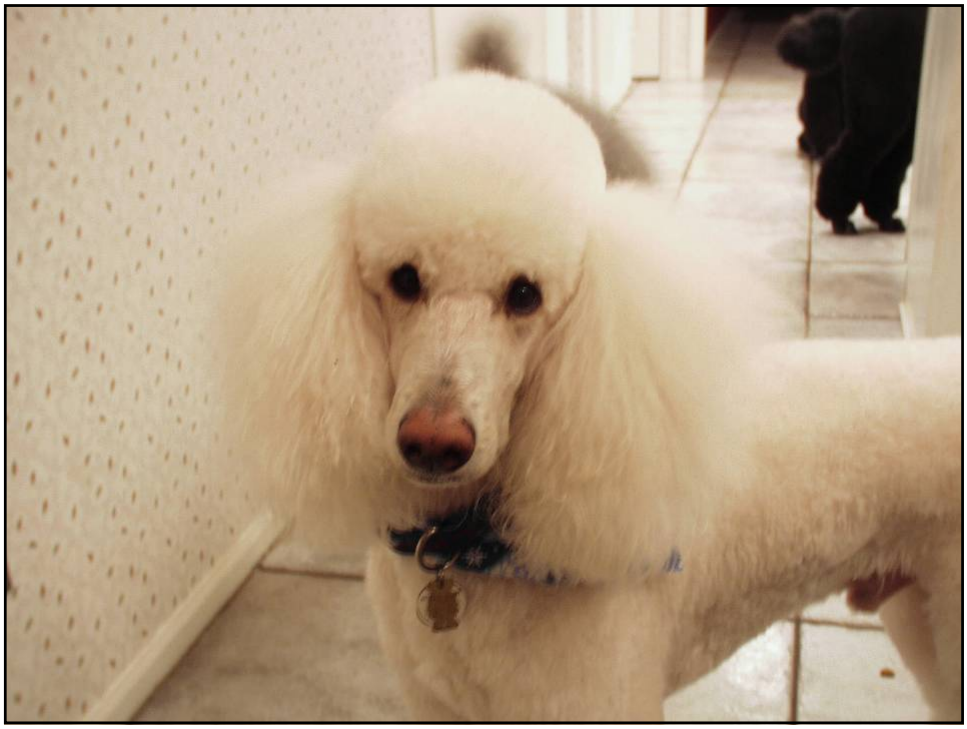
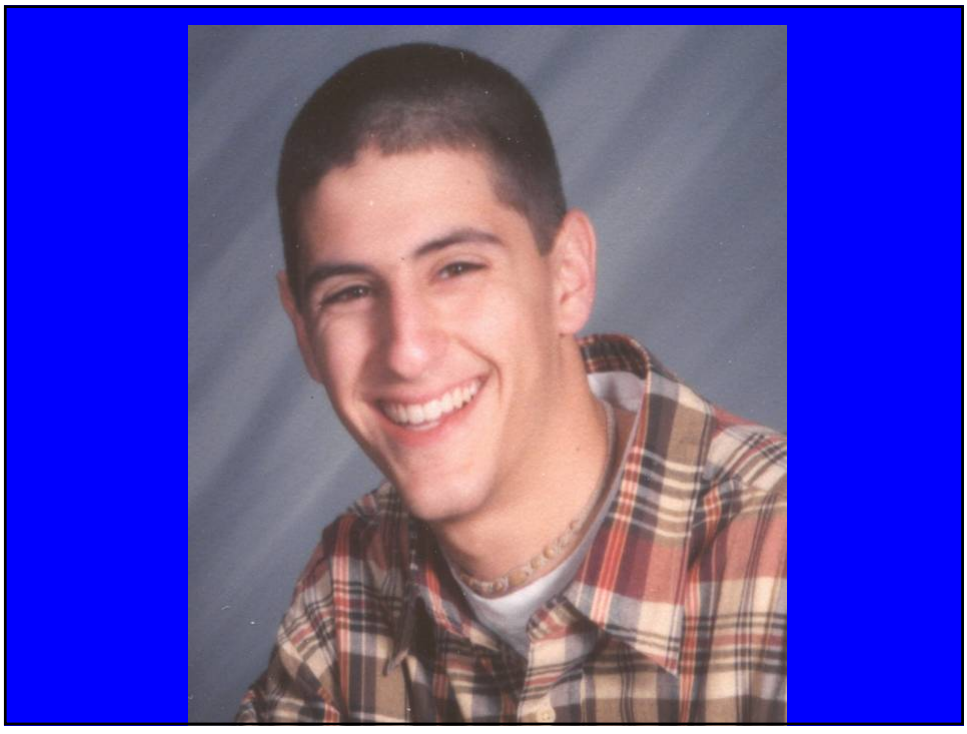


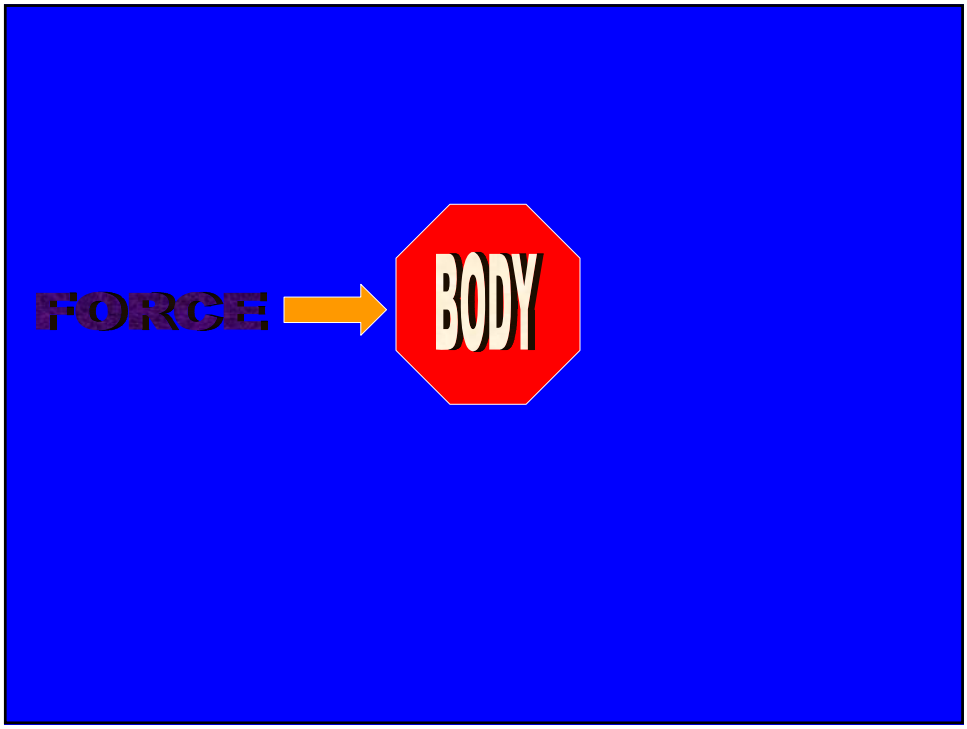


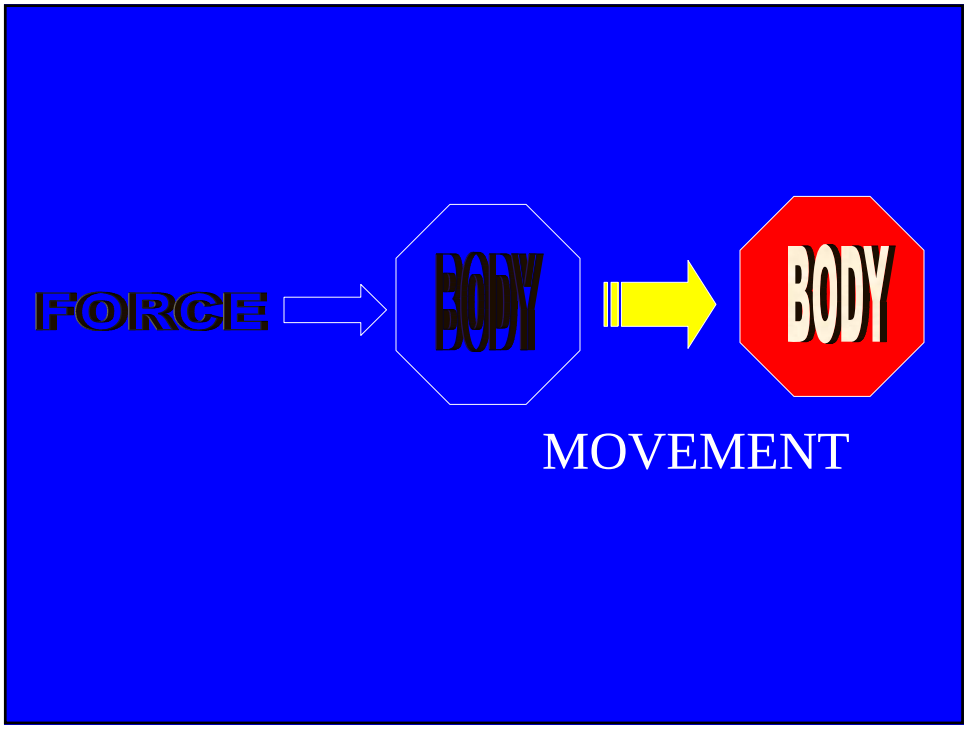
BIOMECHANICS OF TOOTH MOVEMENT

- Mechanics: The science which deals with the action of forces on the form and motion of bodies

- Force: Energy or strength brought to bear causing **motion** or change in a body.

- Orthodontic appliance: A system storing and delivering forces against the teeth, muscles, and/or bones; creating a reaction within the periodontal ligament and alveolar bone that causes movement of the teeth or alters bone morphology or growth.


FORCE
BODY


FORCE
BODY
BODY
MOVEMENT

FORCE

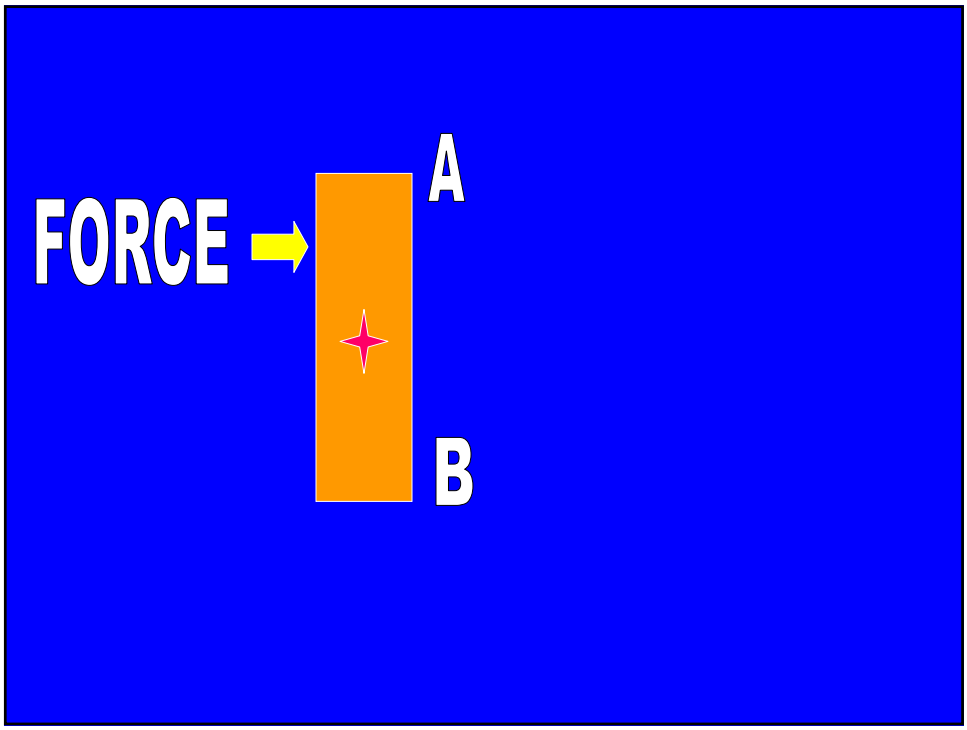
FORCE

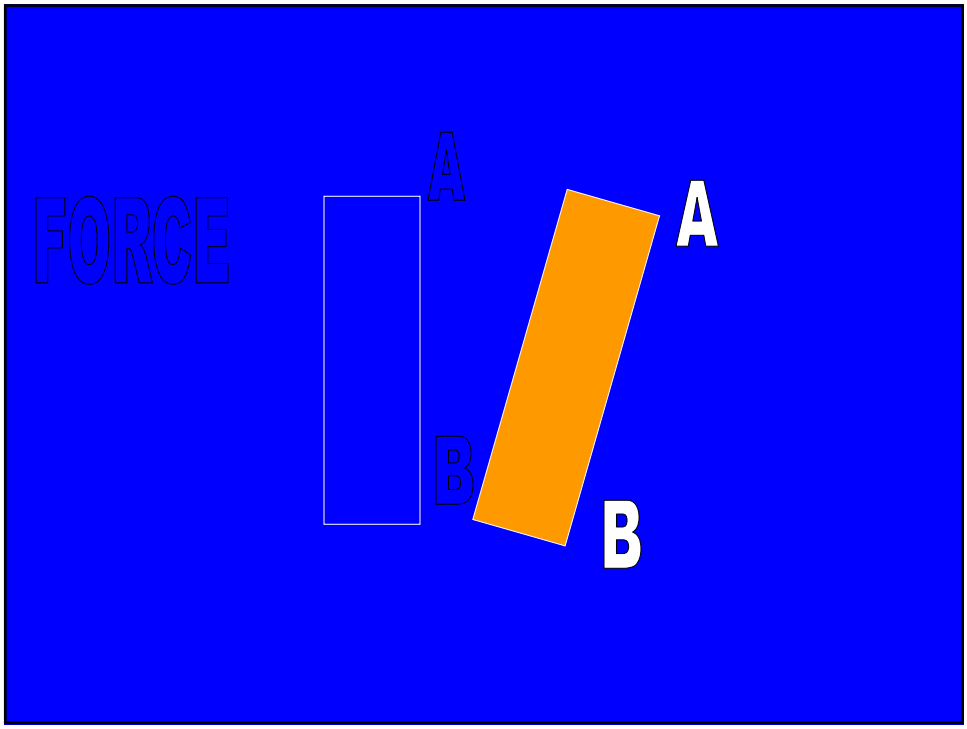
Magnitude

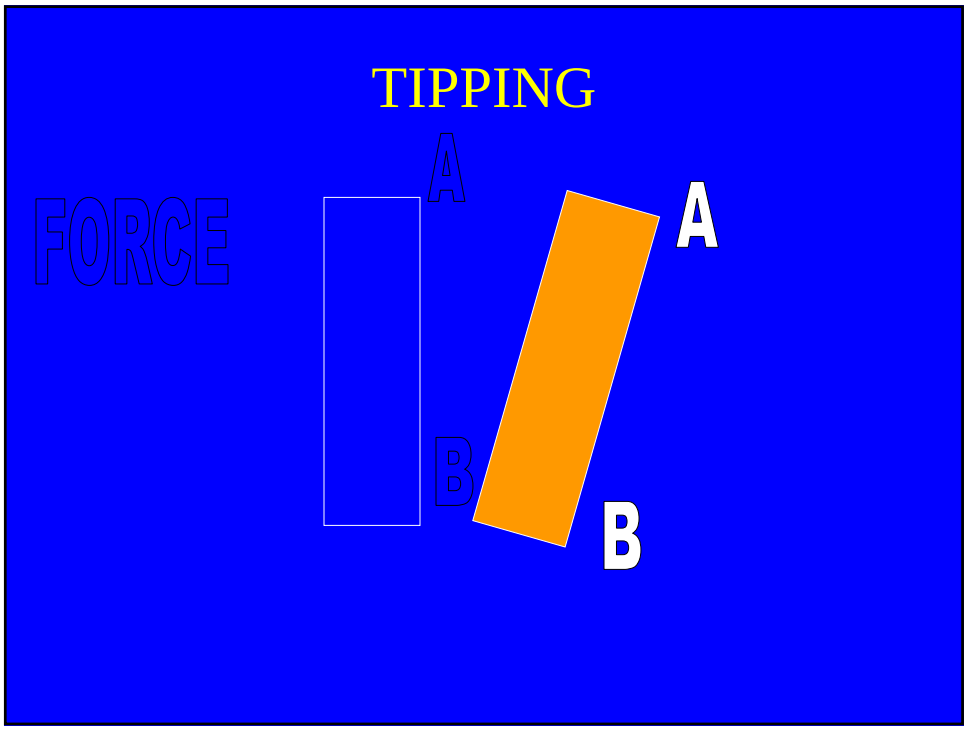
Point of application

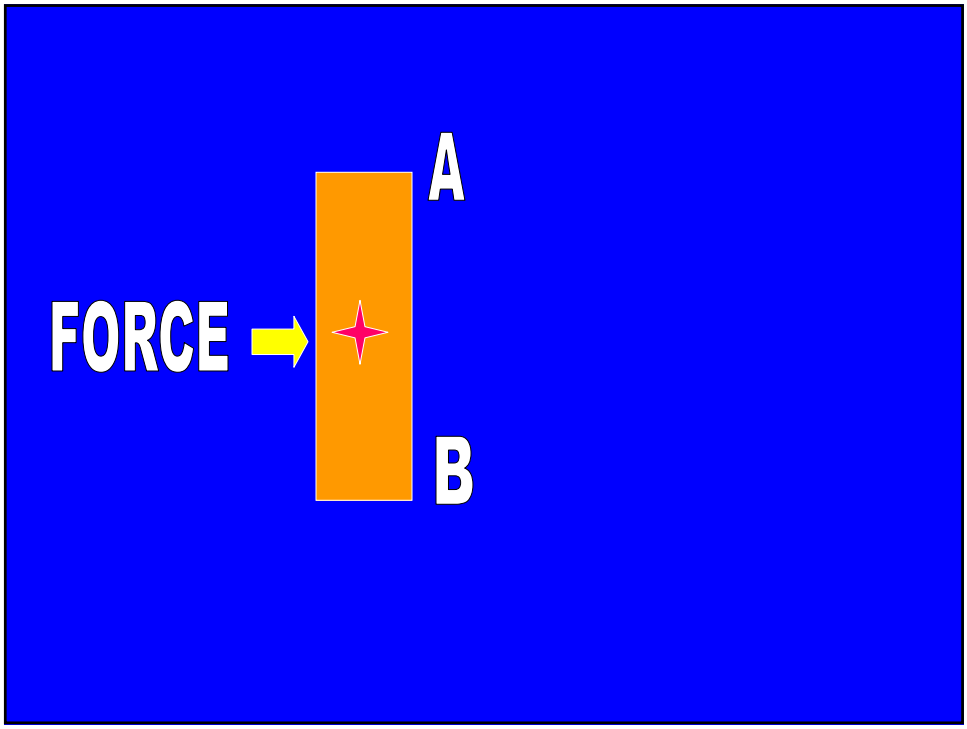
Direction

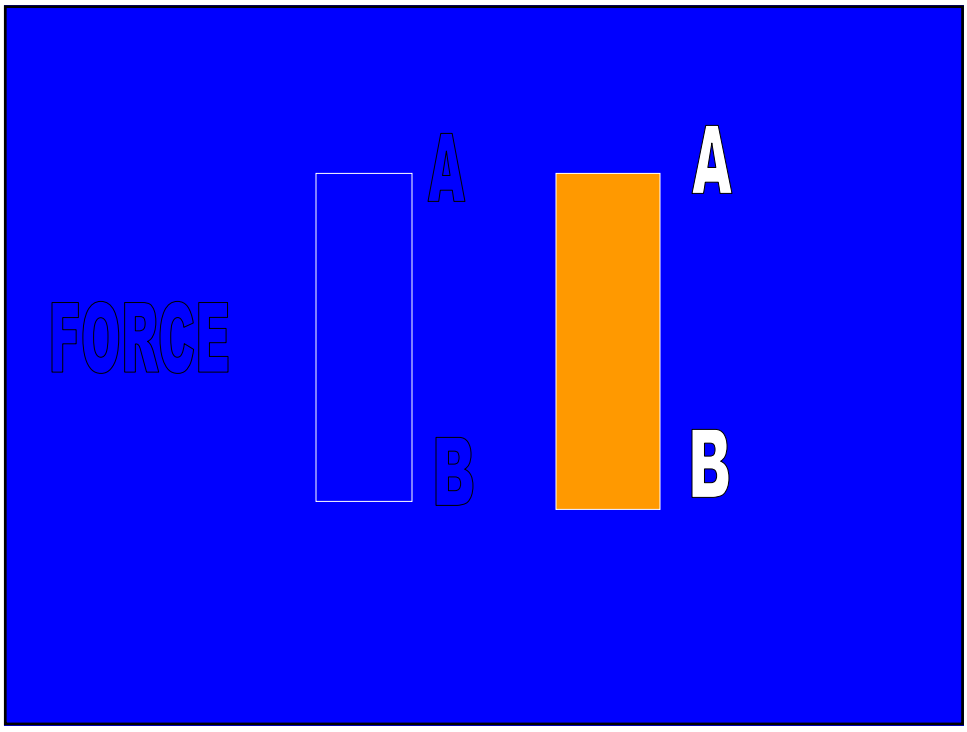
- Center of Resistance: The center of mass or center of gravity



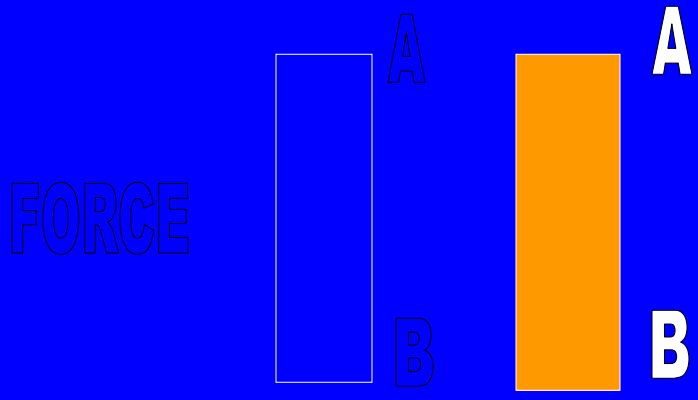

FORCE
A
B
A
B


TIPPING
FORCE
A
B
A
B


A
FORCE
B


A
A
FORCE
B
B

TRANSLATION



Orthodontic appliance

- Active element
- Resistance element

- Anchorage: Resistance to displacement

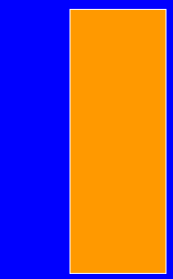
- The anchorage unit can move, however its role is to provide resistance.

Anchorage is classified according to:

1. Manner of force application
    a. Simple anchorage

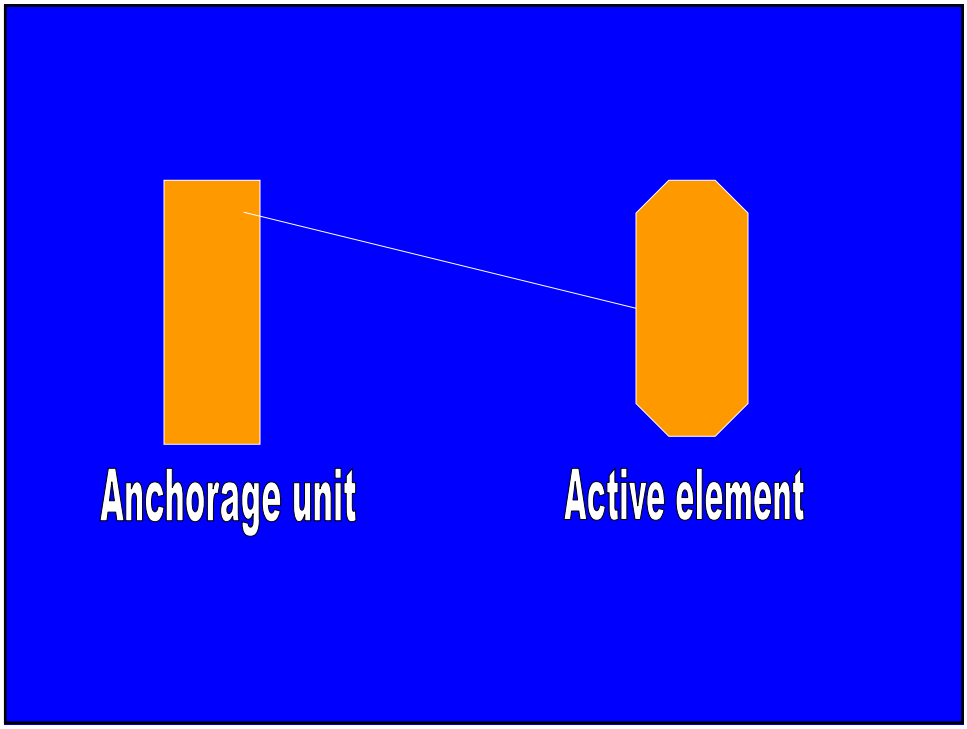
Simple anchorage (resistance to tipping):

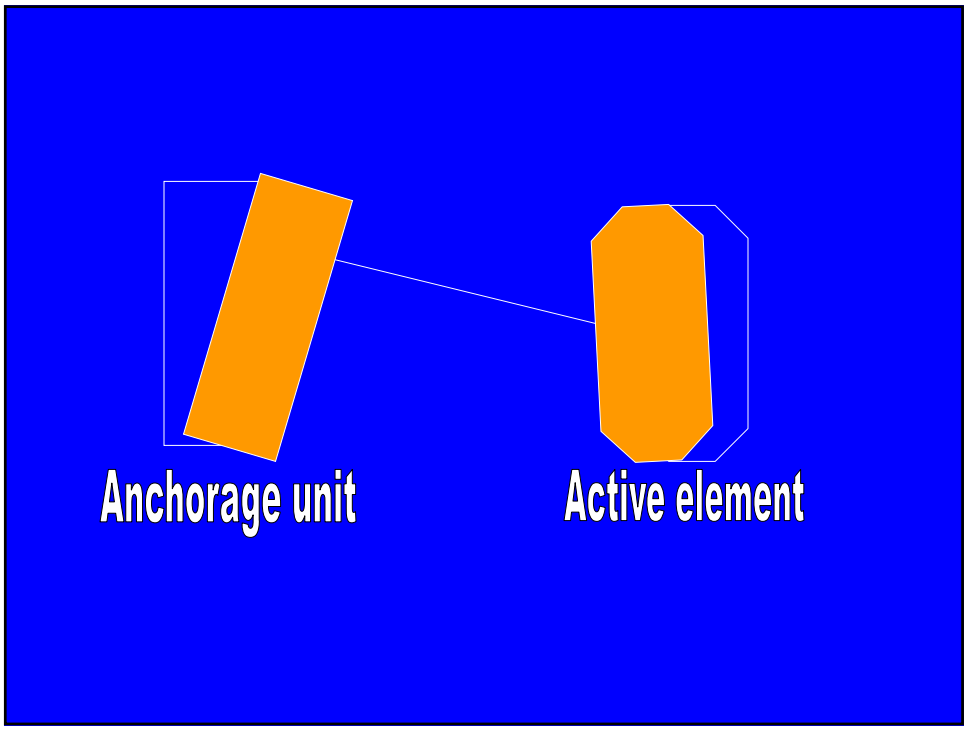
the anchorage tooth is ‘free’ to tip during movement



Anchorage unit

Active element

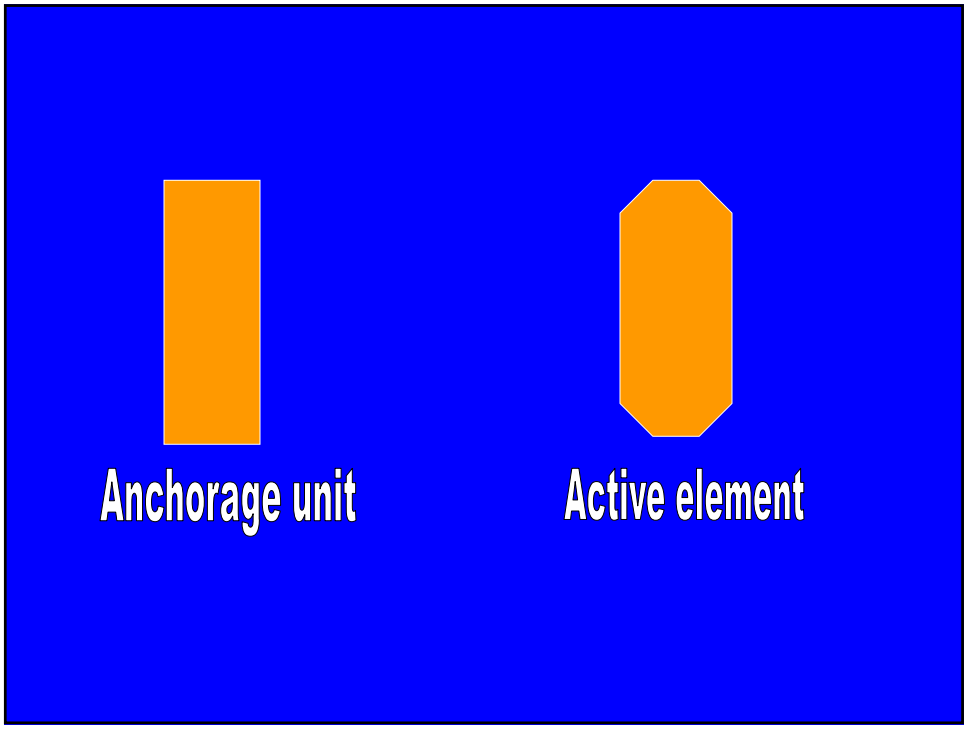

Anchorage unit
Active element

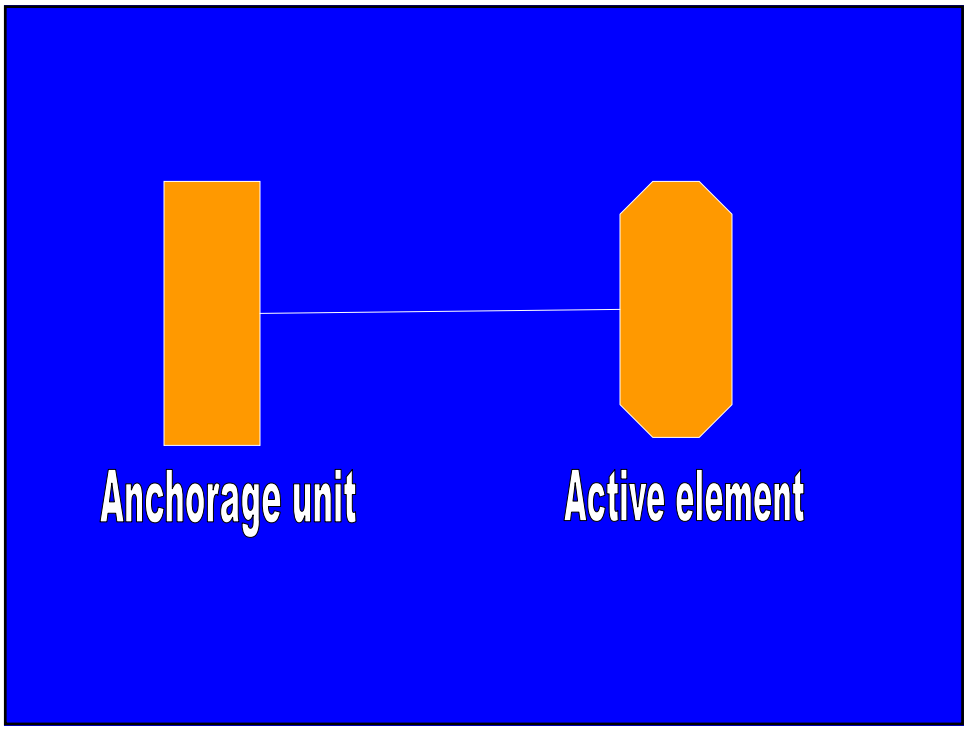

Anchorage unit
Active element

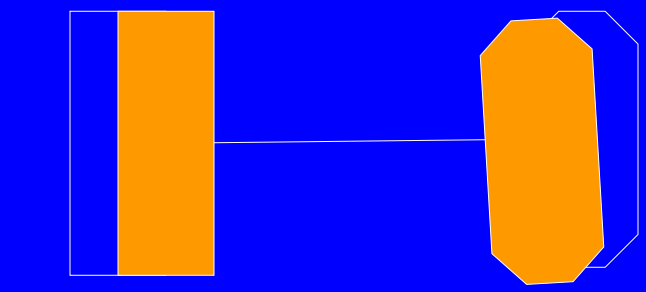
Anchorage is classified according to:

1. Manner of force application
    a. Simple anchorage
    b. Stationary anchorage

Stationary anchorage (resistance to bodily movement): the anchorage tooth is permitted to translate only.


Anchorage unit
Active element

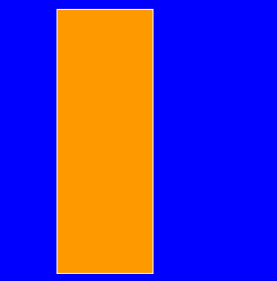

Anchorage unit
Active element



Anchorage is classified according to:

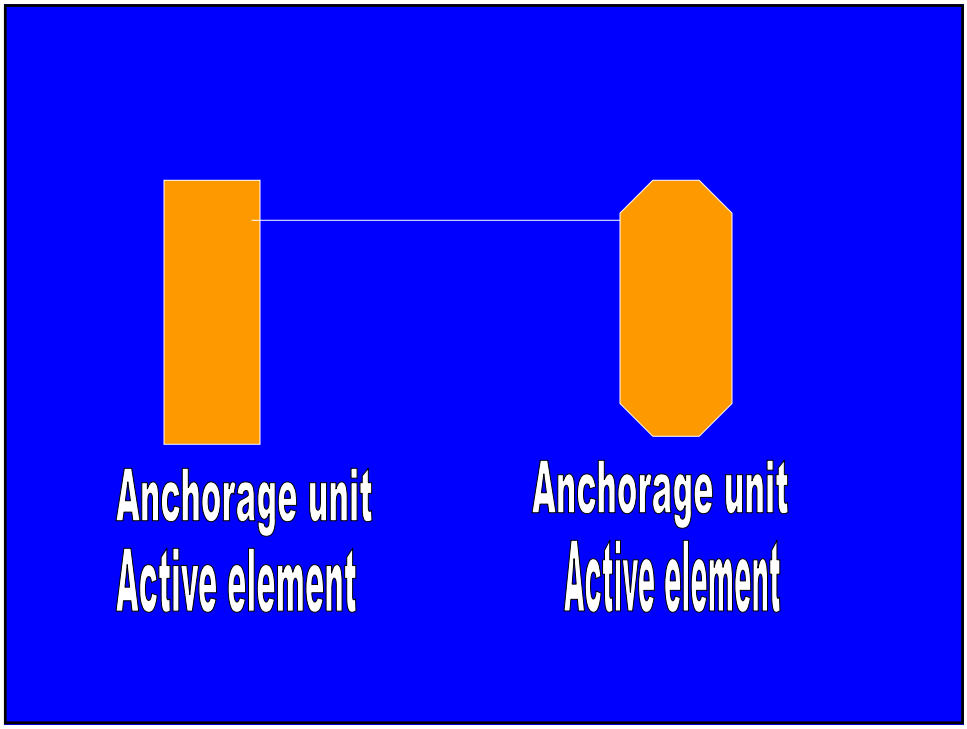
1. Manner of force application
    a. Simple anchorage
    b. Stationary anchorage
    c. Reciprocal anchorage

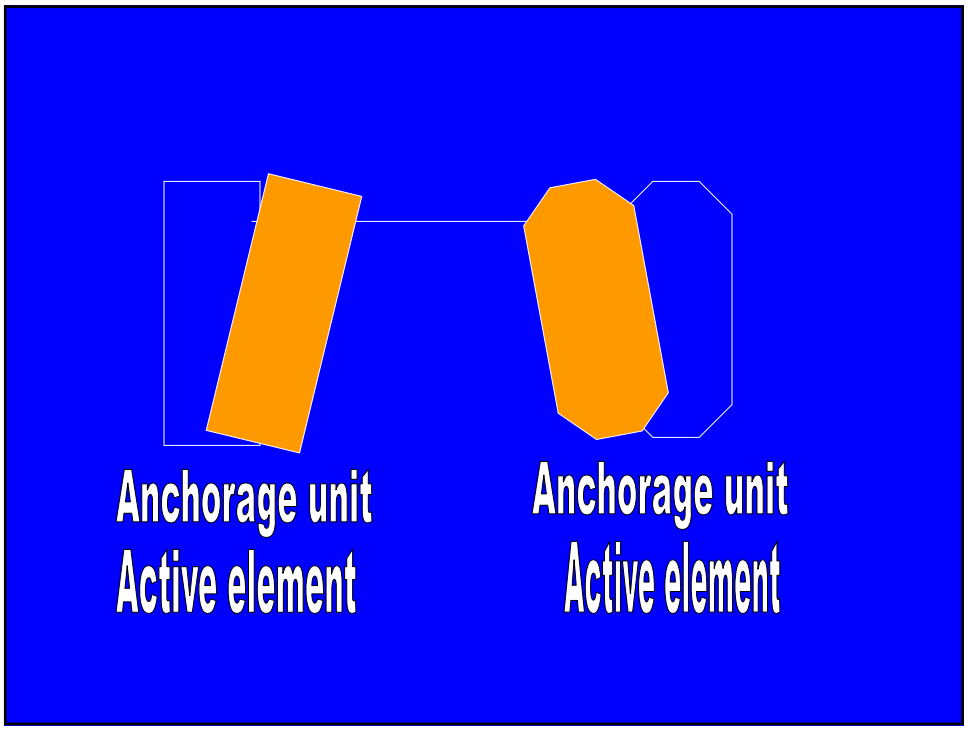
- Reciprocal anchorage: where both bodies which are malposed act as resistance and active elements.



Anchorage unit
Active element

Anchorage unit
Active element

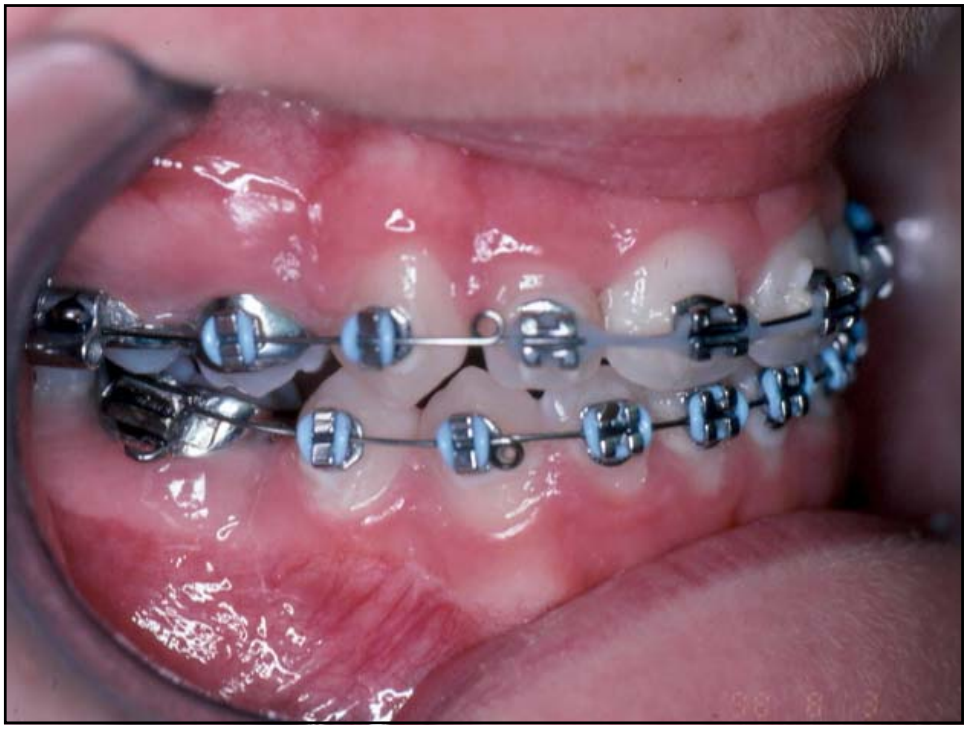

Anchorage unit
Active element
Anchorage unit
Active element

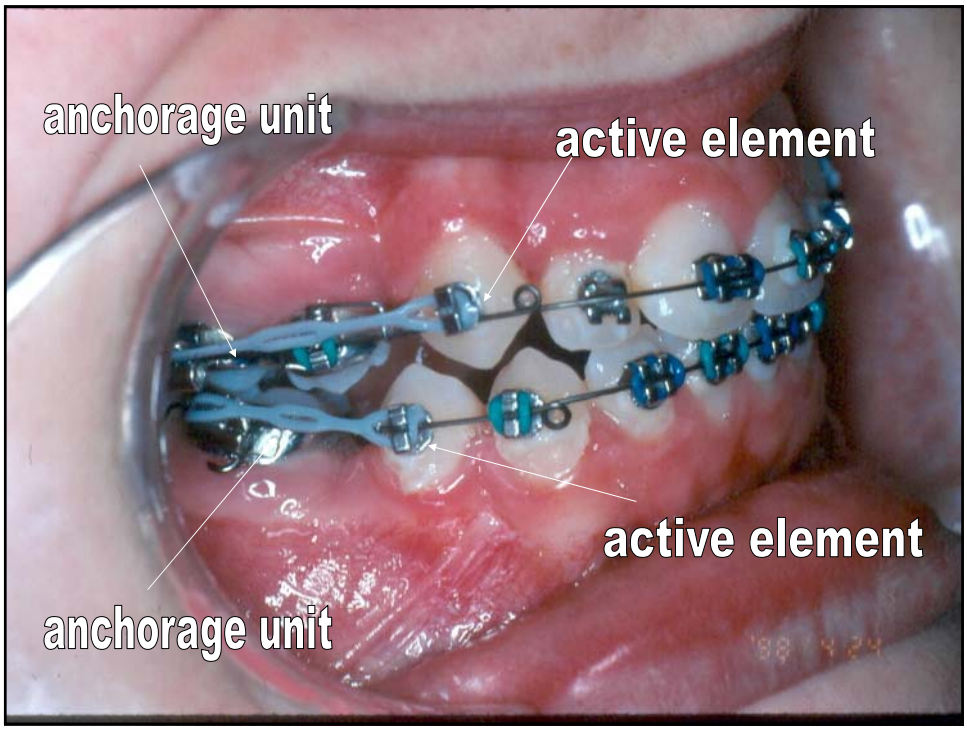

Anchorage unit
Active element
Anchorage unit
Active element

Anchorage is classified according to:

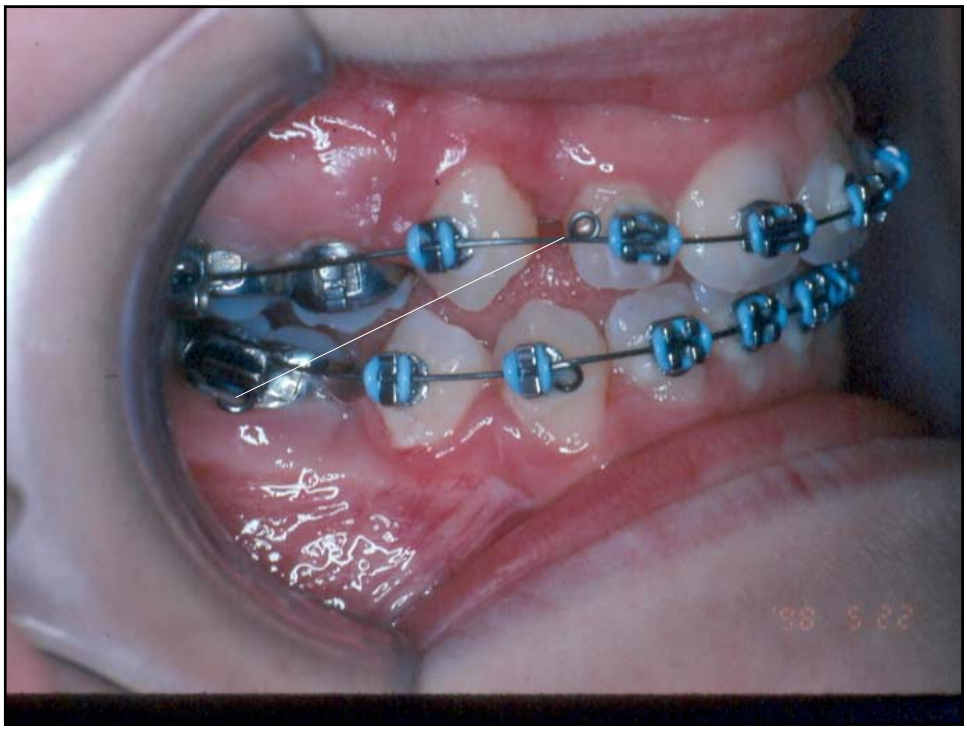
1. Manner of force application
    a. Simple anchorage
    b. Stationary anchorage
    c. Reciprocal anchorage
2. According to the jaws involved
    a. Intra-maxillary anchorage

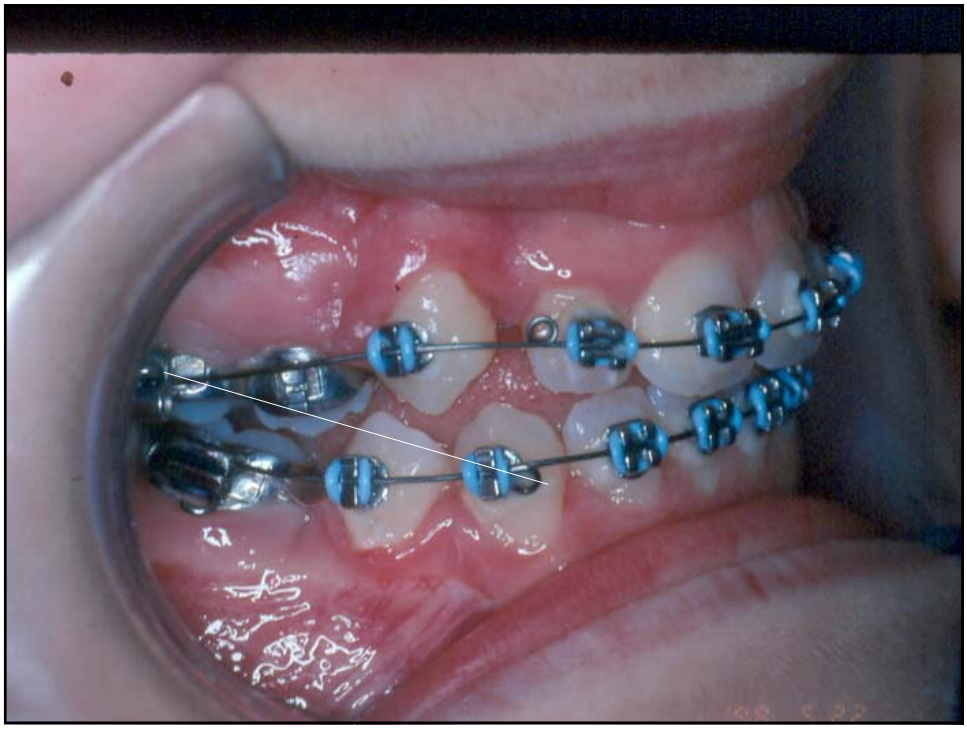
Intra-maxillary anchorage: anchorage established in the same jaw as the active element.




anchorage unit
active element
active element
anchorage unit

- Inter-maxillary anchorage – anchorage established in the opposite jaw of the active element





3. Site of anchorage

   a. Intra-oral; utilizing the teeth, mucosa and other oral structures

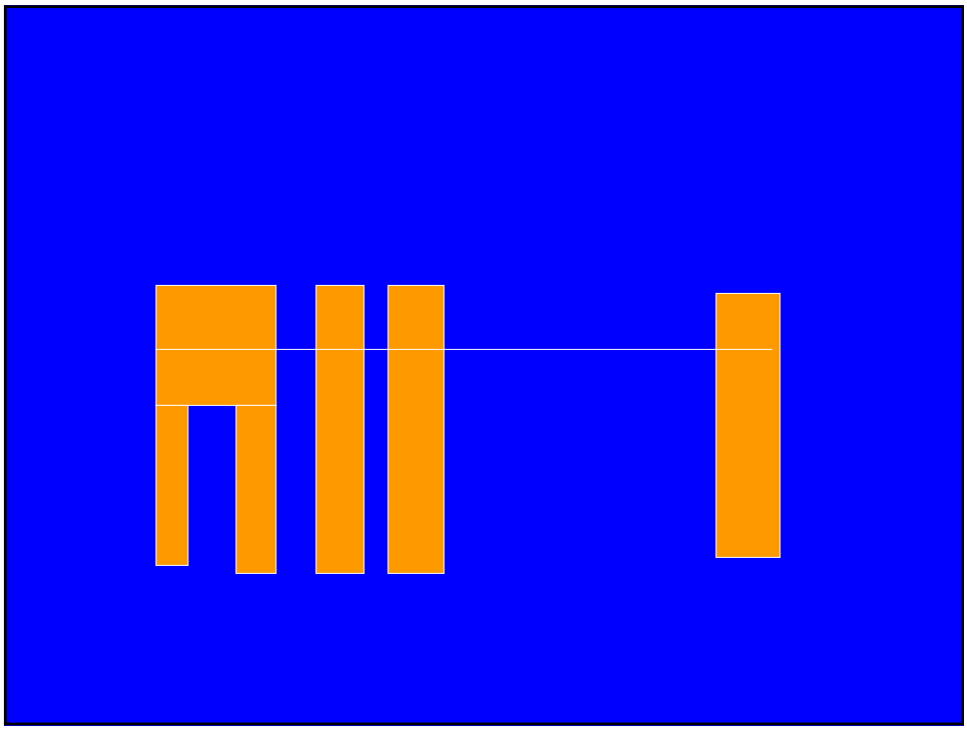
3. Site of anchorage

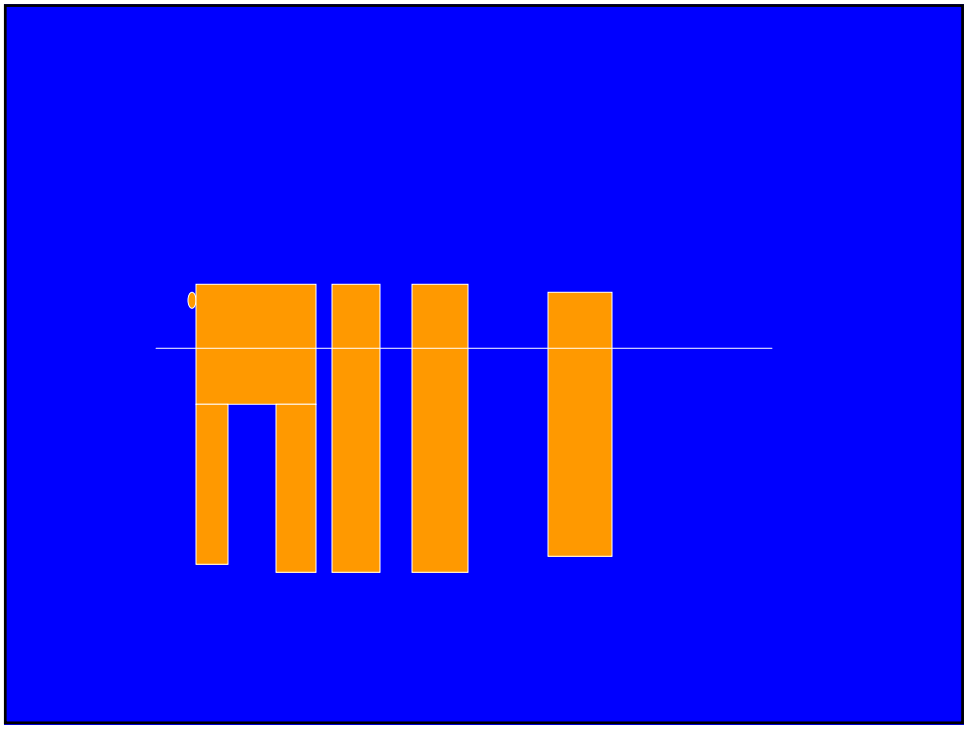
a. Intra-oral; utilizing the teeth, mucosa and other oral structures

b. Extra-oral; anchorage established outside of the oral cavity

- Cervical
- Occipital
- Cranial
- Facial

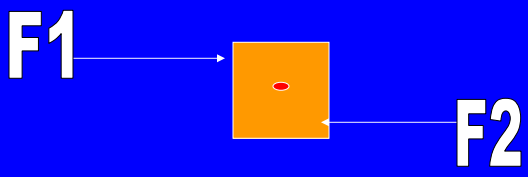
- 4. Number of anchorage units; the number of teeth, number of roots



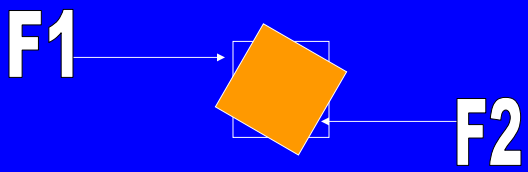


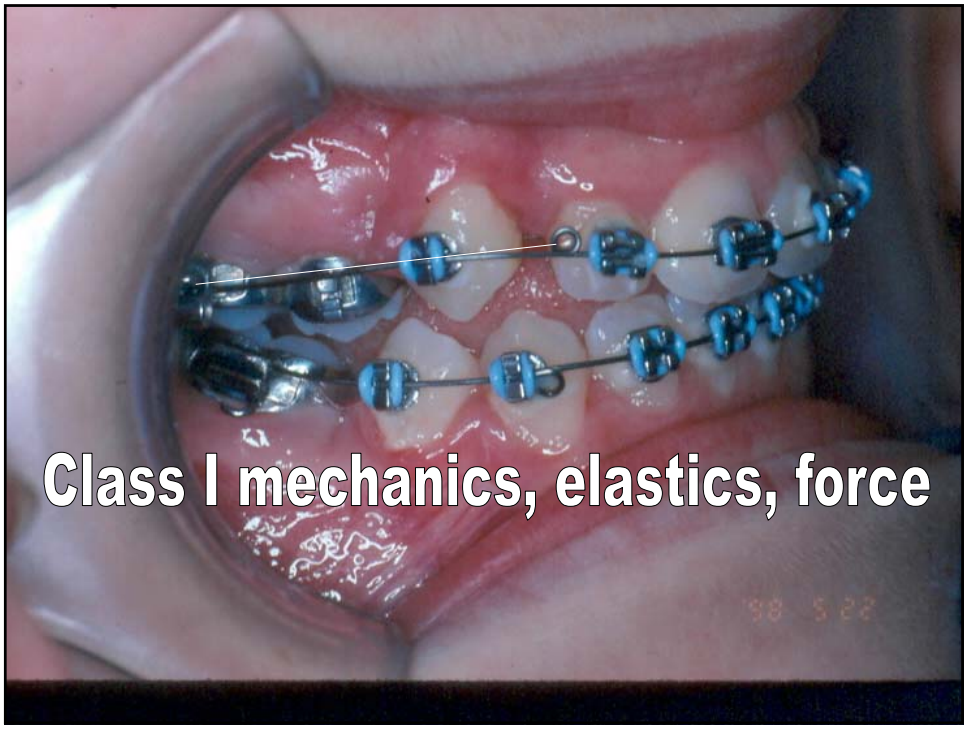
- Couple – Produced by two forces of equal magnitude with opposite, parallel, but non-collinear lines of action.

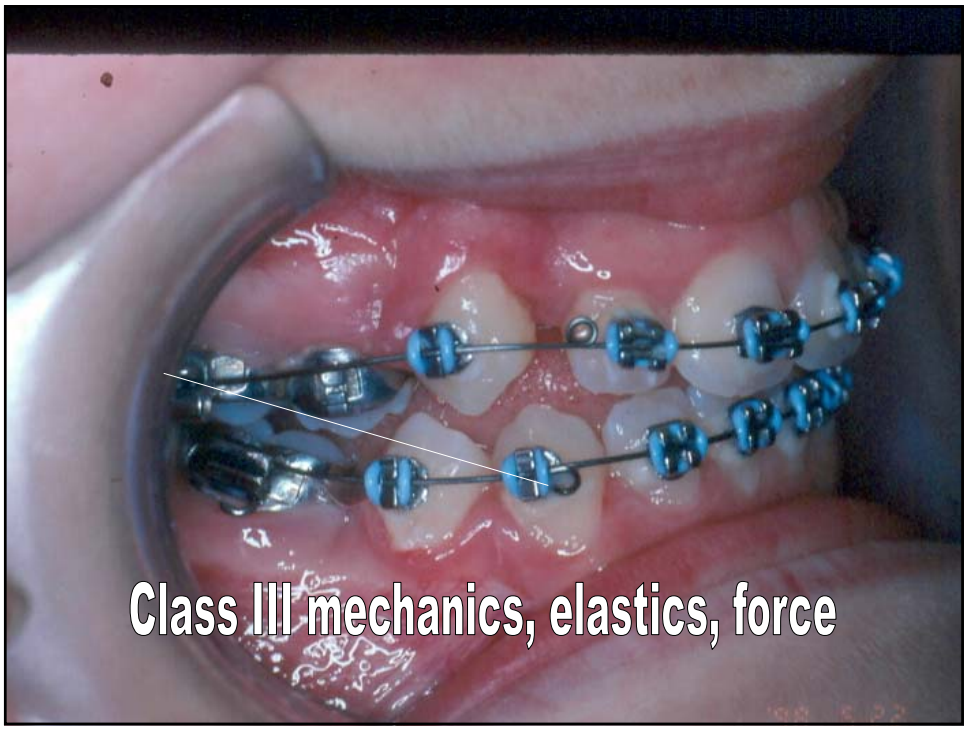
- A couple produces pure rotation.
  Tendencies for translation are canceled out.

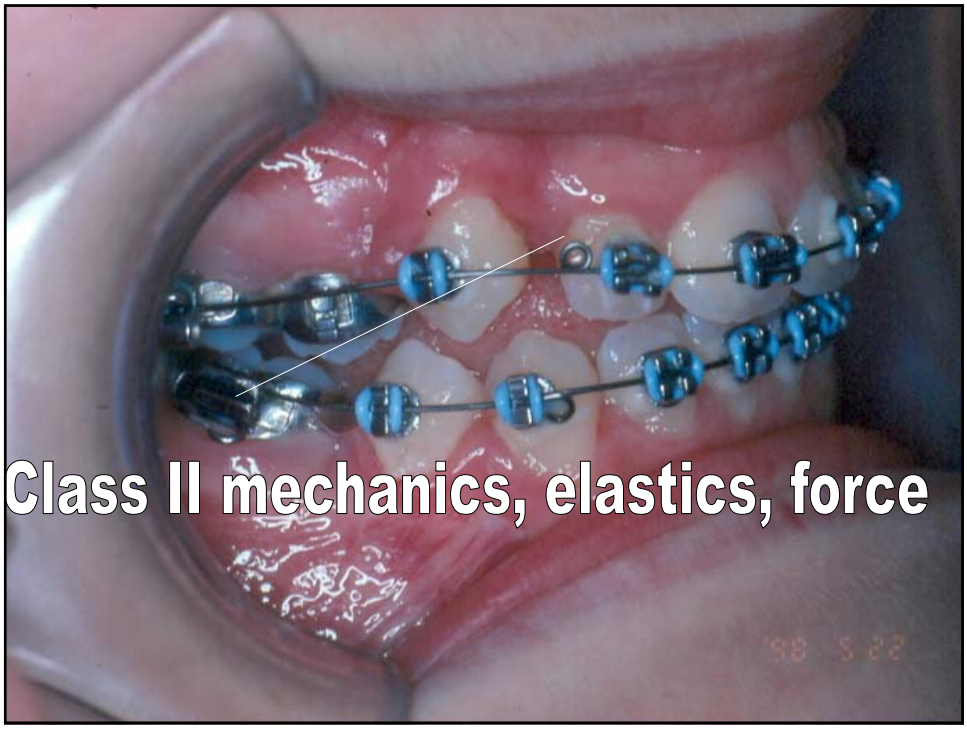


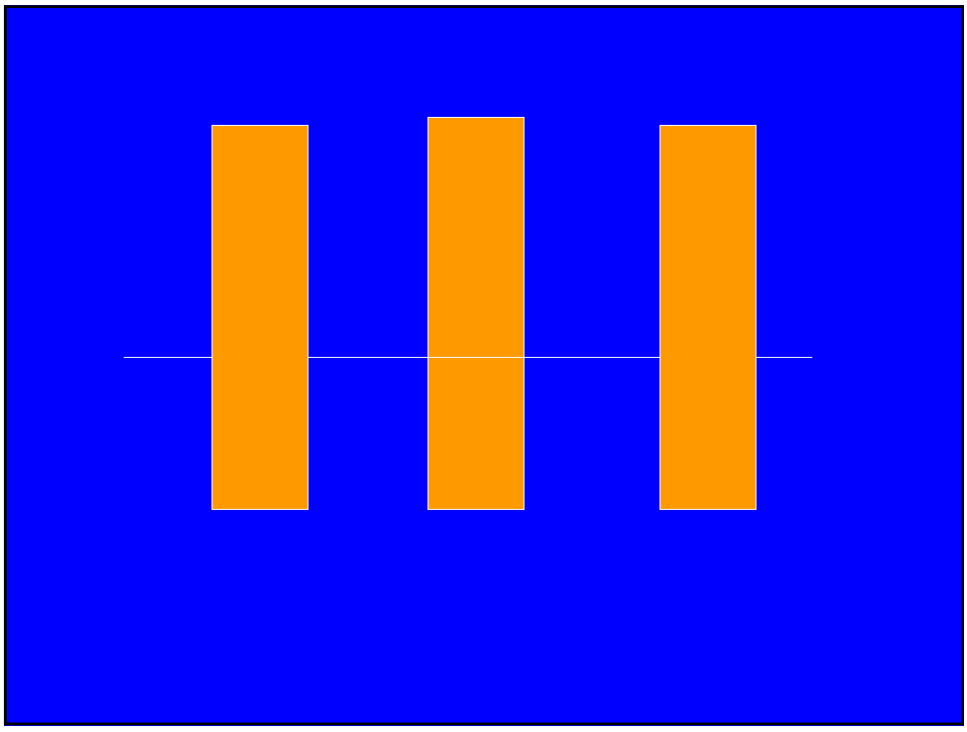
- A couple produces pure rotation.
  Tendencies for translation are canceled out.

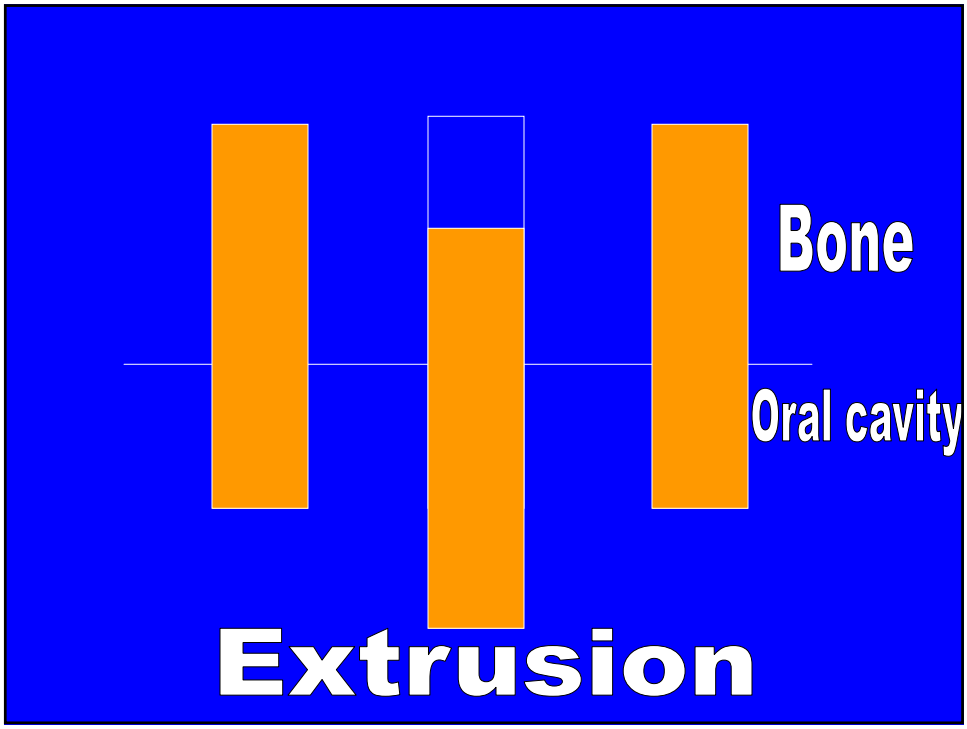


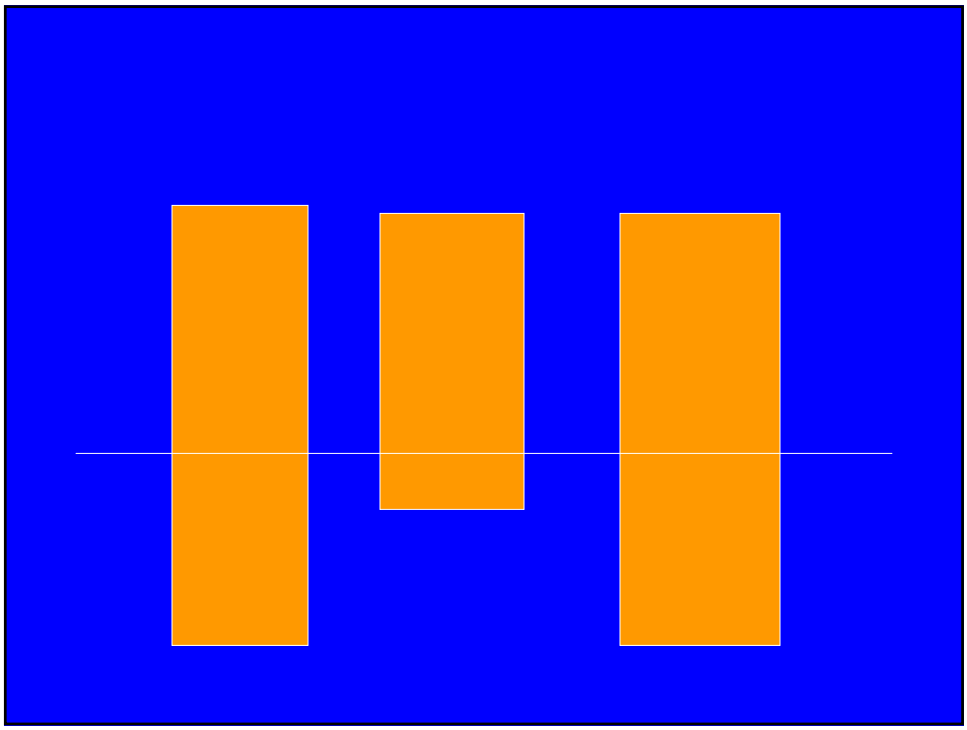

Class I mechanics, elastics, force

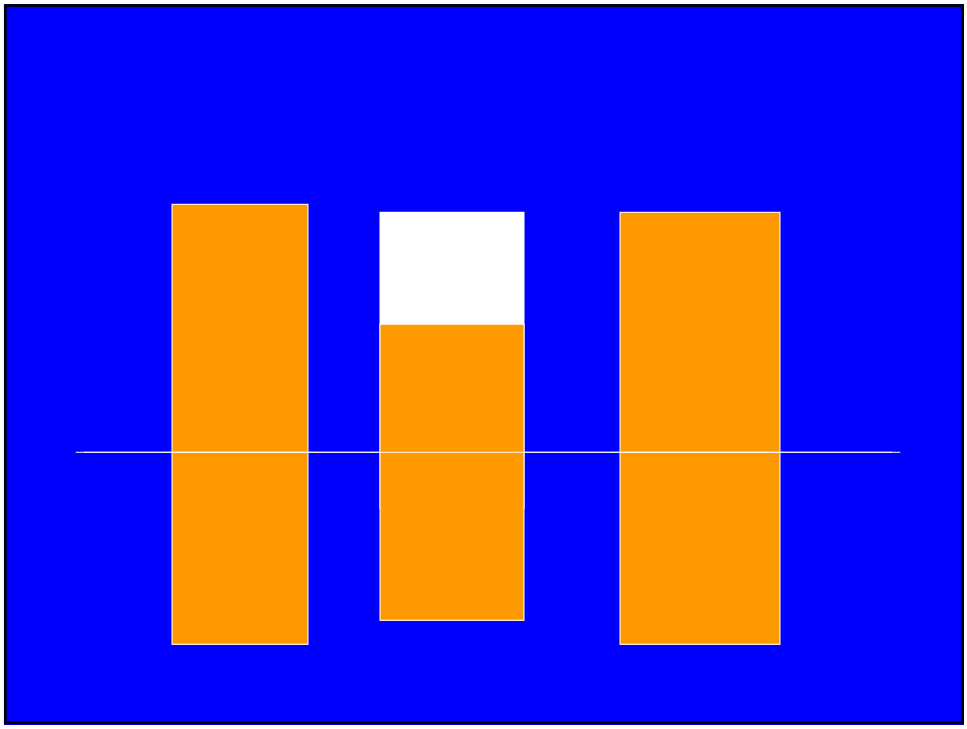

Class III mechanics, elastics, force

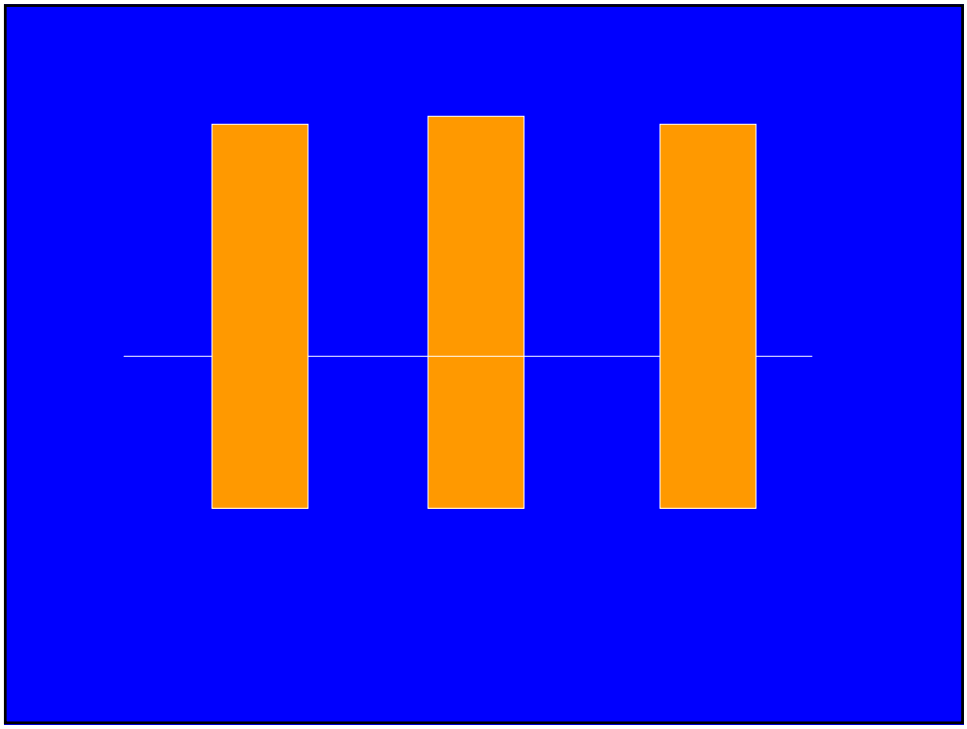

Class II mechanics, elastics, force

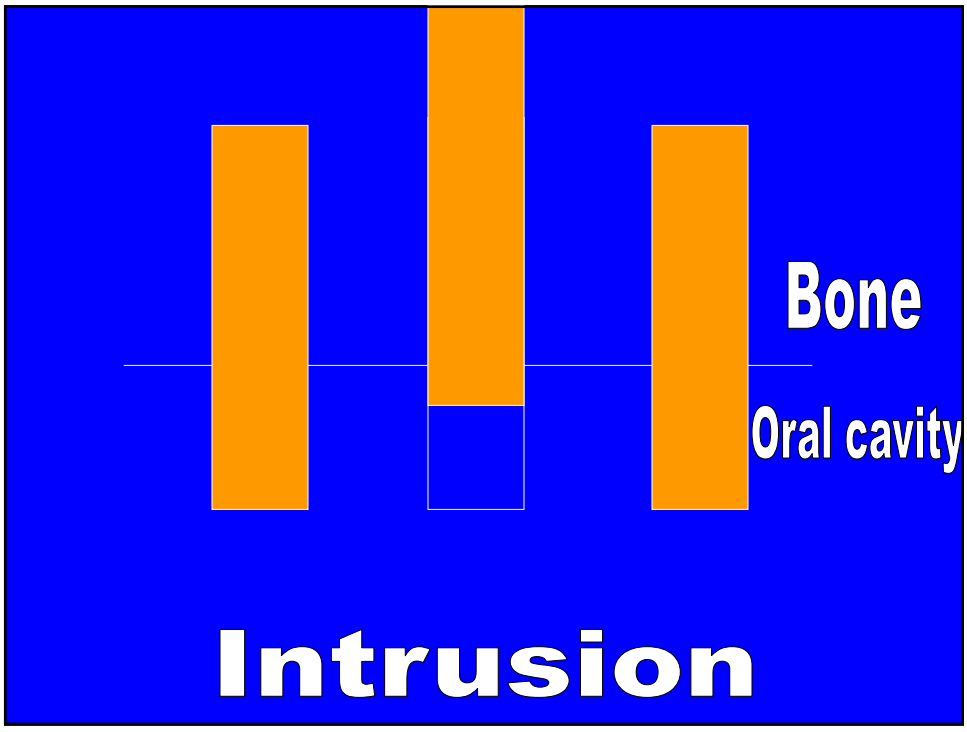


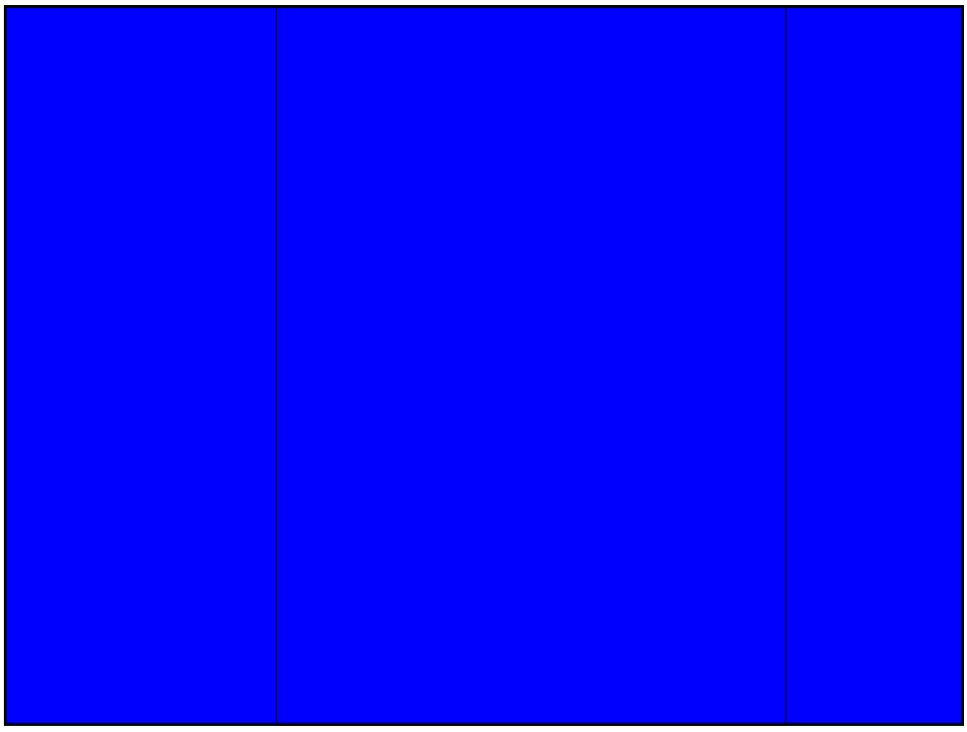

Bone
Oral cavity
Extrusion








Bone
Oral cavity
Intrusion

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