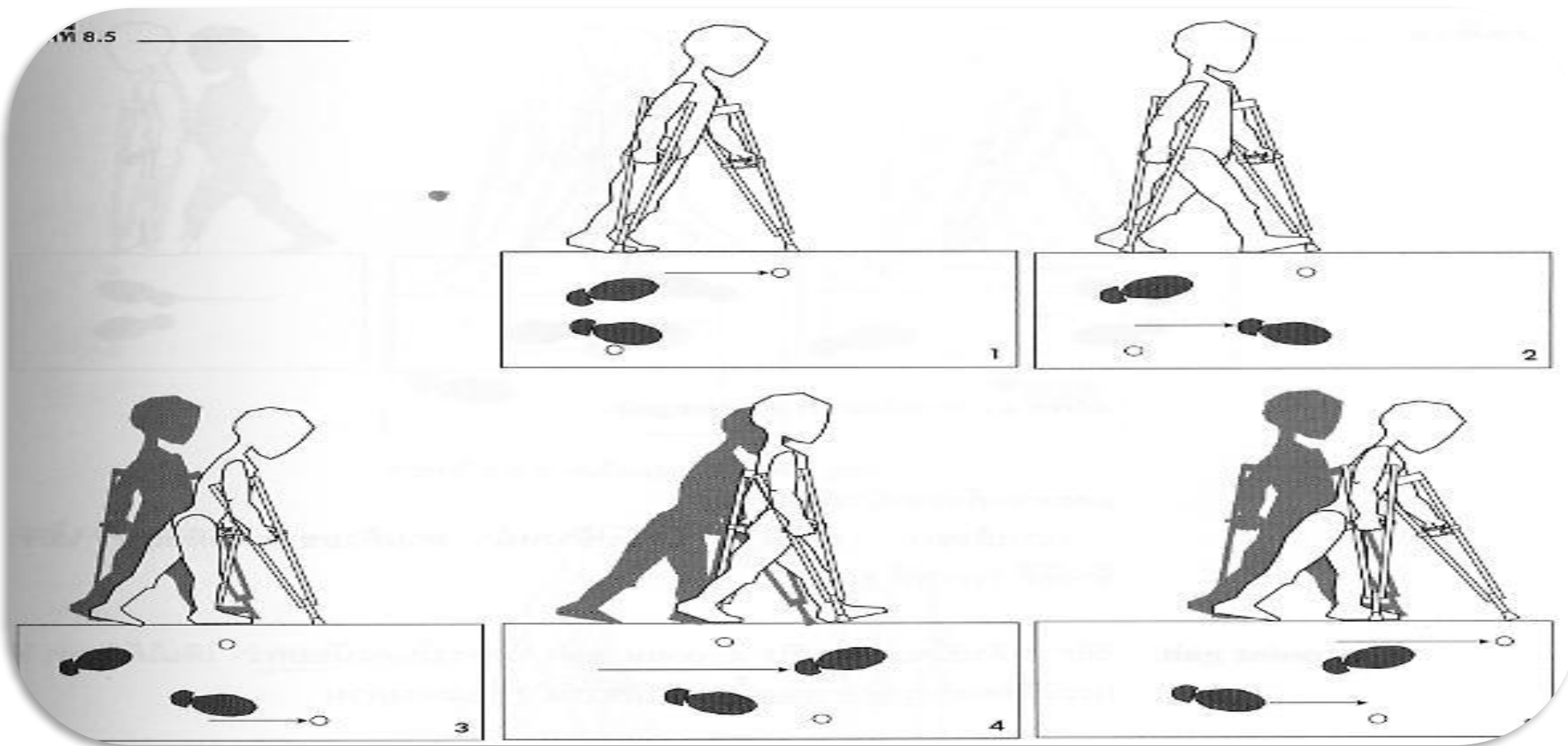
- 4 POINT PATTERN
- 2 POINT PATTERN
- 3 POINT PATTERN



FOUR-POINT GAIT

- Bilateral assistive devices
- Slow gait speed
- Provides maximum stability for patient - at least 3 point contact ground
- Low energy required by patient
- Pattern: advance right crutch, then left foot, left crutch, right foot
- Ataxia or incoordination

□ It is only appropriate when both legs are able to support part of the body weight. Subject who have only minor stability problems may use two canes,



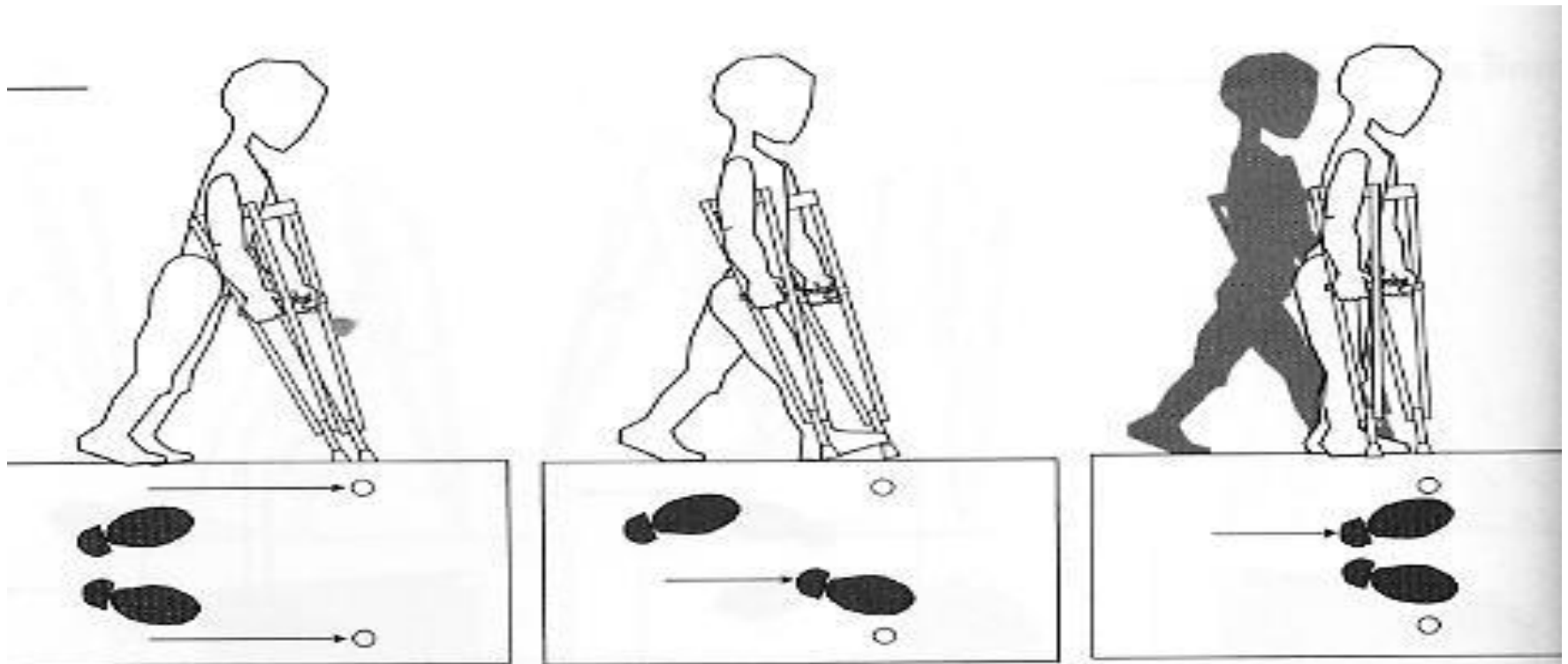
THREE-POINT GAIT/ALTERNATING TWO-POINT GAIT

- Non-weight-bearing gait for lower limb fracture or amputation
- 3-point Partial Weight Bearing gait > required 18-36% more energy per unit distance than normal
- Non-Weight Bearing required 41-61% more energy per unit distance than normal.
- Used when patient has one Full Weight Bearing and one Non-Weight Bearing Lower Extremity.
- Two crutches or a walker(no canes)
- Most rapid gait speed

□ Provides the least amount of stability for the patient

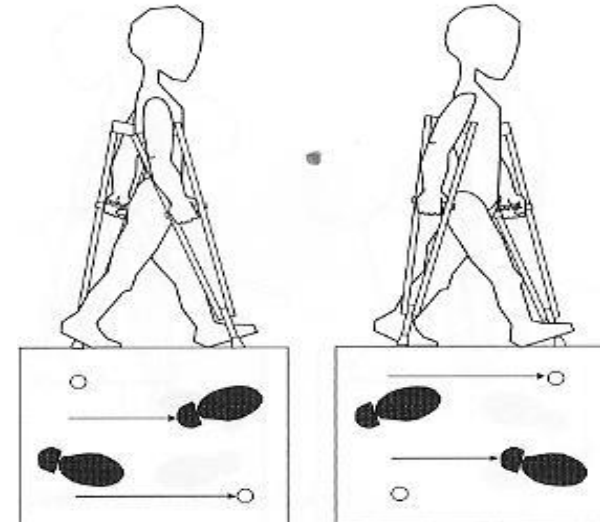
□ High energy required by patient

□ Pattern: advance walker/crutches & Non-Weight Bearing Lower Extremity first, followed by Full Weight Bearing Lower Extremity in a step through or step to pattern



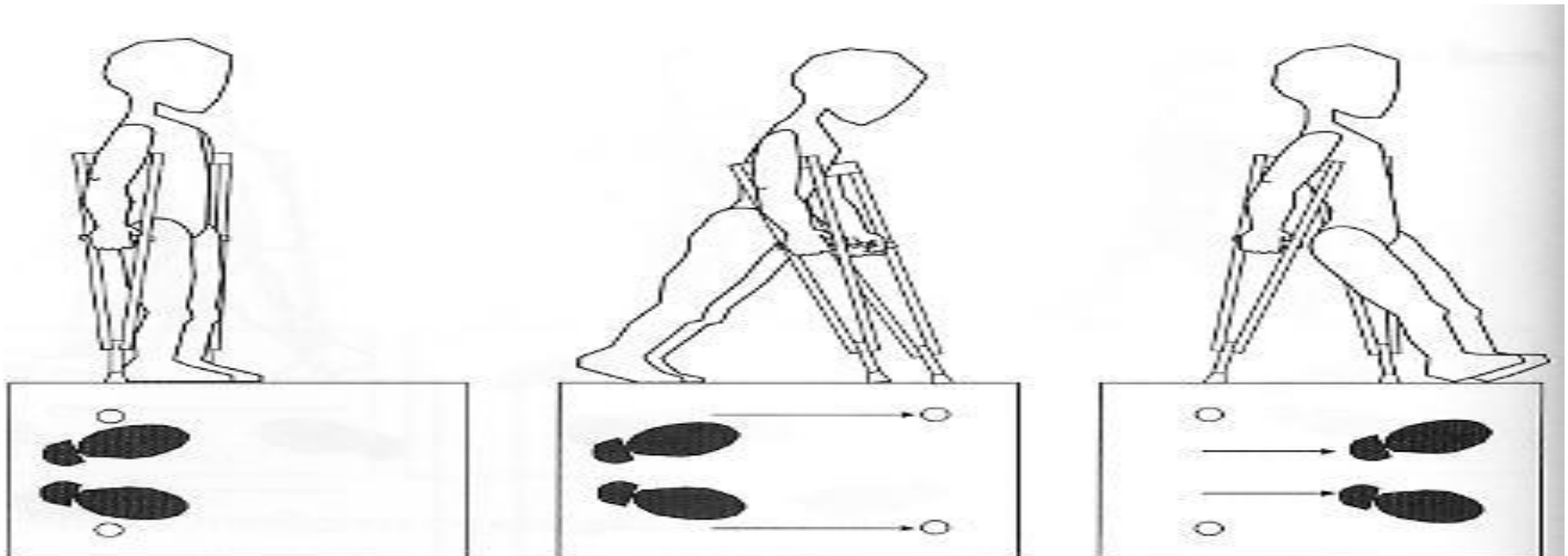
TWO-POINT GAIT

- Bilateral assistive devices
- Gait speed is faster than 4 point
- Provides good stability for patient, but less than the 4 point pattern
- Low energy required by patient
- Pattern: advance right crutch & left foot together, then advance the left crutch & right foot together
- Faster than 4-point gait but less stability
- Decrease both lower limbs weight-bearing



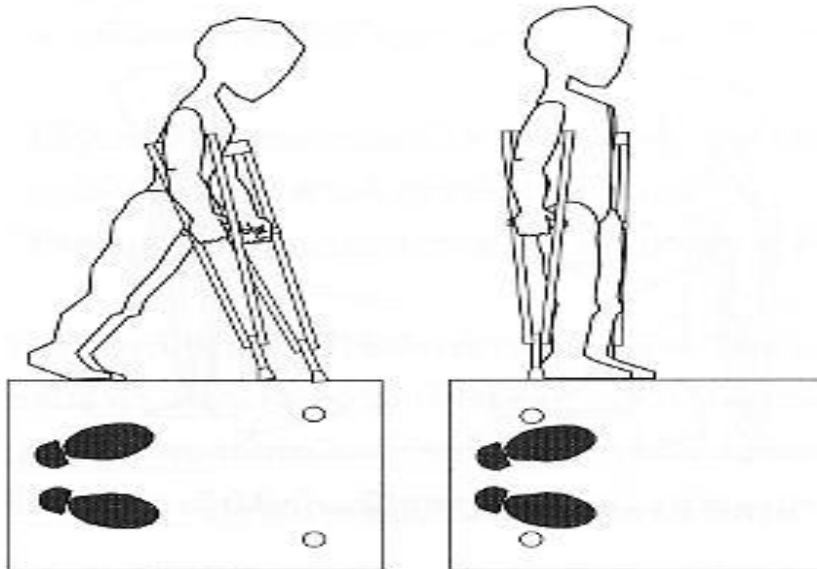
SWING-THROUGH GAIT

- it is used when it is impossible to support the body weight on one leg. Three-point gait involves support of the body weight by the two crutches while the leg or legs are moving forwards, and by the legs while the crutches are moved.
- Fastest gait, requires functional abdominal muscles
- Required increase of 41-61% in net energy cost (= 3-point NWB)



SWING-TO GAIT

- This gait pattern is similar to three-point swing-through gait, except that feet are advanced by a much shorter distance, being placed on the ground behind the level of the crutches.
- Both crutches -> both lower limbs almost to crutch level





CANES

- Body weight transmission for unilateral cane opposite affected side is 20-25%
- Gluteus medius weakness, or pathological at knee or ankle
- Cane eliminate necessary gluteus medius force and reduces compressional force on hip.
- By means of which force can be transmitted to the ground through the wrist and hand. Canes can be used for three purposes

A-TO IMPROVE STABILITY:

This is achieved by increasing the size of the area of support. If more stability is required two canes may be used.

B-TO GENERATE A MOMENT:

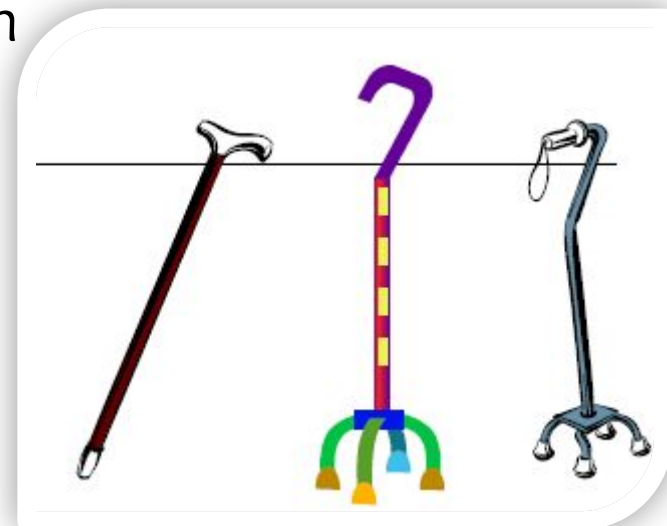
If the cane used on the opposed side of the affected leg, a vertical force is applied through the cane, which generates a counterclockwise moment applied to the shoulder girdle and hence to the pelvis. This reduces the size of the moment, which the hip abductor muscles generate to keep the pelvis level.

C-TO TAKE PART OF THE LOAD AWAY FROM THE LEG:

If the cane used on the same side of the affected leg, and placed close to the foot. In this way, load-sharing can be achieved between the leg and the cane.

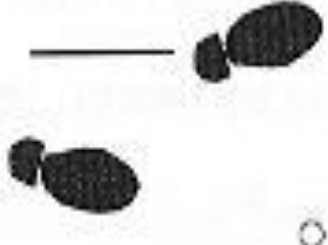
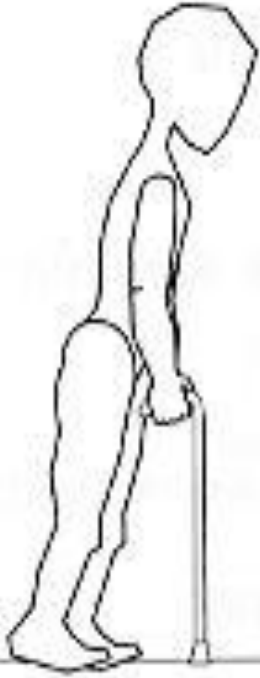
TYPES OF CANES

1. Straight cane
2. Tripod cane
3. Tetrapod cane
4. (L) shaped handle
5. (U) shaped handle
6. Angular shaped handle Adjustable in high





Measure tip of cane to level of greater trochanter,
elbow flexed 20-30 degree

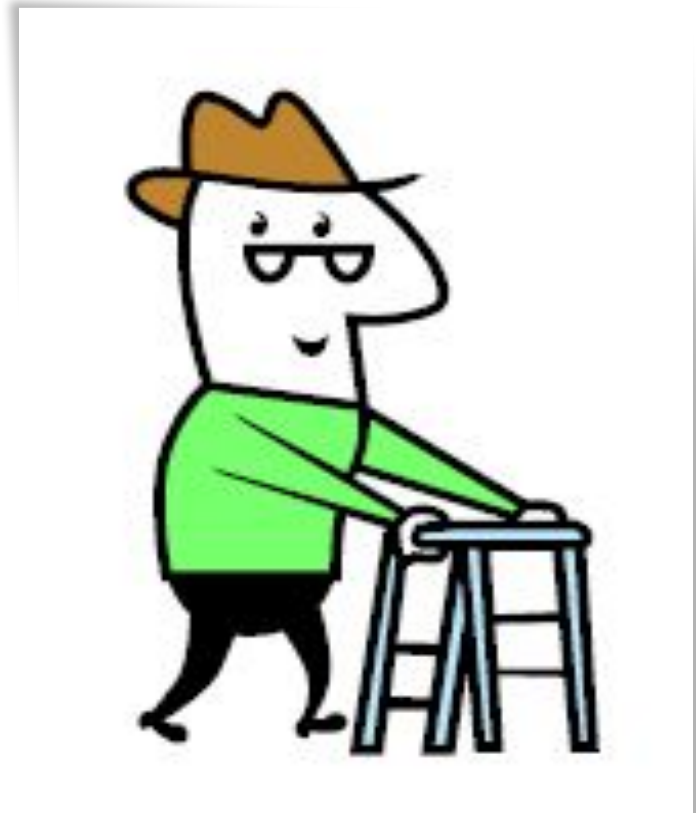




WALKER/ WALKERETTE

- Wider and more stable base of support, but slow gait (interfere smooth reciprocal gait)
- For patients requiring maximum assistance with balance, uncoordinated
- Add wheels to front legs for who lack coordination or power in upper limbs

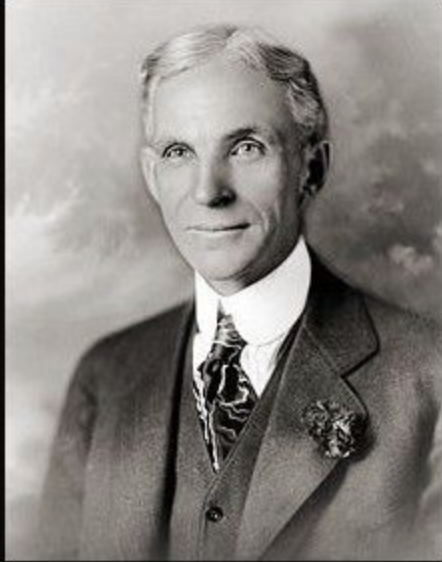
- Front of walker 12 inches in front of patient
- Shoulder relaxed and elbow flexed 20 degree
- Three-point gait



- Patients with poor balance and coordination, decreased weight bearing on 1 or 2 Lower Extremity. Used more often with elderly
- Adjustable
- Height
- Wheels
- Collapsible







Enthusiasm is the yeast that makes your hopes shine to the stars. Enthusiasm is the sparkle in your eyes, the swing in your gait. The grip of your hand, the irresistible surge of will and energy to execute your ideas.

(Henry Ford)

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THANK YOU