Al-Mustaqbal University
College of Engineering & Technology
Biomedical Engineering Department

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Lecture No.: - 4

Lecture Title: [Anthropometric Measurements]

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Exp.No.4 Anthropometric Measurements

Anthropometric Measurements: Physical measurements are defined as the science that studies the measurements of the human body and its parts and shows the structural differences in it using anthropometric measuring instruments.

The study of anthropometric measurements is an opportunity to study the relationship between body shape and size with motor and skill performance, as well as being an important tool in assessing individual growth.

Foundations of Anthropometric Measurements:

- Knowledge based on anthropometric measurements in laboratory status and how to use measurement methods.
- Standardization of conditions of anthropometric measurement of individuals determination of the anatomical points in the human body
- Check the accuracy of the measuring instruments and tools used in the measurement
- Use appropriate statistical methods when processing data

The aims of Anthropometric Measurements:

- To identify the physical growth rates of different age groups and the extent to which these rates are affected by the different environmental factors
- Check the effect of some factors on the structure of the body such as: school life, type and nature of work, sports practice
- Identify the effect of sports practice and the different methods of sports training on the structure body

Table 1 Description of Anthropometric Parameters and How To Measure Them:

Parameter	Description
Body mass	Measure (on a scale accurate to 0.01 kg) the mass of subject with all clothes except underwear removed
ASIS breadth	With a beam caliper, measure the horizontal distance between the anterior superior iliac spines
Thigh length	With a beam caliper, measure the vertical distance between the superior point of the greater trochanter of the femur and the superior margin of the lateral tibia
Midthigh circumference	With a tape perpendicular to the long axis of the leg and at a level midway between the trochanteric and tibial landmarks, measure the circumference of the thigh
Calf length	With a sliding caliper, measure the vertical distance between the superior margin of the lateral tibia and the lateral malleo lus
Calf circumference	With a tape perpendicular to the long axis of the lower leg, measure the maximum circumference of the calf
Knee diameter	With a spreading caliper, measure the maximum breadth of the knee across the femoral epicondyles
Foot length	With a beam caliper, measure the distance from the posterior margin of the heel to the tip of the longest toe
Malleolus height	With the subject standing, use a sliding caliper to measure the vertical distance from the standing surface to the lateral malleolus
Malleolus width	With a sliding caliper, measure the maximum distance between the medial and lateral malleoli
Foot breadth	With a beam caliper, measure the breadth across the distal ends of metatarsals I and V

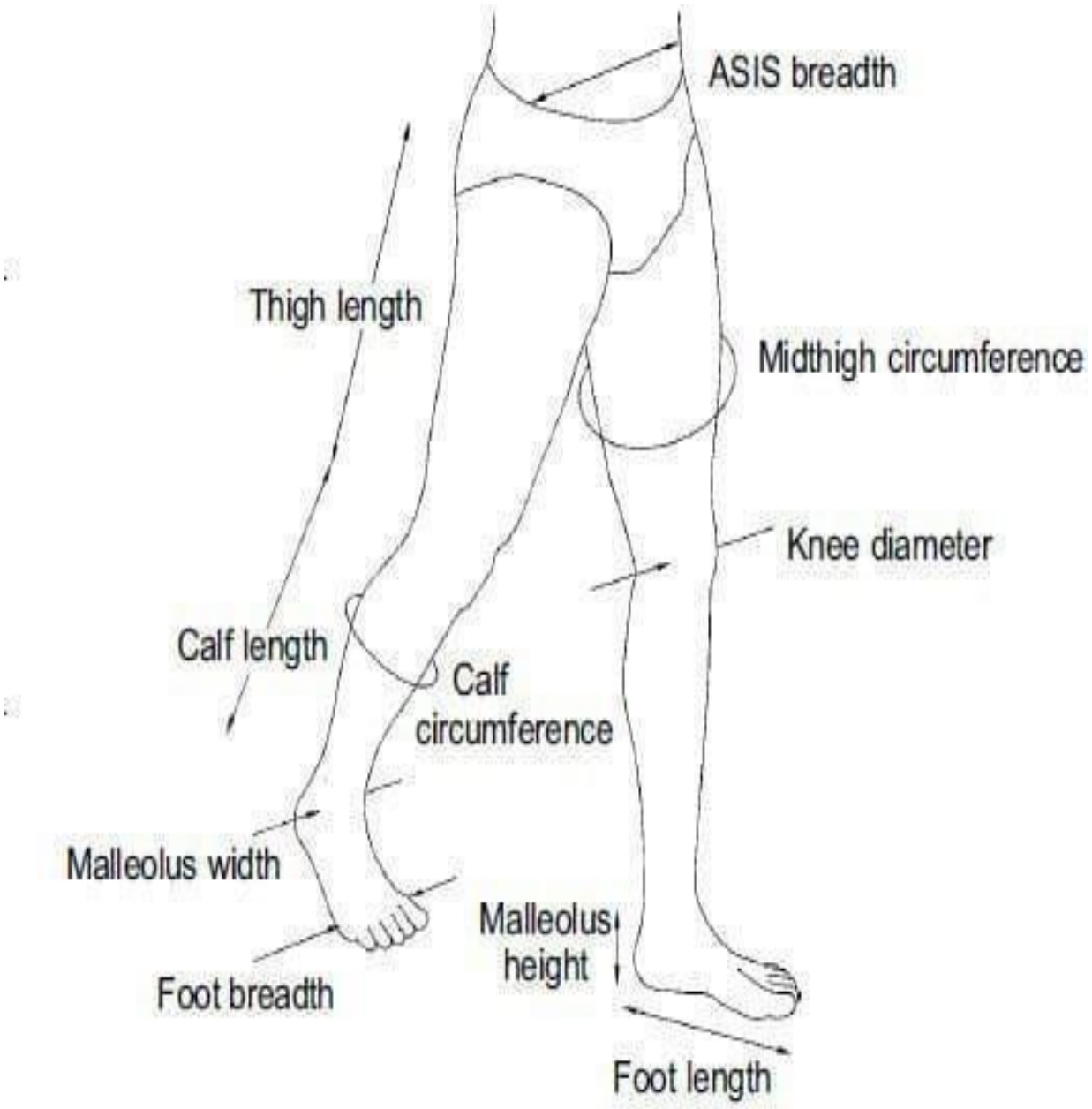


Table 2 Anthropometric Data Required to Predict Body Segment Parameters for a Normal Male:

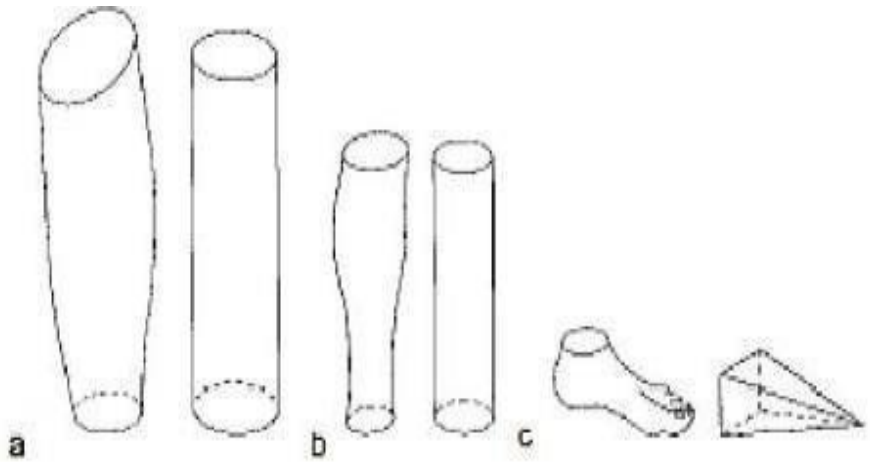
Number	Anthropometric measurement	Value	Units
1	Total body mass	64.90	kg
2	ASIS breadth	0.240	m
3	R. Thigh length	0.460	m
4	L. Thigh length	0.465	m
5	R. Midthigh circumference	0.450	m
6	L. Midthigh circumference	0.440	m
7	R. Calf length	0.430	m
8	L. Calf length	0.430	m
9	R. Calf circumference	0.365	m
10	L. Calf circumference	0.365	m
11	R. Knee diameter	0.108	m
12	L. Knee diameter	0.112	m
13	R. Foot length	0.260	m
14	L. Foot length	0.260	m
15	R. Malleolus height	0.060	m
16	L. Malleolus height	0.060	m
17	R. Malleolus width	0.074	m
18	L. Malleolus width	0.073	m
19	R. Foot breadth	0.098	m
20	L. Foot breadth	0.096	m

To Measured the mass and moment of inertia of segment we used these equation

$$Mass\ of\ thigh = (0.1032)(Total\ body\ mass) + (12.76)(Thigh\ length) \times (Midthigh\ circumference)^2 + (-1.023)$$

$$Mass\ of\ calf = (0.0226)(Total\ body\ mass) + (31.33)(Calf\ length) \times (Calf\ circumference)^2 + (0.016)$$

$$Mass\ of\ foot = (0.0083)(Total\ body\ mass) + (254.5)(Malleolus\ hight) \times (Foot\ length) + (-0.065)$$



Moment of inertia of cylinder about flexion/extension axis =

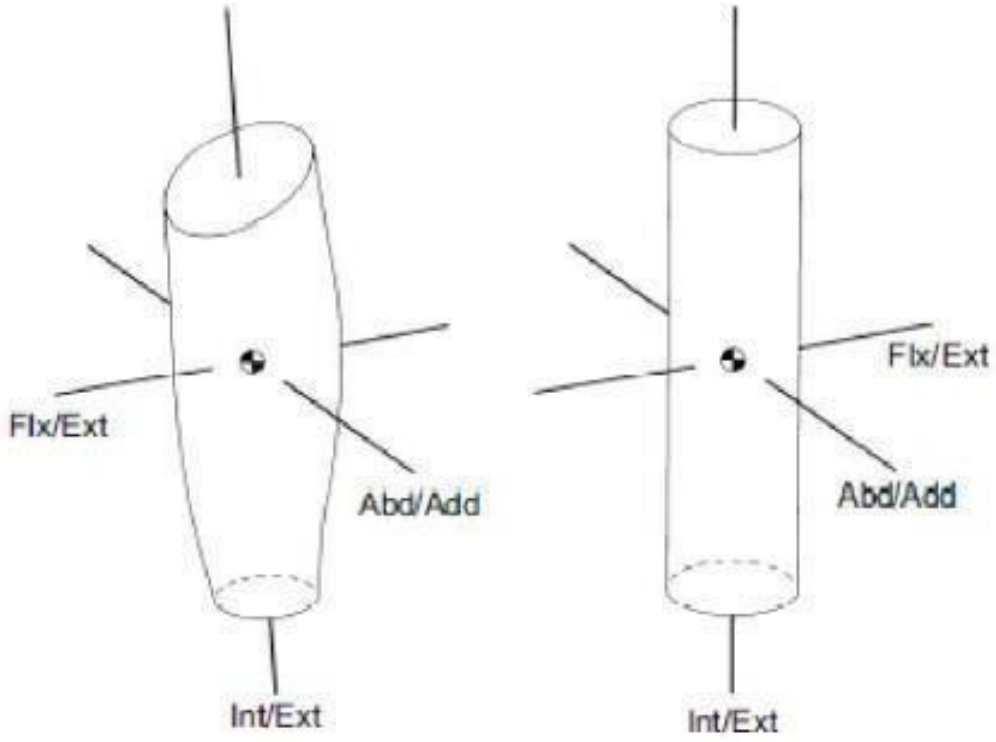
$$\frac{1}{12}(Mass)[(Length)^2 + 0.076(Circumference)^2]$$

Moment of inertia of cylinder about the abduction/adduction axis =

$$\frac{1}{12}(Mass)[(Length)^2 + 0.076(Circumference)^2]$$

Moment of inertia of cylinder about the internal/external rotation axis =

$$\frac{1}{8\pi^2}(Mass)(Circumference)^2$$



DISSCUSTION

1. What is the Anthropometric? And what are Features needed for estimating body segment parameters?

2 What is the benefit of these measurements? And in what field can be used?

3 Make a table to anthropometric data required to predict body segment parameters for your lower extremity.

4 Measured the mass and moment of inertia of segment you measured in question 3.