SNS COLLEGE OF PHYSIOTHERAPY COIMBATORE - 641035

COURSE NAME: BASICS PHYSICS

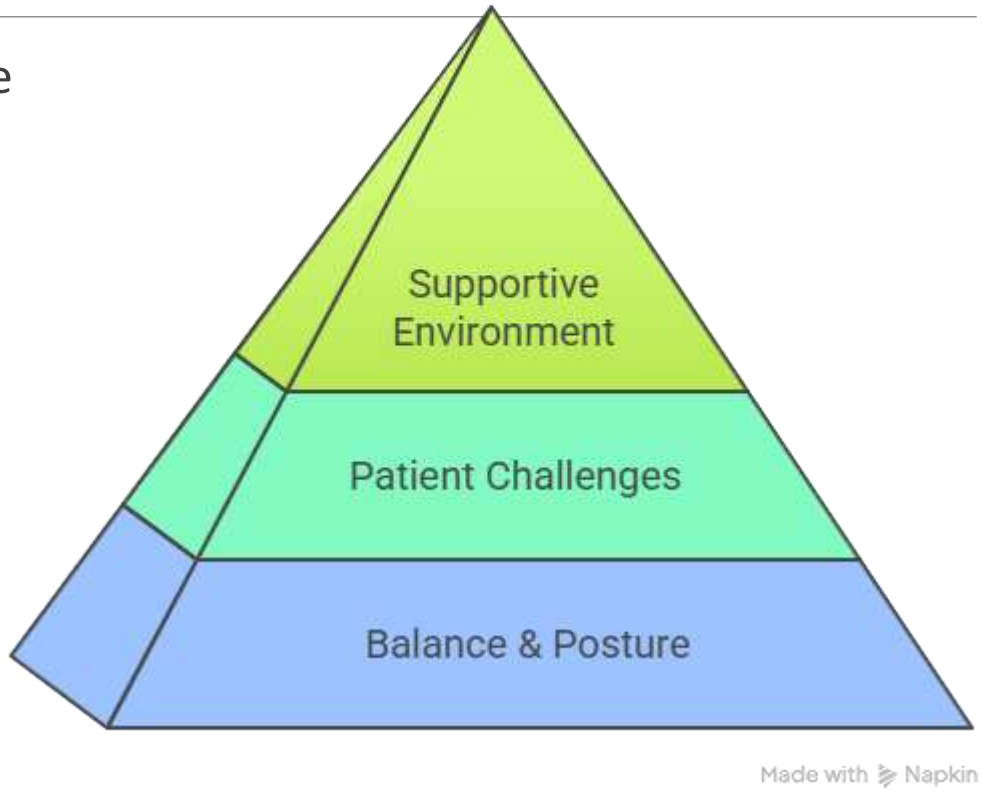
TOPIC: MECHANICS AND BIOMECHANICS

SUBJECT CODE: 746283

Empathize

Understand patient balance and posture issues.

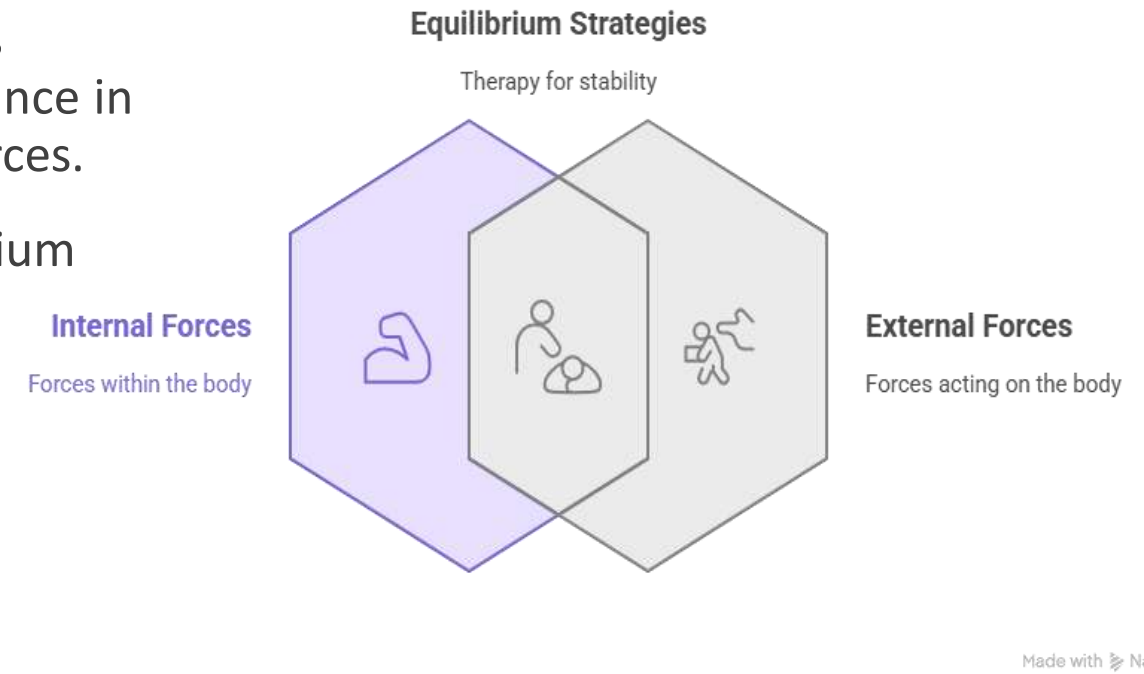
Observe how force imbalance leads to instability.



Define

Problem: Patient lacks stability due to imbalance in internal & external forces.

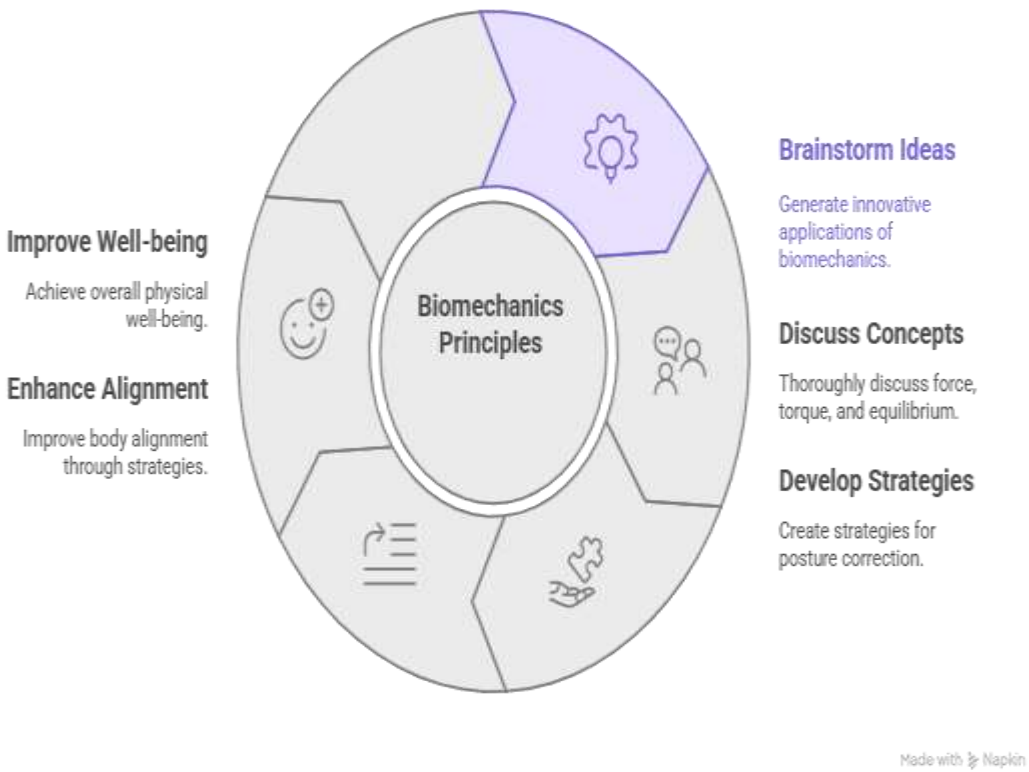
Goal: Identify equilibrium concepts for therapy.



Ideate

Brainstorm how to apply biomechanics principles.

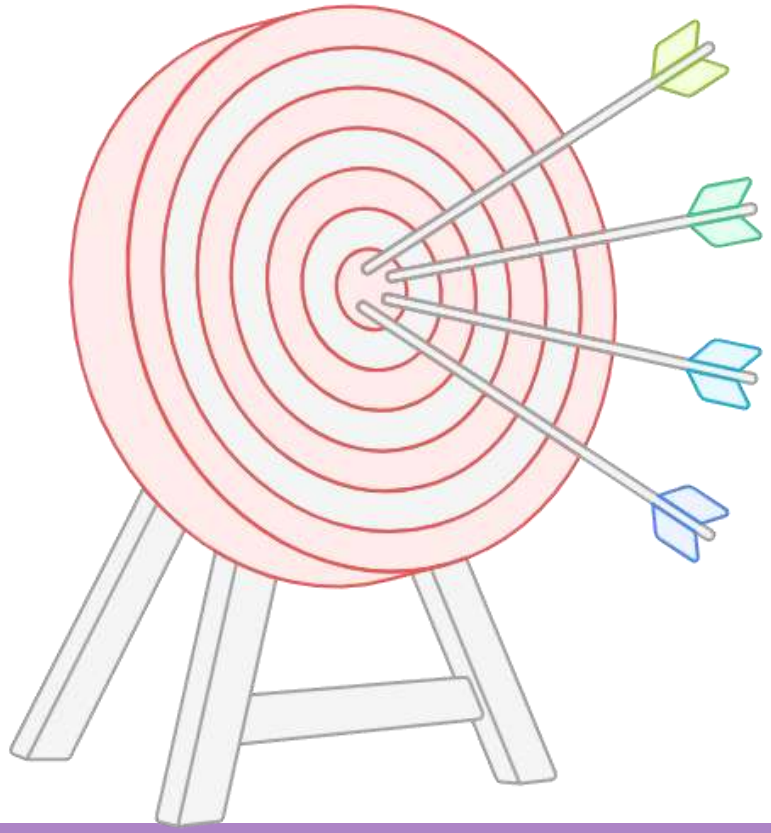
Discuss force, torque, and equilibrium for posture correction.



Prototype

Rehabilitation Model Components

Develop rehab models – traction setup, weight balance exercises, stability drills.



Overall Physical Performance

The ultimate goal of rehabilitation

Stability Drills

Exercises to improve balance and coordination

Weight Balance Exercises

Activities to strengthen core and limbs

Traction Setup

Devices to relieve pressure and align spine

Test

Apply methods with patients, adjust according to results.

Definition of Force

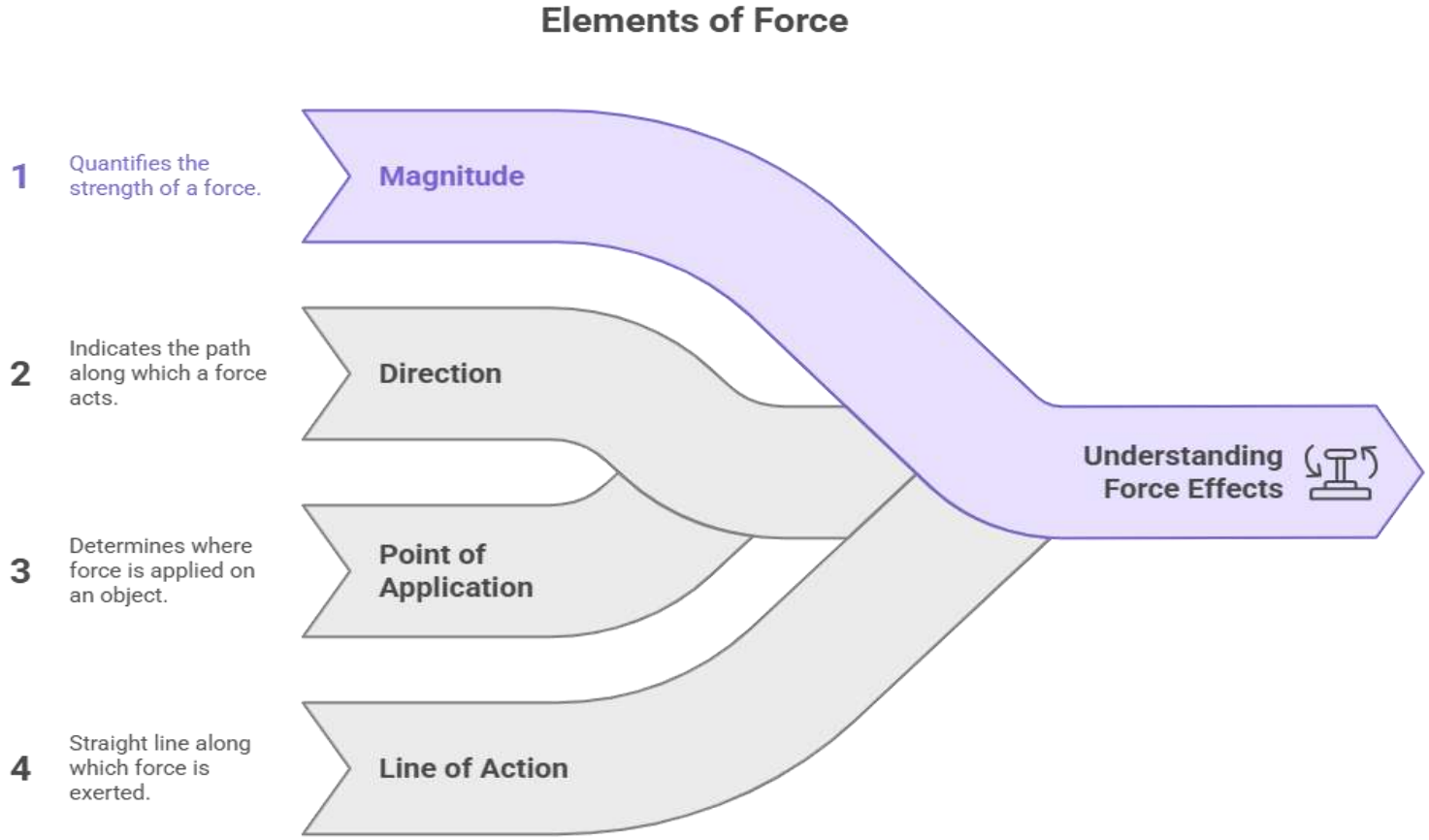
Force = Push or Pull

F = m × a | Unit: Newton (N)

Force changes rest or motion state.

Characteristics of Force

Magnitude | Direction | Point of Application | Line of Action



Types of Forces

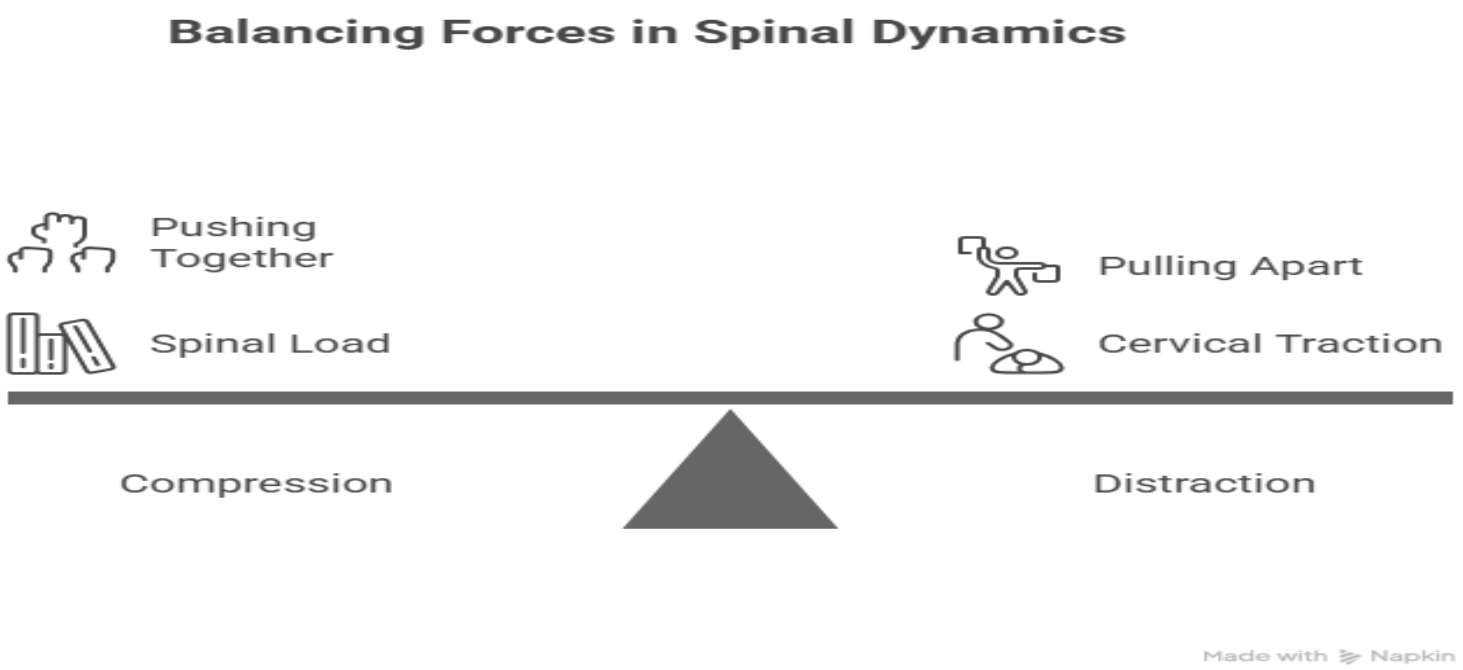
Internal – muscles, ligaments

External – gravity, weights, friction

Compression & Distraction

Compression = push | Distraction = pull apart

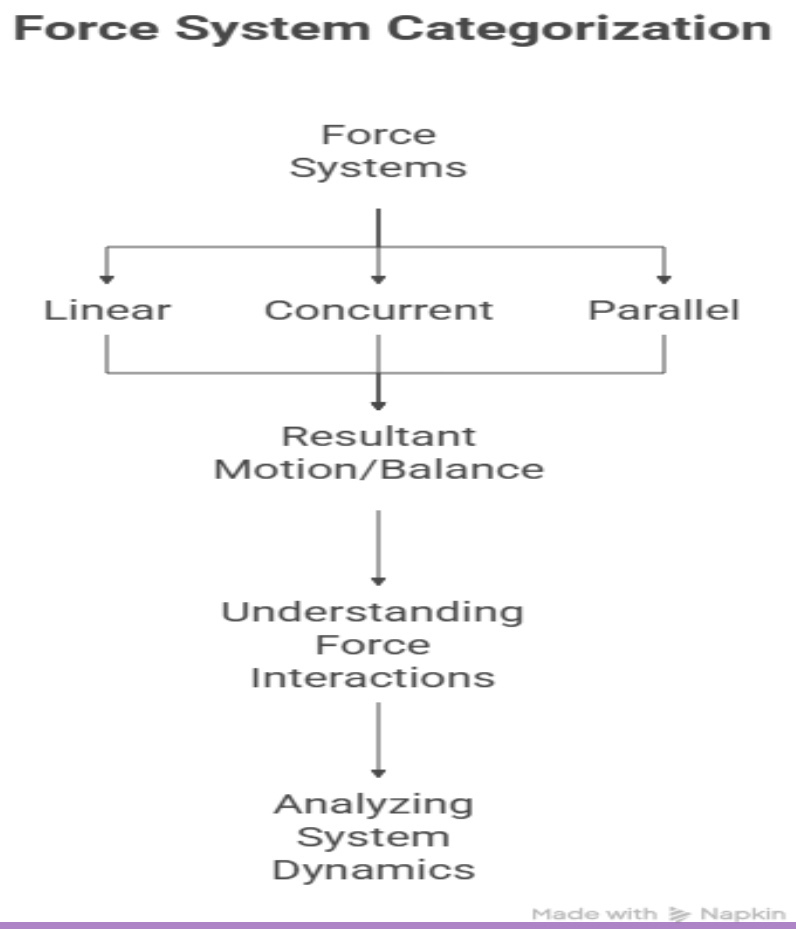
Example: Spinal load vs cervical traction



Force Systems

Linear | Concurrent | Parallel

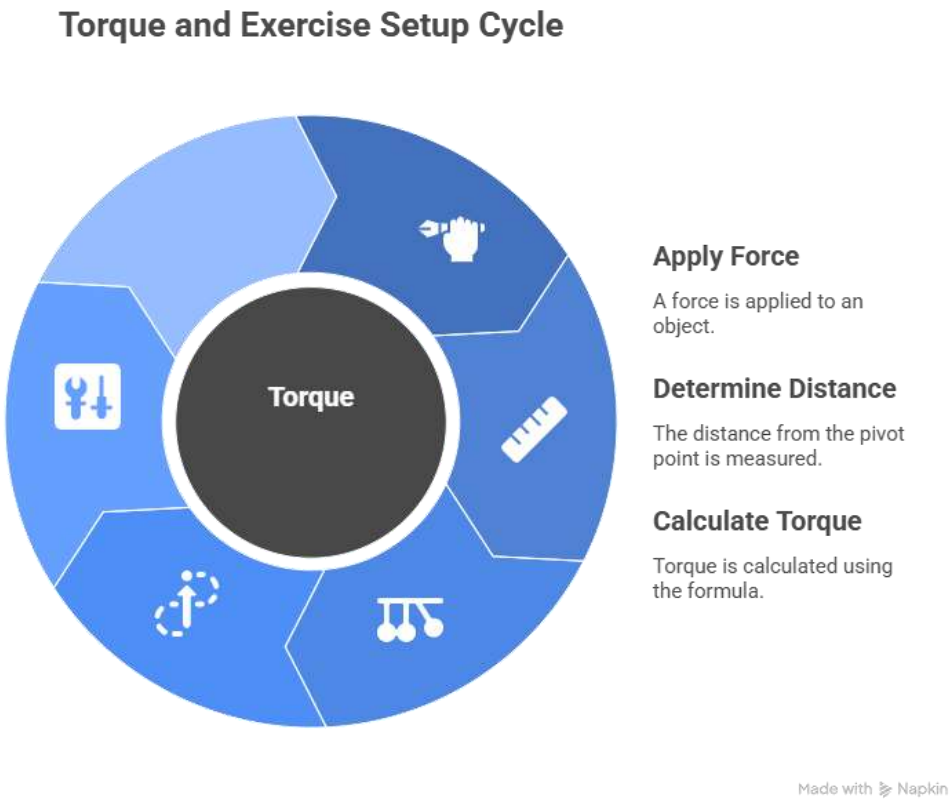
Resultant motion or balance depends on system type.



Torque & Moment

Torque = Force × Distance

Rotational effect of a force – key for exercise setup.



Equilibrium

$\Sigma F = 0 \mid \Sigma \tau = 0$

Static and Dynamic equilibrium in body balance.

Types of Equilibrium

Stable | Unstable | Neutral

Example: Book, Pen, Ball

Clinical Relevance

Understanding forces helps design safe, effective rehab programs.

Empathize (Review)

Focus: How force imbalance affects patients with postural deficits.

Ideate (Review)

Develop strategies: balance training, muscle strengthening, ergonomic alignment.

Class Assessment

1. Define force and equilibrium.
2. Differentiate internal vs external forces.
3. Case: Patient cannot maintain standing — identify acting forces.
4. Suggest equilibrium improvement methods.