

AmbujaNeotia



**THE NEOTIA
UNIVERSITY**

ज्ञानम् आत्म प्रदीपाय

UGC Enlisted & Recognised

Department of Physiotherapy

School of Health Science

**Bachelor of Physiotherapy
(BPT)**

Biomechanics & Kinesiology I

Practical Manual

Course Code: BPT 371

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Certificate

This is to certify that Mr./Ms. with
UID number of Bachelor of
Physiotherapy Semester 3rd has satisfactorily completed the practical prescribed
by the Neotia University for the year

.....
Signature of Student

.....
Signature of Faculty

Date of Submission:

Terminology

Purpose: To review the various articulations of the human body, to familiarize you with the movements possible at these joints, and to learn terminology used to describe human movement.

Dress: Shorts, t-shirt

Objectives: At the completion, you should be able to:

1. Define the following terms:

frontal plane	eversion	anterior (ventral)
sagittal plane	plantar flexion	posterior (dorsal)
transverse plane	dorsiflexion	superior (cranial)
anteroposterior (AP) axis	radial deviation (flexion)	inferior (caudal)
mediolateral (ML) or transverse axis	ulnar deviation (flexion)	medial
superior-inferior (SI) longitudinal axis	medial (internal) rotation	lateral
flexion	lateral (external) rotation	proximal
extension	pronation	distal
hyperextension	supination	inversion
abduction	horizontal abduction	hyperflexion
adduction	horizontal adduction	hyperadduction
circumduction	anatomical position	hyperabduction
lateral flexion	rotation to the right	rotation to the left
linear motion	angular motion	general motion

2. Identify the joints at which each of the above movements occur.
3. Identify the major bones in the body.
4. Describe and demonstrate joint movements that occur in each plane of motion.

To study human movements, one must be able to clearly describe a position or movement. Since there are numerous positions the human body can adopt and movements the human body can perform, a reference or baseline position is used to reduce confusion and define positional and motion terms. "Anatomical position" is the name of this baseline position. The anatomical position is an upright standing posture in which all joints, except the ankle, are extended so that all body segments form a straight line, with the palms facing forward. The anatomical position is used to define movement terminology. The movement terms are defined according to the orientation of 3 cardinal planes and their associated axes to the body. Basically, a plane can be described as a pane of glass that divides the body or a segment into two parts. The cardinal planes cut

the body exactly in half. Each cardinal plane is associated with an infinite number of planes that pass through the body. Each plane has its own axis of rotation. The axis runs perpendicular to the plane. Body segments can move linearly in a plane, or angularly in a plane and around its associated axis. The joint that is in the center of the surrounding moving segments is the axis. A movement term for the body or a segment is defined according to which of the three planes it is moving in. The intersection of the cardinal planes while in anatomical position is called the center of gravity. It is important to know that these terms are derived from the knowledge of planes and axes. In advanced movement analysis, the planes and axes become the basis for quantitative analysis and thus the dominant system for research.

The joints in the human body can be classified according to structure or function. For the purpose of this lab, we will use a very simple functional classification system. Joints may be classified according to the number of axes around which movement can occur. For this lab, you will use the terms nonaxial (no axis), uniaxial (one axis), biaxial (two axes), and triaxial (three axes) to classify the joints in the body.

Use your textbook to write the definitions of the terms listed

frontal plane (lateral/coronal) -

sagittal plane (anteroposterior/median) -

transverse plane (horizontal) -

anteroposterior (sagittal) axis -

mediolateral (frontal) axis -

longitudinal axis -

flexion -

extension -

hyperextension -

abduction –

adduction -

circumduction -

lateral flexion -

eversion -

plantar flexion -

dorsiflexion -

radial deviation (flexion) –

ulnar deviation (flexion) -

medial rotation –

lateral rotation -

pronation -

supination -

horizontal abduction (extension) –

horizontal adduction (flexion) -

anatomical position -

rotation to the right –

rotation to the left -

anterior (ventral) -

posterior (dorsal) -

superior (cranial) -

inferior (caudal) -

medial -

lateral -

proximal -

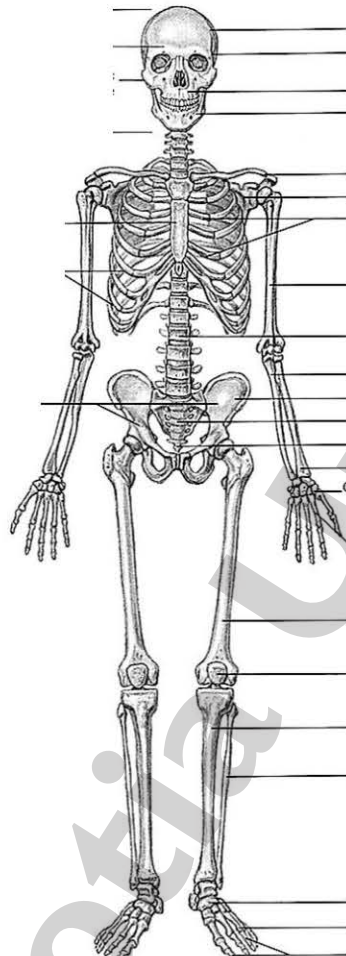
distal -

Review the major bones

Review the major bones of the body listed on the following page and make sure you can identify each bone one.

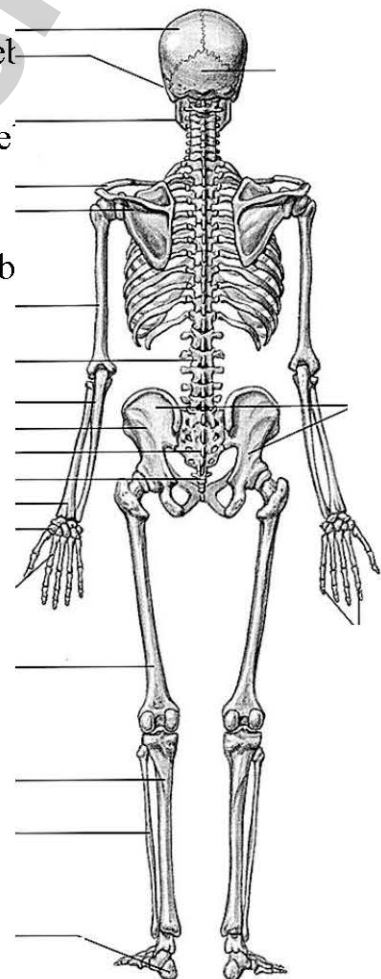
Anterior view

1. Skull
2. Clavicle
3. Humerus
4. Radius
5. Ulna
6. Carpals
7. Metacarpals
8. Phalanges
9. Scapula
10. Sternum
11. Ilium
12. Sacrum
13. Coccyx
14. Femur
15. Patella
16. Tibia
17. Fibula
18. Tarsals
19. Metatarsals

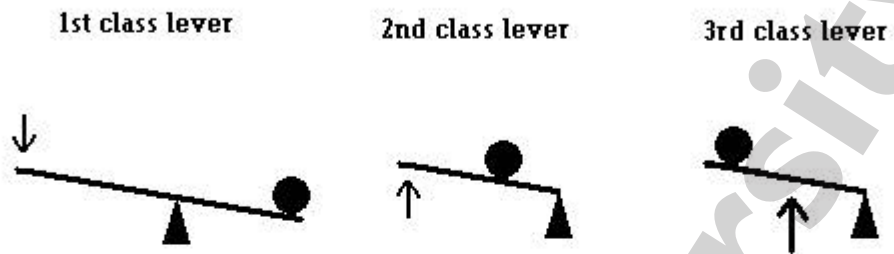


Posterior view

1. Cervical vertebrae
2. Scapula
3. Thoracic vertebrae
4. Rib
5. Humerus
6. Lumbar vertebrae
7. Ilium
8. Sacrum
9. Coccyx
10. Ulna
11. Radius
12. Femur
13. Tibia
14. Fibula
15. Calcaneus



Levers its classification



Muscle function & Performance

Define the following terms (Diagram)

concentric tension -

eccentric tension -

isometric/static tension -

motive force -

resistive force -

functional muscle group -

Posture

POSTURE ASSESSMENT

POSTURE ASSESSMENT [1 – 4 SCALE]

GRADING

1. Normal
2. With head protruding
3. Head protruding with kyphosis
4. Marked flexion of all joints

Biomechanics of Upper Limb

Shoulder

Draw neatly labelled figures indicating bones, ligaments, muscles with description

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Elbow

Draw neatly labelled figures indicating bones, ligaments, muscles with description

Wrist and hand

Draw neatly labelled figures indicating bones, ligaments, muscles with description

Movements

Joints	Movements Possible	Muscles Involved	Accessory Movements	Limiting structures
Shoulder				
Elbow				
Wrist & Hand.				

Joint	Functional Classification	Movements Permitted	Planes of Motion Associated with	Axes of Motion Associated with
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			Identified Movements	Identified Movements
Wrist	<i>biaxial</i>	<i>flexion, extension, hyperextension; radial & ulnar deviation; circumduction</i>	<i>sagittal frontal sagittal & frontal</i>	<i>mediolateral anteroposterior ML & AP</i>
Radioulnar	<i>uniaxial</i>	<i>pronation, supination</i>	<i>transverse</i>	<i>longitudinal</i>
Elbow	<i>uniaxial</i>	<i>flexion, extension</i>	<i>sagittal</i>	<i>ML</i>
Shoulder	<i>triaxial</i>	<i>flexion, extension, hyperextension; abduction, adduction; medial & lateral rotation; horizontal adduction & abduction; circumduction</i>	<i>sagittal frontal transverse transverse sagittal & frontal</i>	<i>ML AP longitudinal longitudinal ML & AP</i>
Hip	<i>triaxial</i>	<i>flexion, extension, hyperextension; abduction, adduction; medial & lateral rotation; horizontal adduction & abduction; circumduction</i>	<i>sagittal frontal transverse transverse sagittal & frontal</i>	<i>ML AP longitudinal longitudinal ML & AP</i>
Knee	<i>biaxial</i>	<i>flexion, extension, hyperextension; medial & lateral rotation</i>	<i>sagittal transverse</i>	<i>ML longitudinal</i>
Ankle	<i>uniaxial</i>	<i>dorsiflexion, plantar flexion</i>	<i>sagittal</i>	<i>ML</i>
MCP/MTP	<i>biaxial</i>	<i>flexion, extension, hyperextension; radial & ulnar deviation; circumduction</i>	<i>sagittal frontal sagittal & frontal</i>	<i>ML AP ML & AP</i>
PIP/DIP	<i>uniaxial</i>	<i>flexion, extension, hyperextension</i>	<i>sagittal</i>	<i>ML</i>

* MTP/MCP – all metatarsophalangeal/metacarpophalangeal joints except MCP 1

** PIP/DIP – all proximal interphalangeal/distal interphalangeal joint (also IP joints)

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