

Anthropometry and Workspace design



University of
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Lab Human

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❖ Objectives:

1. To learn how to use measuring instruments.
2. To learn how to find and describe reference points for taking anthropometric measurements.
3. To decide a proper set of anthropometric measurements to be able to design a workplace, a product, or a tool.
4. To express anthropometric measures in percentiles of any similar population for which data are available.
5. To design the place where a person works for a long time in a way that suits his body.

❖ Background:

Anthropometry encompasses the examination of the physical measurements, proportions, and makeup of the human body. The aim of using anthropometric data is to enhance the design of objects and environments for human use, ensuring they are more comfortable, efficient, user-friendly, and safer compared to earlier designs.

❖ Principles in Applying Anthropometric Data:

1. Design for Extremes:
 - Maximum: Design for maximum values to accommodate all individuals.
 - Minimum: Design for minimum values to ensure inclusivity.
2. Adjustable Range Design:
 - Use a range from the 5th percentile female to the 95th percentile male for accommodating 95% of a mixed-gender population.
3. Design for the Average:
 - Base designs on average-sized individuals, with adjustments for outliers.

❖ Types of Anthropometric Variability:

- Sex Differences
- Ethnic Variations
- Secular Trends
- Aging Effects

❖ Equipment:

1. Anthropometer:
 - Large: Range 0-60 cm, ideal for shoulder width, long bone length, and chest depth.

- Small: Range 0-30 cm, suitable for wrist, elbow, knee, and ankle widths, as well as smaller muscle masses.

2. Measuring Tape:



❖ Tables:

Gender	popliteal height	buttock popliteal length	elbow finger length	hip breadth	sitting elbow height
F	42	47	44	31	30
F	44	47	45	30	34
F	42.5	49.5	44	30	26
F	43.5	50	42.2	35	30
F	38	48	41.5	29	29
F	41	43	40	33	24
F	42	47	44	31	30
F	41	47.5	45.5	33	29
F	41	47	45	31.2	33
F	43.5	44	45.5	32.1	26
F	42.5	49.5	48.7	31.3	32
F	43.5	50.5	42.4	30.2	30
F	40	44	50.5	33.5	28
F	40	47	44	33	30
M	46	55	49	33	27
M	46	54	48	35	26
M	47	54	47	36	27
M	45	54	48	38	26
M	42	44	47	36	30
M	44	42	46	31	30
M	48	45	50	31	28
M	48	43	46	30	27
M	44	40	42	31	27
M	46	41	42	30	29
M	41	40	44	34	27
M	44	43	49	33	28
M	45	44	44	32	28

F&M	popliteal height	butteck popliteal length	elbow finger length	hip breadth	sitting elbow height
Mean	43.352	46.667	45.344	32.344	28.556
Std dev.	2.518	4.341	2.788	2.222	2.293
Max	48	55	50.5	38	34
Min	38	40	40	29	24
5th precentile	40	40.3	41.65	30	26
50th percentile	43.5	47	45	32	28
95th percentile	47.7	54	49.7	36	32.7

Parameters	popliteal height	butteck popliteal length	elbow finger length	hip breadth	sitting elbow height
CV	5.8%	9.3%	6.1%	6.9%	8.0%

Gender	popliteal height	butteck popliteal length	elbow finger length	hip breadth	sitting elbow height
M	46	55	49	33	27
M	46	54	48	35	26
M	47	54	47	36	27
M	45	54	48	38	26
M	42	44	47	36	30
M	44	42	46	31	30
M	48	45	50	31	28
M	48	43	46	30	27
M	44	40	42	31	27
M	46	41	42	30	29
M	41	40	44	34	27
M	44	43	49	33	28
M	45	44	44	32	28

M	popliteal height	butteck popliteal length	elbow finger length	hip breadth	sitting elbow height
Mean	45.077	46.077	46.308	33.077	27.692
Std dev.	2.100	5.866	2.626	2.565	1.316
Max	48	55	50	38	30
Min	41	40	42	30	26
5th precentile	41.6	40	42	30	26
50th percentile	45	44	47	33	27
95th percentile	48	54.4	49.4	36.8	30

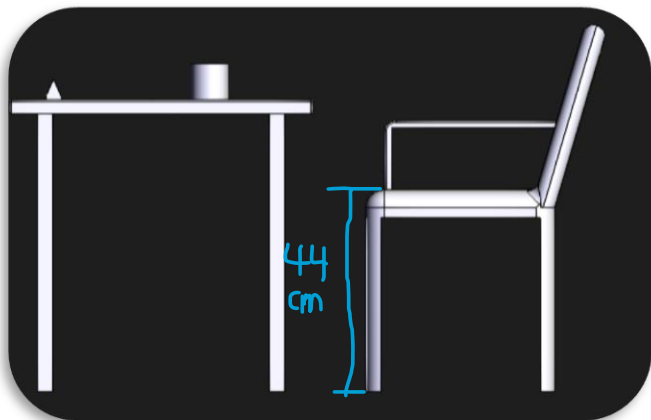
Gender	popliteal height	butteck popliteal length	elbow finger length	hip breadth	sitting elbow height
F	42	47	44	31	30
F	44	47	45	30	34
F	42.5	49.5	44	30	26
F	43.5	50	42.2	35	30
F	38	48	41.5	29	29
F	41	43	40	33	24
F	42	47	44	31	30
F	41	47.5	45.5	33	29
F	41	47	45	31.2	33
F	43.5	44	45.5	32.1	26
F	42.5	49.5	48.7	31.3	32
F	43.5	50.5	42.4	30.2	30
F	40	44	50.5	33.5	28
F	40	47	44	33	30

F	popliteal height	buttock popliteal length	elbow finger length	hip breadth	sitting elbow height
Mean	41.750	47.214	44.450	31.664	29.357
Std dev.	1.696	2.293	2.718	1.665	2.735
Max	44	50.5	50.5	35	34
Min	38	43	40	29	24
5th percentile	39.3	43.65	40.975	29.65	25.3
50th percentile	42	47	44	31.25	30
95th percentile	43.675	50.175	49.33	34.025	33.35

❖ Design:

■ popliteal height:

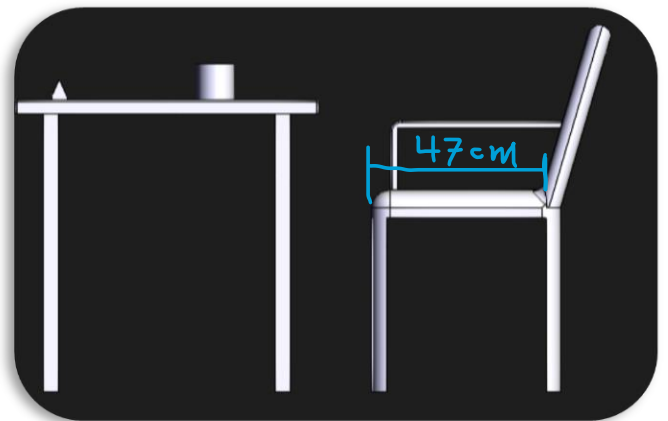
- distance from the underside of the foot to the underside of the thigh at the knees.
- Its seat height: 50th percentile popliteal height.



■ Buttock popliteal length:

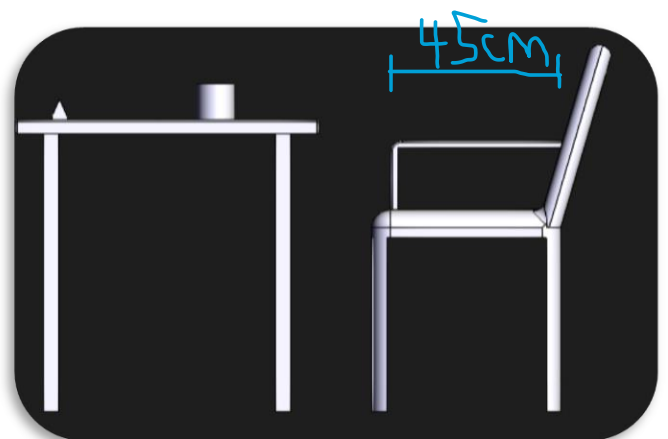
- The horizontal distance from the plane of the most posterior point on the buttocks to the back of the lower leg at the knee. To measure, the subject sits erect with the knees at right angles, with the upper leg parallel to the floor, and feet flat on the floor.

- Its seat depth: 50th percentile buttock popliteal distance.



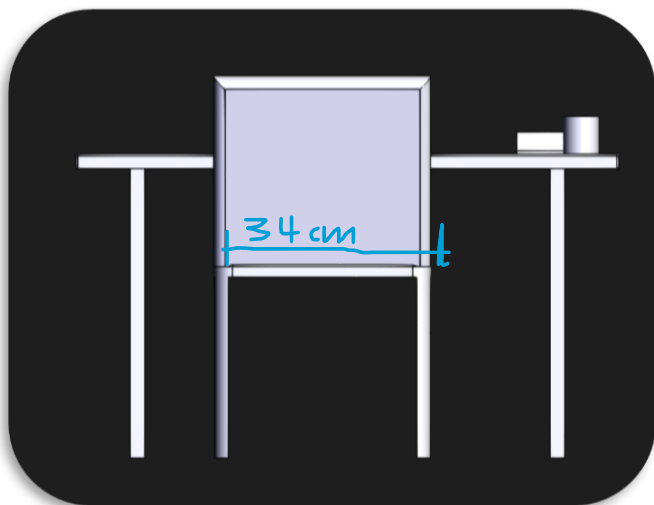
■ Elbow Fingertip Length:

- Distance from the point of the elbow to the tip of the middle finger.
- Its arm rest length: 50th percentile elbow fingertip length.



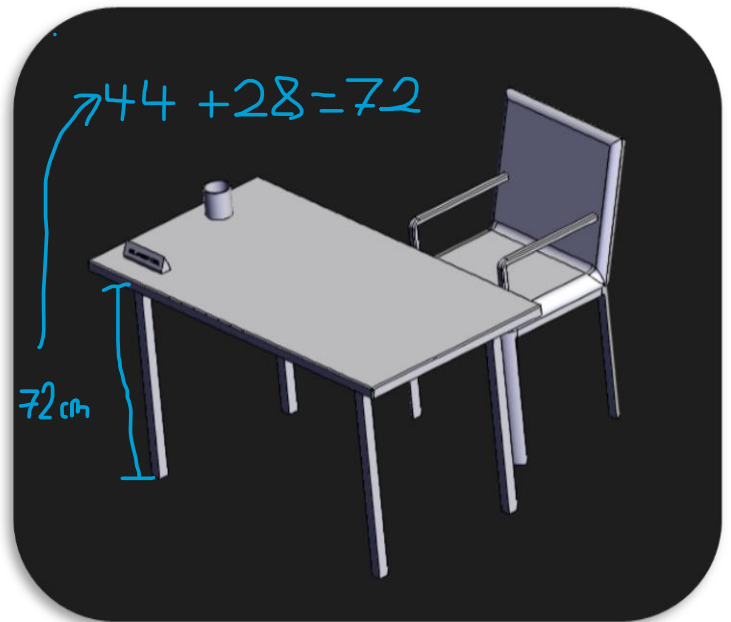
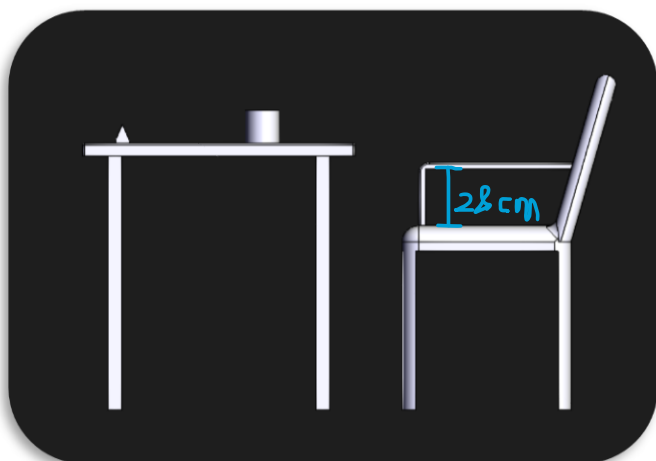
■ hip breadth:

- remove your outer garments, put your feet together, and wrap a soft measuring tape straight and snug around the widest part of your hips.
- Its seat width: 95th percentile female hip breadth.



■ Sitting elbow height:

- vertical distance from the cushion to the lower end of the elbow
- Its arm rest height: 50th percentile sitting elbow height.



❖ Errors:

in the experiment resulted in inaccuracies in readings and data analysis. Some listed issues include:

- Failure to keep neutral posture during anthropometric measurements.
- Not removing shoes before measuring.
- Wearing inadequate clothing.
- Human error and uncertainties in measuring devices.
- Measurements taken by different individuals, leading to inconsistencies.
- Samples did not perfectly follow a normal distribution, especially clear in hip breadth, despite assuming normality when calculating percentiles.

❖ American Sofa:



▪ Table:

Comparing between Our Sofa data and American atanderd Sofa Data.

	american standerd sofa	sofa dimension in home
W	66	66
H	76.2	76
D	60	59

- So, the sofa in home matching the American standard dimensions.