

APPENDIX J

ESTIMATES OF STATURE FROM MAXIMUM LENGTHS OF LONG BONE MEASUREMENTS

J-1. General

Studies conducted indicate that the established height of deceased persons may be determined from bone measurements of their skeletal remains. The studies were based on measurements of military personnel taken when they entered the service and on the maximum lengths of long bones of the skeletal remains of these persons. Data for a large number of American White and Negro males and a small number of Mongoloids, Mexicans, and Puerto Ricans were used.

J-2. Formulas

Formulas¹ for estimating the stature of each of the five racial groups of American males were determined from data obtained from studies. Scales were developed using formulas, furnished for each racial group, with the exception of Puerto Ricans because of the small number of samples used for this group. However, since the values for Puerto Ricans differ only slightly from those for the American Negro, the table for estimating the stature of the American Negro is used for a Puerto Rican. Estimates of stature from long bones of each racial group are

given in tables J-1 through J-4. To achieve precise stature estimates, the user must *not* average stature estimates obtained from several bones. Table J-5 gives estimates of stature based on the sum of measurements of the femur plus the fibula. Table J-6 gives estimates of stature from maximum lengths of the sum of measurements of the femur plus the tibia.

J-3. Bone Length-Stature Relationship

Studies of bone length-stature relationship show the leg bones correlate better with the stature than do the arm bones. Therefore, the lengths of the leg bones are preferred over those of the arm bones. However, when: leg bones are missing or badly fractured, then arm bone measurements are used.

J-4. Applying the Formulas

First the race of the skeletal remains is determined and the lengths of the long bones are measured in centimeters. Then the appropriate formula is selected from table J-7 in the order of preference shown for each racial group. Only one formula should be used for an individual remains, and it should be the formula with the least standard error of estimate according to the bones that are available.

¹In the published studies, the authors speak of the formulas as either regression equations or regression formulas.

Table J-1. Estimation of Stature From Long Bones of American White Males¹

[Raised number indicates numerator of fraction of inch expressed in 10ths; thus, 60⁹ reads 60 9/10 inches]

Humerus		Radius		Ulna		Femur		Tibia		Fibula	
CMS	Inches	CMS	Inches	CMS	Inches	CMS	Inches	CMS	Inches	CMS	Inches
25.6	59 ⁹										
25.9	60 ⁷					37.3	59 ⁹				
26.2	60 ⁵	19.1	59 ⁹	20.8	59 ⁹	37.7	60 ⁷	28.7	59 ⁹	29.5	59 ⁹
26.5	60 ³	19.3	60 ¹	21.1	60 ⁷	38.1	60 ⁵	29.1	60 ⁵	29.9	60 ¹
26.8	61 ⁷	19.6	60 ⁵	21.3	60 ⁵	38.5	61 ⁵	29.5	60 ³	30.3	60 ⁷
27.1	61 ⁵	19.8	60 ³	21.6	61 ³	38.9	61 ³	29.9	60 ⁷	30.7	61 ¹
27.5	62 ⁵	20.1	61 ¹	21.9	61 ¹	39.3	61 ⁷	30.3	61 ¹	31.3	61 ⁵
27.8	62 ³	20.4	61 ⁷	22.2	61 ⁵	39.8	62 ⁷	30.7	61 ⁵	31.4	61 ³
28.1	62 ⁷	20.6	62 ⁵	22.4	62 ¹	40.2	62 ⁵	31.1	61 ⁷	31.8	62 ¹
28.4	63 ¹	20.9	62 ³	22.7	62 ⁵	40.6	62 ³	31.5	62 ¹	32.3	62 ⁷
28.8	63 ⁵	21.2	62 ⁷	23.0	63 ³	41.0	63 ⁷	31.9	62 ⁵	32.6	63 ¹
29.1	63 ³	21.4	63 ⁷	23.2	63 ¹	41.4	63 ⁵	32.3	63 ⁵	32.9	63 ⁵
29.4	64 ⁷	21.7	63 ¹	23.5	63 ⁷	41.9	64 ¹	32.7	63 ¹	33.3	63 ³
29.7	64 ⁵	22.0	64 ¹	23.8	64 ¹	42.3	64 ⁵	33.1	63 ⁵	33.7	64 ⁷
30.1	65 ⁵	22.2	64 ⁵	24.0	64 ⁵	42.7	64 ³	33.5	64 ⁷	34.0	64 ⁵
30.4	65 ³	22.5	64 ³	24.3	64 ³	43.1	65 ⁷	33.9	64 ⁵	34.4	64 ³
30.7	65 ⁷	22.8	65 ¹	24.6	65 ¹	43.5	65 ⁵	34.3	64 ³	34.8	65 ¹
31.0	66 ⁵	23.0	65 ⁵	24.9	65 ⁷	44.0	66 ⁵	34.7	65 ¹	35.2	65 ⁵
31.4	66 ³	23.3	66 ³	25.1	66 ⁵	44.4	66 ³	35.1	65 ⁵	35.5	66 ¹
31.7	66 ⁷	23.5	66 ⁷	25.4	66 ³	44.8	66 ⁷	35.5	66 ¹	35.9	66 ⁵
32.0	67 ⁷	23.8	66 ⁵	25.7	66 ⁷	45.2	67 ¹	35.9	66 ⁵	36.3	66 ³
32.3	67 ⁵	24.1	67 ⁷	25.9	67 ⁷	45.6	67 ⁵	36.3	66 ³	36.7	67 ¹
32.7	68 ⁵	24.3	67 ⁵	26.2	67 ⁵	46.1	67 ³	36.7	67 ⁷	37.0	67 ⁵
33.0	68 ³	24.6	68 ⁵	26.5	68 ³	46.5	68 ¹	37.1	67 ¹	37.4	68 ⁵
33.3	68 ⁷	24.9	68 ³	26.7	68 ⁷	46.9	68 ⁵	37.5	68 ³	37.8	68 ³
33.6	69 ⁵	25.1	68 ⁷	27.0	68 ⁷	47.3	69 ⁵	37.9	68 ⁷	38.1	68 ⁷
33.9	69 ³	25.4	69 ⁷	27.3	69 ³	47.7	69 ³	38.3	68 ⁷	38.5	69 ⁷
34.3	69 ⁷	25.7	69 ⁵	27.6	69 ⁷	48.2	69 ⁷	38.6	69 ⁵	38.9	69 ⁵
34.6	70 ¹	25.9	69 ³	27.8	69 ⁷	48.6	70 ⁷	39.0	69 ³	39.3	70 ⁵
34.9	70 ⁵	26.2	70 ¹	28.1	70 ³	49.0	70 ⁵	39.4	69 ⁷	39.6	70 ³
35.2	70 ³	26.5	70 ⁵	28.4	70 ⁷	49.4	70 ³	39.8	70 ⁷	40.0	70 ⁷
35.6	71 ³	26.7	71 ¹	28.6	71 ¹	49.8	71 ³	40.2	70 ⁵	40.4	71 ¹
35.9	71 ⁵	27.0	71 ⁵	28.9	71 ⁵	50.3	71 ⁷	40.6	70 ³	40.8	71 ⁵
36.2	71 ³	27.2	71 ³	29.2	71 ³	50.7	72 ¹	41.0	71 ³	41.1	71 ³
36.5	72 ³	27.5	72 ³	29.4	72 ³	51.1	72 ⁵	41.4	71 ⁷	41.5	72 ⁷
36.9	72 ⁷	27.8	72 ⁷	29.7	72 ⁷	51.5	72 ⁵	41.8	72 ¹	41.9	72 ⁵
37.2	73 ¹	28.0	73 ³	30.0	73 ¹	51.9	73 ⁷	42.2	72 ⁵	42.2	72 ⁷
37.5	73 ⁵	28.3	73 ⁵	30.3	73 ⁵	52.4	73 ¹	42.6	72 ⁵	42.6	73 ¹
37.8	73 ³	28.6	73 ³	30.5	73 ³	52.8	74 ⁵	43.0	73 ³	43.0	73 ⁷
38.3	74 ⁷	28.8	74 ¹	30.8	74 ⁷	53.2	74 ³	43.4	73 ⁷	43.4	74 ¹
38.5	74 ⁵	29.1	74 ⁷	31.1	74 ¹	53.6	74.8	43.8	74 ⁵	43.7	74 ⁵
38.8	74 ³	29.4	75 ¹	31.3	75 ⁵	54.0	75 ¹	44.2	74 ³	44.1	74 ³
39.1	75 ⁷	29.6	75 ³	31.6	75 ³	54.5	75 ⁵	44.6	74 ⁷	44.5	75 ³
39.5	75 ¹	29.9	75 ⁷	31.9	75 ⁷	54.9	75 ³	45.0	75 ¹	44.9	75 ⁷
39.8	76 ⁵	30.2	76 ¹	32.1	76 ¹	55.3	76 ⁵	45.4	75 ⁵	45.2	76 ⁵
40.1	76 ³	30.4	76 ⁵	32.4	76 ³	55.7	76 ⁷	45.8	75 ³	45.6	76 ¹
40.4	76 ⁷	30.7	77 ¹	32.7	77 ⁵	56.1	77 ⁵	46.2	76 ³	46.0	76 ⁵
40.8	77 ³	30.9	77 ³	33.0	77 ³	56.6	77 ⁷	46.6	76 ⁷	46.3	77 ¹
41.1	77 ⁷	31.2	77 ⁷	33.2	77 ⁷	57.0	77 ¹	47.0	77 ⁵	46.7	77 ⁵
41.4	77 ⁵	31.5	78 ¹	33.5	78 ¹	57.4	78 ⁵	47.4	77 ³	47.1	77 ³

¹ When the stature estimate of a White male is compared with the stature measurement taken before the man was 21 years of age, the measured stature should increased according to the time lapse between measurement and death (table J-8). The stature estimate for a man over 30 years of age should be reduced by .06 (1/16) in years—30) cm.

The above information and scale, obtained by applying formulas for estimating stature (cm) to given bone lengths (cm), are based a study made by Mildred Trotter and Goldine C. Gleser, 1958.

Table J-2. Estimation of Stature From Long Bones of American Negro Males¹

[Raised number indicates numerator of fraction of inch expressed in 10ths; thus, 60⁹ reads 60 9/10 inches]

Humerus		Radius		Ulna		Femur		Tibia		Fibula	
CMS	Inches	CMS	Inches	CMS	Inches	CMS	Inches	CMS	Inches	CMS	Inches
26.4	59 ⁶										
26.7	60 ⁰										
27.0	60 ³	20.0	59 ⁸	21.7	59 ⁸	37.9	59 ⁸				
27.3	60 ⁷	20.3	60 ³	22.0	60 ³	38.3	60 ¹	29.6	59 ¹		
27.6	61 ⁰	20.6	60 ⁶	22.3	60 ⁷	38.7	60 ⁴	30.1	59 ⁶	30.3	59 ⁴
27.9	61 ⁴	20.9	61 ⁰	22.6	61 ¹	39.1	60 ⁸	30.6	60 ⁰	30.8	59 ⁸
28.2	61 ⁷	21.2	61 ³	22.9	61 ⁴	39.6	61 ³	31.0	60 ³	31.2	60 ³
28.5	62 ⁰	21.5	61 ⁷	23.2	61 ⁸	40.1	61 ⁶	31.5	60 ⁶	31.7	60 ⁷
28.8	62 ⁴	21.8	62 ¹	23.5	62 ³	40.6	62 ⁰	32.0	61 ²	32.1	61 ¹
29.1	62 ⁷	22.1	62 ⁵	23.8	62 ⁶	41.0	62 ³	32.4	61 ⁵	32.6	61 ⁶
29.4	63 ¹	22.4	62 ⁸	24.2	63 ¹	41.5	62 ⁷	32.9	62 ⁰	33.0	61 ⁸
29.7	63 ⁴	22.6	63 ²	24.5	63 ⁴	42.0	63 ²	33.3	62 ³	33.5	62 ⁴
30.0	63 ⁷	22.9	63 ⁶	24.8	63 ⁸	42.5	63 ⁶	33.8	62 ⁷	33.9	62 ⁸
30.3	64 ¹	23.2	64 ⁰	25.1	64 ³	43.0	64 ⁰	34.2	63 ¹	34.4	63 ³
30.6	64 ⁴	23.5	64 ⁴	25.4	64 ⁶	43.4	64 ³	34.7	63 ⁵	34.9	63 ⁷
31.0	64 ⁸	23.8	64 ⁷	25.7	65 ⁰	43.9	64 ⁷	35.2	64 ⁰	35.3	64 ⁰
31.3	65 ²	24.1	65 ¹	26.0	65 ³	44.4	65 ¹	35.6	64 ³	35.8	64 ⁵
31.6	65 ⁵	24.4	65 ⁵	26.3	65 ⁷	44.9	65 ⁶	36.1	64 ⁷	36.2	64 ⁸
31.9	65 ⁸	24.7	65 ⁸	26.6	66 ¹	45.3	65 ⁸	36.5	65 ¹	36.7	65 ³
32.2	66 ²	25.0	66 ³	26.9	66 ⁵	45.8	66 ³	37.0	65 ⁵	37.1	65 ⁷
32.5	66 ⁶	25.3	66 ⁷	27.2	66 ⁸	46.3	66 ⁷	37.4	65 ⁸	37.6	66 ²
32.8	66 ⁹	25.6	67 ¹	27.5	67 ²	46.8	67 ¹	37.9	66 ³	38.1	66 ⁶
33.1	67 ³	25.9	67 ⁵	27.8	67 ⁶	47.2	67 ⁵	38.3	66 ⁶	38.5	67 ⁰
33.4	67 ⁶	26.2	67 ⁸	28.1	68 ⁰	47.7	67 ⁸	38.8	67 ¹	39.0	67 ³
33.7	67 ⁹	26.4	68 ¹	28.4	68 ³	48.2	68 ³	39.3	67 ⁵	39.4	67 ⁶
34.0	68 ³	26.7	68 ⁵	28.7	68 ⁷	48.7	68 ⁷	39.7	67 ⁸	39.9	68 ³
34.3	68 ⁶	27.0	68 ⁸	29.1	69 ²	49.1	69 ⁰	40.2	68 ³	40.3	68 ⁷
34.6	68 ⁹	27.3	69 ³	29.4	69 ⁶	49.6	69 ⁶	40.6	68 ⁶	40.8	69 ¹
34.9	69 ³	27.6	69 ⁷	29.7	70 ⁰	50.1	69 ⁸	41.1	69 ⁰	41.3	69 ⁶
35.2	69 ⁶	27.9	70 ¹	30.0	70 ⁴	50.6	70 ³	41.5	69 ⁴	41.7	69 ⁸
35.6	70 ¹	28.2	70 ⁵	30.3	70 ⁸	51.0	70 ⁶	42.0	69 ⁸	42.2	70 ²
35.9	70 ⁴	28.5	70 ⁸	30.6	71 ¹	51.5	71 ⁰	42.5	70 ³	42.6	70 ⁶
36.2	70 ⁸	28.8	71 ³	30.9	71 ⁵	52.0	71 ⁴	42.9	70 ⁶	43.1	71 ²
36.5	71 ¹	29.1	71 ⁷	31.2	71 ⁸	52.5	71 ⁸	43.4	71 ⁰	43.5	71 ⁶
36.8	71 ⁵	29.4	72 ¹	31.5	72 ³	52.9	72 ²	43.8	71 ⁴	44.0	72 ¹
37.1	71 ⁹	29.7	72 ⁵	31.8	72 ⁶	53.4	72 ⁶	44.3	71 ⁸	44.5	72 ⁵
37.4	72 ³	30.0	72 ⁹	32.1	73 ⁰	53.9	73 ⁰	44.7	72 ¹	44.9	72 ⁹
37.7	72 ⁷	30.2	73 ¹	32.4	73 ⁴	54.4	73 ⁴	45.2	72 ⁵	45.4	73 ³
38.0	72 ⁹	30.5	73 ⁵	32.7	73 ⁸	54.8	73 ⁷	45.6	72 ⁹	45.8	73 ⁷
38.3	73 ¹	30.8	73 ⁹	33.0	74 ²	55.3	74 ²	46.1	73 ⁴	46.3	74 ²
38.6	73 ⁵	31.1	74 ³	33.3	74 ⁶	55.8	74 ⁶	46.6	73 ⁸	46.7	74 ⁶
38.9	73 ⁹	31.4	74 ⁷	33.6	74 ⁹	56.3	75 ⁰	47.0	74 ¹	47.2	75 ⁰
39.2	74 ³	31.7	75 ¹	34.0	75 ⁴	56.7	75 ³	47.5	74 ⁵	47.6	75 ⁴
39.5	74 ⁷	32.0	75 ⁵	34.3	75 ⁸	57.2	75 ⁷	47.9	74 ⁹	48.1	75 ⁸
39.8	74 ⁹	32.3	75 ⁹	34.6	76 ²	57.7	76 ¹	48.4	75 ³	48.6	76 ³
40.1	75 ³	32.6	76 ³	34.9	76 ⁶	58.2	76 ⁶	48.8	75 ⁷	49.0	76 ⁷
40.5	75 ⁷	32.9	76 ⁷	35.2	76 ⁹	58.6	76 ⁹	49.3	76 ¹	49.5	77 ¹
40.8	76 ⁰	33.2	77 ⁰	35.5	77 ³	59.1	77 ³	49.8	76 ⁵	49.9	77 ⁵
41.1	76 ⁴	33.5	77 ⁴	35.8	77 ⁷	59.6	77 ⁷	50.2	76 ⁹	50.4	78 ⁰
41.4	76 ⁸	33.7	77 ⁸	36.1	78 ⁰	60.1	78 ¹	50.7	77 ³	50.8	78 ⁴
41.7	77 ²	34.0	78 ¹	36.4	78 ⁴	60.5	78 ⁵	51.1	77 ⁷	51.3	78 ⁸

¹ The stature estimate for a man over 30 years of age should be reduced by .06 (age in years—30) cm.

The above information and scale, obtained by applying formulas for estimating stature (cm) to given bone lengths (cm), are based on a study made by Mildred Trotter and Goldine C. Gleser, 1958.

Table J-3. Estimation of Stature From Long Bones of American Mongoloid Males¹

[Raised number indicates numerator of fraction of inch expressed in 10ths; thus, 60° reads 60 9/10 inches]

Humerus		Radius		Ulna		Femur		Tibia		Fibula	
CMS	Inches	CMS	Inches	CMS	Inches	CMS	Inches	CMS	Inches	CMS	Inches
25.5	59 ⁷										
25.8	60 ⁰										
26.1	60 ³					36.7	59 ⁴				
26.4	60 ⁶					37.1	60 ⁰				
26.7	60 ⁹	19.7	59 ⁷	21.4	59 ⁴	37.5	60 ³				
27.0	61 ²	20.0	60 ²	21.7	60 ²	37.9	60 ⁷				
27.3	61 ⁴	20.3	60 ⁴	22.0	60 ⁴	38.3	61 ⁰	29.6	59 ⁰	29.8	59 ⁰
27.6	61 ⁶	20.6	61 ⁰	22.3	61 ⁰	38.7	61 ³	30.1	60 ⁴	30.3	60 ³
27.9	62 ²	20.9	61 ⁴	22.6	61 ⁴	39.1	61 ⁷	30.6	60 ⁰	30.8	60 ⁰
28.2	62 ⁵	21.2	61 ⁸	22.9	61 ⁸	39.6	62 ¹	31.0	61 ²	31.2	61 ²
28.5	62 ⁸	21.5	62 ²	23.2	62 ²	40.1	62 ⁵	31.5	61 ⁷	31.7	61 ⁷
28.8	63 ¹	21.8	62 ⁷	23.5	62 ⁷	40.6	62 ⁹	32.0	62 ²	32.1	62 ⁰
29.1	63 ⁴	22.1	63 ¹	23.8	63 ¹	41.0	63 ³	32.4	62 ⁶	32.6	62 ²
29.4	63 ⁷	22.4	63 ⁵	24.2	63 ⁵	41.5	63 ⁷	32.9	63 ⁰	33.0	62 ⁶
29.7	64 ¹	22.6	63 ⁸	24.5	64 ¹	42.0	64 ¹	33.3	63 ⁴	33.5	63 ⁴
30.0	64 ⁴	22.9	64 ²	24.8	64 ⁴	42.5	64 ⁵	33.8	63 ⁸	33.9	63 ⁷
30.3	64 ⁷	23.2	64 ⁶	25.1	64 ⁷	43.0	65 ⁰	34.2	64 ²	34.4	64 ²
30.6	65 ⁰	23.5	65 ⁰	25.4	65 ³	43.4	65 ³	34.7	64 ⁷	34.9	64 ⁷
31.0	65 ⁴	23.8	65 ⁴	25.7	65 ⁷	43.9	65 ⁷	35.2	65 ²	35.3	65 ¹
31.3	65 ⁷	24.1	65 ⁸	26.0	66 ¹	44.4	66 ²	35.6	65 ⁶	35.8	65 ⁵
31.6	66 ¹	24.4	66 ³	26.3	66 ⁵	44.9	66 ⁶	36.1	66 ⁰	36.2	65 ⁹
31.9	66 ⁴	24.7	66 ⁷	26.6	66 ⁹	45.3	66 ⁹	36.5	66 ⁴	36.7	66 ⁴
32.2	66 ⁷	25.0	67 ¹	26.9	67 ³	45.8	67 ³	37.0	66 ⁸	37.1	66 ⁸
32.5	67 ⁰	25.3	67 ⁵	27.2	67 ⁷	46.3	67 ⁷	37.4	67 ²	37.6	67 ²
32.8	67 ⁴	25.6	68 ⁰	27.5	68 ⁰	46.8	68 ²	37.9	67 ⁷	38.1	67 ⁷
33.1	67 ⁷	25.9	68 ⁴	27.8	68 ⁴	47.2	68 ⁶	38.3	68 ¹	38.5	68 ¹
33.4	68 ⁰	26.2	68 ⁸	28.1	69 ⁰	47.7	68 ⁸	38.8	68 ⁶	39.0	68 ⁶
33.7	68 ³	26.4	69 ¹	28.4	69 ⁴	48.2	69 ⁴	39.3	69 ⁰	39.4	68 ⁹
34.0	68 ⁶	26.7	69 ⁵	28.7	69 ⁸	48.7	69 ⁸	39.7	69 ⁴	39.9	69 ⁴
34.3	68 ⁹	27.0	69 ⁸	29.1	70 ²	49.1	70 ¹	40.2	69 ⁸	40.3	69 ⁸
34.6	69 ³	27.3	70 ²	29.4	70 ⁵	49.6	70 ⁵	40.6	70 ²	40.8	70 ¹
34.9	69 ⁶	27.6	70 ⁶	29.7	71 ⁰	50.1	71 ⁰	41.1	70 ⁷	41.3	70 ⁷
35.2	70 ⁰	27.9	71 ²	30.0	71 ⁴	50.6	71 ⁴	41.5	71 ¹	41.7	71 ¹
35.6	70 ³	28.2	71 ⁶	30.3	72 ⁰	51.0	71 ⁷	42.0	71 ⁵	42.2	71 ⁵
35.9	70 ⁶	28.5	72 ⁰	30.6	72 ⁴	51.5	72 ²	42.5	72 ¹	42.6	72 ⁰
36.2	70 ⁹	28.8	72 ⁴	30.9	72 ⁸	52.0	72 ⁶	42.9	72 ⁵	43.1	72 ⁴
36.5	71 ³	29.1	72 ⁸	31.2	73 ²	52.5	73 ⁰	43.4	72 ⁹	43.5	72 ⁸
36.8	71 ⁶	29.4	73 ²	31.5	73 ⁶	52.9	73 ⁴	43.8	73 ³	44.0	73 ³
37.1	71 ⁹	29.7	73 ⁷	31.8	74 ¹	53.4	73 ⁸	44.3	73 ⁷	44.5	73 ⁷
37.4	72 ³	30.0	74 ¹	32.1	74 ⁵	53.9	74 ²	44.7	74 ¹	44.9	74 ¹
37.7	72 ⁶	30.2	74 ⁵	32.4	74 ⁹	54.4	74 ⁶	45.2	74 ⁵	45.4	74 ⁴
38.0	72 ⁹	30.5	74 ⁹	32.7	75 ³	54.8	75 ⁰	45.6	75 ⁰	45.8	75 ⁰
38.3	73 ³	30.8	75 ³	33.0	75 ⁷	55.3	75 ⁴	46.1	75 ⁴	46.3	75 ⁴
38.6	73 ⁶	31.1	75 ⁷	33.3	76 ¹	55.8	75 ⁸	46.6	75 ⁸	46.7	75 ⁸
38.9	73 ⁹	31.4	76 ⁰	33.6	76 ⁵	56.3	76 ²	47.0	76 ²	47.2	76 ¹
39.2	74 ³	31.7	76 ⁵	34.0	77 ¹	56.7	76 ⁶	47.5	76 ⁶	47.6	76 ⁷
39.5	74 ⁶	32.0	76 ⁹	34.3	77 ⁵	57.2	77 ⁰	47.9	77 ¹	48.1	77 ²
39.8	74 ⁹	32.3	77 ³	34.6	77 ⁹	57.7	77 ⁴	48.4	77 ⁵	48.6	77 ⁶
40.1	75 ³	32.6	77 ⁷	34.9	78 ³	58.2	77 ⁸	48.8	78 ⁰	49.0	78 ⁰
40.5	75 ⁶	32.9	78 ¹	35.2	78 ⁷	58.6	78 ²	49.3	78 ⁴	49.5	78 ⁴
40.8	75 ⁹	33.2	78 ⁵	35.5	79 ¹	59.1	78 ⁶	49.8	78 ⁸	49.9	78 ⁸
41.1	76 ³	33.5	79 ⁰	35.8	79 ⁵	59.6	79 ⁰	50.2	79 ³	50.4	79 ¹
41.4	76 ⁶	33.7	79 ⁴	36.1	80 ⁰	60.1	79 ⁴	50.7	79 ⁷	50.8	79 ⁷
41.7	76 ⁹	34.0	79 ⁸	36.4	80 ⁴	60.5	79 ⁸	51.1	80 ¹	51.3	80 ²

¹ The stature estimate for a man over 30 years of age should be reduced by .06 (age in years-30) cm.

The above information and scale, obtained by applying formulas for estimating stature (cm) to given bone lengths (cm), are based a study by Mildred Trotter and Goldine C. Gleser, 1958.

Table J-4. Estimation of Stature From Long Bones of American Mexican Males¹

[Raised number indicates numerator of fraction of inch expressed in 10ths; thus, 60^a reads 60 9/10 inches]

Humerus		Radius		Ulna		Femur		Tibia		Fibula	
CMS	Inches	CMS	Inches	CMS	Inches	CMS	Inches	CMS	Inches	CMS	Inches
26.7	59 ^a										
27.0	60 ¹	20.0	59 ⁷	21.7	59 ^a	37.9	59 ^a				
27.3	60 ^a	20.3	60 ¹	22.0	60 ²	38.3	59 ^a	29.6	59 ²		
27.6	60 ^a	20.6	60 ^a	22.3	60 ^a	38.7	60 ³	30.1	59 ¹	30.3	59 ^b
27.9	61 ²	20.9	61 ⁰	22.6	61 ⁰	39.1	60 ¹	30.6	60 ²	30.8	60 ⁰
28.2	61 ^a	21.2	61 ⁴	22.9	61 ⁴	39.6	61 ¹	31.0	60 ^b	31.2	60 ^a
28.5	61 ^a	21.5	61 ^a	23.2	61 ^a	40.1	61 ⁴	31.5	61 ⁰	31.7	60 ^a
28.8	62 ²	21.8	62 ²	23.5	62 ³	40.6	62 ¹	32.0	61 ^a	32.1	61 ¹
29.1	62 ⁴	22.1	62 ⁷	23.8	62 ⁷	41.0	62 ^a	32.4	61 ^a	32.6	61 ^a
29.4	62 ^a	22.4	63 ¹	24.2	63 ³	41.5	63 ⁰	32.9	62 ³	33.0	62 ²
29.7	63 ³	22.6	63 ^a	24.5	63 ⁷	42.0	63 ^a	33.3	62 ⁷	33.5	62 ⁷
30.0	63 ^a	22.9	63 ^a	24.8	64 ¹	42.5	63 ^a	33.8	63 ¹	33.9	63 ³
30.3	63 ^a	23.2	64 ²	25.1	64 ^a	43.0	64 ^a	34.2	63 ^b	34.4	63 ^b
30.6	64 ³	23.5	64 ^a	25.4	65 ⁰	43.4	64 ^a	34.7	64 ^a	34.9	64 ¹
31.0	64 ⁷	23.8	65 ⁰	25.7	65 ^a	43.9	65 ³	35.2	64 ^a	35.3	64 ^a
31.3	65 ¹	24.1	65 ^a	26.0	65 ^a	44.4	65 ^a	35.6	64 ^a	35.8	64 ^a
31.6	65 ⁴	24.4	65 ^a	26.3	66 ²	44.9	66 ²	36.1	65 ³	36.2	65 ³
31.9	65 ^a	24.7	66 ³	26.6	66 ^a	45.3	66 ^a	36.5	65 ⁷	36.7	65 ^a
32.3	66 ¹	25.0	66 ⁷	26.9	67 ¹	45.8	67 ¹	37.0	66 ¹	37.1	66 ²
32.5	66 ^b	25.3	67 ¹	27.2	67 ^a	46.3	67 ^a	37.4	66 ^a	37.6	66 ⁷
32.8	66 ^a	25.6	67 ^a	27.5	67 ^a	46.8	68 ¹	37.9	67 ⁰	38.1	67 ²
33.1	67 ²	25.9	68 ⁰	27.8	68 ³	47.2	68 ^a	38.3	67 ³	38.5	67 ^a
33.4	67 ^a	26.2	68 ^a	28.1	68 ⁷	47.7	68 ^a	38.8	67 ^a	39.0	68 ¹
33.7	67 ^a	26.4	68 ⁷	28.4	69 ²	48.2	69 ^a	39.3	68 ^a	39.4	68 ^a
34.0	68 ²	26.7	69 ¹	28.7	69 ^a	48.7	70 ⁰	39.7	68 ^a	39.9	69 ⁰
34.3	68 ^b	27.0	69 ^a	29.1	70 ¹	49.1	70 ³	40.2	69 ¹	40.3	69 ^a
34.6	68 ^a	27.3	69 ^a	29.4	70 ^a	49.6	70 ⁷	40.6	69 ^b	40.8	69 ^a
34.9	69 ²	27.6	70 ^a	29.7	71 ⁰	50.1	71 ²	41.1	69 ^a	41.3	70 ^a
35.2	69 ^a	27.9	70 ^a	30.0	71 ^a	50.6	71 ¹	41.5	70 ³	41.7	70 ⁷
35.6	70 ⁰	28.2	71 ²	30.3	71 ^a	51.0	72 ¹	42.0	70 ^a	42.2	71 ²
35.9	70 ^a	28.5	71 ⁴	30.6	72 ²	51.5	72 ^a	42.5	71 ²	42.6	71 ^a
36.2	70 ⁷	28.8	72 ⁰	30.9	72 ⁷	52.0	73 ¹	42.9	71 ^a	43.1	72 ¹
36.5	71 ¹	29.1	72 ⁴	31.2	73 ¹	52.5	73 ^b	43.4	72 ¹	43.5	72 ^b
36.8	71 ⁴	29.4	72 ^a	31.5	73 ^b	52.9	73 ^a	43.8	72 ⁴	44.0	73 ⁰
37.1	71 ^a	29.7	73 ³	31.8	73 ^a	53.4	74 ^a	44.3	72 ^a	44.5	73 ^b
37.4	72 ¹	30.0	73 ⁷	32.1	74 ³	53.9	74 ^a	44.7	73 ³	44.9	73 ^a
37.7	72 ⁴	30.2	74 ⁰	32.4	74 ^a	54.4	75 ^a	45.2	73 ⁷	45.4	74 ⁰
38.0	72 ^a	30.5	74 ^a	32.7	75 ³	54.8	75 ⁷	45.6	74 ¹	45.8	74 ^b
38.3	73 ¹	30.8	74 ^a	33.0	75 ^a	55.3	76 ²	46.1	74 ^a	46.3	75 ³
38.6	73 ^a	31.1	75 ²	33.3	76 ⁰	55.8	76 ⁷	46.6	75 ⁰	46.7	75 ⁷
38.9	73 ^a	31.4	75 ⁷	33.6	76 ^a	56.3	77 ²	47.0	75 ^a	47.2	76 ²
39.2	74 ²	31.7	76 ¹	34.0	77 ⁰	56.7	77 ^a	47.5	75 ^a	47.6	76 ^a
39.5	74 ^a	32.0	76 ^b	34.3	77 ^a	57.2	78 ⁰	47.9	76 ²	48.1	77 ⁰
39.8	74 ^a	32.3	76 ^a	34.6	77 ^a	57.7	78 ^a	48.4	76 ⁷	48.6	77 ^b
40.1	75 ²	32.6	77 ³	34.9	78 ³	58.2	79 ⁰	48.8	77 ¹	49.0	77 ^a
40.5	75 ⁷	32.9	77 ^a	35.2	78 ⁷	58.6	79 ^a	49.3	77 ^a	49.5	78 ^a
40.8	76 ⁰	33.2	78 ²	35.5	79 ¹	59.1	80 ⁰	49.8	78 ⁰	49.9	78 ^b
41.1	76 ^a	33.5	78 ^a	35.8	79 ^a	59.6	80 ^a	50.2	78 ^a	50.4	79 ³
41.4	76 ⁷	33.7	78 ^b	36.1	80 ⁰	60.1	80 ^a	50.7	78 ^a	50.8	79 ⁷
41.7	77 ⁰	34.0	79 ²	36.4	80 ^a	60.5	81 ^a	51.1	79 ^a	51.3	80 ³

¹ The stature estimate for a man over 30 years of age should be reduced by .06 (age in years—30) cm.

The above information and scale, obtained by applying formulas for estimating stature (cm) to given bone lengths (cm), are based on a study made by Mildred Trotter and Goldine C. Gleser, 1958.

Table J-5. Estimation of Stature Based on the Sum of Measurements of the Femur Plus Fibula (Centimeters)¹

Bone lengths Fem + Fib (CMS.)	Estimated stature (inches)		
	White ²	Negro	Mongoloid
68.1	59.9	59.0	60.4
69.0	60.4	59.3	60.8
69.9	60.9	59.7	61.2
70.8	61.3	60.1	61.7
71.8	61.9	60.6	62.1
72.7	62.3	61.0	62.6
73.6	62.8	61.5	63.0
74.5	63.2	62.3	63.4
75.5	63.8	62.4	63.9
76.4	64.2	62.8	64.3
77.4	64.7	63.2	64.8
78.3	65.2	63.7	65.3
79.2	65.7	64.1	65.7
80.2	66.2	64.6	66.2
81.1	66.7	65.0	66.6
82.0	67.1	65.4	67.0
82.9	67.6	65.8	67.5
83.9	68.1	66.3	68.0
84.9	68.6	66.8	68.4
85.7	69.0	67.2	68.8
86.7	69.5	67.6	69.3
87.6	70.0	68.1	69.7
88.6	70.5	68.5	70.2
89.4	70.9	68.9	70.6
90.4	71.5	69.4	71.1
91.4	72.0	69.9	71.6
92.3	72.4	70.3	72.0
93.2	72.9	70.7	72.4
94.1	73.4	71.1	72.9
95.1	73.9	71.6	73.3
96.0	74.3	72.0	73.8
96.9	74.8	72.5	74.2
97.9	75.3	72.9	74.7
98.8	75.8	73.4	75.1
99.8	76.3	73.8	75.6
100.6	76.7	74.2	76.0
101.6	77.2	74.7	76.5
102.5	77.7	75.1	76.9
103.5	78.2	75.6	77.4
104.3	78.6	76.0	77.8
105.3	79.1	76.4	78.2
106.3	79.6	76.9	78.7
107.2	80.1	77.3	79.1
108.1	80.6	77.8	79.6
109.0	81.0	78.2	80.0
110.0	81.6	78.7	80.5
110.9	82.0	79.1	80.9
111.8	82.5	79.5	81.4

¹The stature estimate for a man over 30 years of age should be reduced by .06 (age in years—30) cm.

²When a stature of a White male is to be compared with a stature measurement taken before the man was 21 years of age, the measured stature should be increased according to the time lapse between measurement and death (table J-6).

The above information and scale, obtained by applying formulas for estimating stature (cm) to given bone lengths (cm), are based on a study made by Mildred Trotter and Goldine C. Gleaser, 1958.

Table J-6. Estimates of Stature From Maximum Lengths of the Sum of Measurements of the Femur Plus Tibia¹[Raised number indicates numerator of fraction of inch expressed in 10ths; thus, 60⁹ reads 60 9/10 inches]

Bone lengths Fem + Tib	Estimated statures (inches)		
	White ²	Negro	Mongoloid
66.4	59 ⁴	58 ³	59 ⁴
67.2	59 ⁷	58 ⁷	60 ⁰
68.0	60 ¹	59 ⁰	60 ⁴
68.8	60 ⁵	59 ⁴	60 ⁸
69.6	60 ⁹	59 ⁸	61 ¹
70.5	61 ⁴	60 ²	61 ⁶
71.3	61 ⁸	60 ⁶	62 ⁰
72.1	62 ²	60 ⁹	62 ³
72.9	62 ⁶	61 ³	62 ⁷
73.7	63 ⁰	61 ⁶	63 ¹
74.6	63 ⁴	62 ⁰	63 ⁵
75.4	63 ⁸	62 ⁴	63 ⁹
76.2	64 ²	62 ⁷	64 ³
77.0	64 ⁶	63 ¹	64 ⁷
77.8	65 ⁰	63 ⁵	65 ¹
78.7	65 ⁵	63 ⁹	65 ⁵
79.5	65 ⁹	64 ²	65 ⁹
80.3	66 ²	64 ⁶	66 ³
81.1	66 ⁶	64 ⁹	66 ⁷
81.9	67 ⁰	65 ³	67 ⁰
82.8	67 ⁴	65 ⁷	67 ⁴
83.6	67 ⁸	66 ¹	67 ⁸
84.4	68 ²	66 ⁵	68 ²
85.2	68 ⁷	66 ⁹	68 ⁶
86.0	69 ¹	67 ³	69 ⁰
86.8	69 ⁵	67 ⁷	69 ⁴
87.6	69 ⁹	67 ¹	69 ⁸
88.4	70 ³	68 ⁵	70 ²
89.2	70 ⁷	68 ⁹	70 ⁶
90.0	71 ¹	69 ⁰	70 ⁹
90.9	71 ⁵	69 ⁴	71 ³
91.7	71 ⁹	69 ⁸	71 ⁷
92.5	72 ³	70 ¹	72 ¹
93.3	72 ⁷	70 ⁵	72 ⁵
94.1	73 ¹	70 ⁹	72 ⁹
95.0	73 ⁵	71 ³	73 ³
95.8	74 ⁰	71 ⁷	73 ⁷
96.6	74 ⁴	72 ⁰	74 ¹
97.4	74 ⁸	72 ⁴	74 ⁵
98.2	75 ²	72 ⁸	74 ⁹
99.1	75 ⁶	73 ¹	75 ³
99.9	76 ⁰	73 ⁵	75 ⁷
100.7	76 ⁴	73 ⁹	76 ¹
101.5	76 ⁸	74 ²	76 ⁵
102.3	77 ²	74 ⁶	76 ⁹
103.2	77 ⁷	75 ⁰	77 ³
104.0	78 ¹	75 ⁴	77 ⁷
104.8	78 ⁵	75 ⁸	78 ⁰

¹ The stature estimate for a person over 30 years of age should be reduced by .06 (age in years - 30) cm.² When a stature of a White male is to be compared with a stature measurement taken before the man was 21 years of age, the measured stature should be increased according to the time lapse between measurement and death (table J-8).

The above information and scale, obtained by applying formulas for estimating stature (cm) to given bone lengths (cm), are based on a study made by Mildred Trotter and Goldine C. Gleaser, 1958.

Table J-7. Formulas to Estimate the Living Stature of American Males^{1 2}

White ³		Negro	
1.31 (Fem + Fib) + 63.05	±3.62	1.20 (Fem + Fib) + 67.77	±3.63
1.26 (Fem + Tib) + 67.09	±3.74	1.15 (Fem + Tib) + 71.75	±3.68
2.60 Fib + 75.50	±3.86	2.10 Fem + 72.22	±3.91
2.32 Fem + 65.53	±3.94	2.19 Tib + 85.36	±3.96
2.42 Tib + 81.93	±4.00	2.34 Fib + 80.07	±4.02
1.82 (Hum + Rad) + 67.97	±4.31	1.66 (Hum + Rad) + 73.08	±4.18
1.78 (Hum + Ulna) + 66.98	±4.37	1.65 (Hum + Ulna) + 70.67	±4.23
2.89 Hum + 78.10	±4.57	2.88 Hum + 75.48	±4.23
3.79 Rad + 79.42	±4.66	3.32 Rad + 85.43	±4.57
3.67 Ulna + 75.55	±4.72	3.20 Ulna + 82.77	±4.74

Mongoloid		Mexican	
1.22 (Fem + Fib) + 70.24	±3.18		
1.22 (Fem + Tib) + 70.37	±3.24		
2.40 Fib + 80.56	±3.24	2.44 Fem + 58.67	±2.99
2.39 Tib + 81.45	±3.27	2.50 Fib + 75.44	±3.52
2.15 Fem + 72.57	±3.80	2.36 Tib + 80.62	±3.73
1.68 (Hum + Ulna) + 71.18	±4.14		
1.67 (Hum + Rad) + 74.83	±4.16		
2.68 Hum + 83.19	±4.25	3.55 Rad + 80.71	±4.04
3.54 Rad + 82.00	±4.60	3.56 Ulna + 74.56	±4.05
3.48 Ulna + 77.45	±4.66	2.92 Hum + 73.94	±4.24

¹ Formulas are based on long bone measurements (cm), with standard errors, and are given in order of preference.

² The stature estimate for a man over 30 years of age should be reduced by .06 (age in years - 30) cm.

³ When the stature estimate of a White male is compared with the stature measurement taken before the man was 21 years of age, the measured stature should be increased according to the time lapse between measurement and death (table J-8).

a. First Example. The remains under observation is of the Mongoloid race. Both femur are missing; however, bone measurements are made of the fibula and tibia. Referring to the order of preference for Mongoloids, the formula for the fibula precedes that for the tibia; therefore, the formula to be applied for stature estimate is 2.40 Fib + 80.56 or 2.40 x length in centimeters for fibula + 80.56. This gives the estimated stature in centimeters for the remains under observation.

b. Second Example. The recorded height of a White male when he entered the service may vary from the height of the remains associated with this person. Table J-8 shows the average increase (cm) in stature of American White males in half-year intervals and multiples thereof from 17 to 21 years of age. The average increase in height of a White male, as determined from the table, is added to the stature measurement taken at the time he entered the service. This figure is the approximate height of the person at the time of death. The complete skeletal remains of a White male are recovered. Bone measurements obtained are as follows:

Humerus	31.7cm	Femur ..	.46.1cm
Ulna	27.8cm	Tibia . . .	38.8cm
Radius	25.4cm	Fibula	38.2 cm

Since the table for White males (table J-7) indicates first preference to the equation using measurements for the femur plus the fibula and since these bones are present, the formula furnished, 1.31 (Fem + Fib) + 63.05, is applied as follows:

(1) Substitute bone measurements for femur and fibula, in centimeters, in the formula:

$$1.31 \times (46.1 + 38.2) + 63.05$$

or

$$1.31$$

$$\underline{\times 84.3} = \text{the sum of bone measurements of femur plus fibula}$$

$$393$$

$$524$$

$$1048$$

$$\underline{110.433}$$

$$+ 63.05$$

$$173.483 \text{ cm} = \text{Estimated stature for the remains}$$

Note: To convert centimeters to inches, divide result by 2.54. To convert inches to centimeters, multiply result by 2.54.

The estimated stature of 173.483 centimeters for the above remains is corrected to inches as follows:

$$173.483 \div 2.54 = 68.3 \text{ or } 68\text{-}3/10 \text{ inches} = \text{Stature of remains in inches}$$

(2) Assume that the recorded height for the person believed to be associated with the remains was 67 inches (171.45 cm) when he entered the service. At that time the soldier was 18 years 3 months old. He was killed in action 2 years later. Refer to table J-8 and determine the approximate stature that he had attained at the time of his death. In the first column, find the 2-year interval between measurement of stature and death. Next, check the

age interval for 18-18.5, and you find that the man had an average growth of 1.31 centimeters. Add this amount to the recorded height when he entered the service (171.45 cm), and you find that he measured approximately 172.76 centimeters in stature at the time of his death. This height is more closely related to the estimated height for the remains as determined from the measurement of the maximum lengths of the long bones.

Table J-8. Average Increase (cm) in Stature of American White Males in Half-Year Intervals and Multiples Thereof From 17 to 21 Years of Age

Time elapsed, years	Age in half-year intervals							
	17-17.5	17.5-18	18-18.5	18.5-19	19-19.5	19.5-20	20-20.5	20.5-21
1/2	1.03	.72	.51	.36	.26	.18	.13	.09
1	1.75	1.23	.87	.62	.44	.31	.22	.16
1 1/2	2.26	1.59	1.13	.80	.57	.40	.29	.20
2	2.62	1.85	1.31	.93	.66	.47	.33	
2 1/2	2.88	2.03	1.44	1.02	.73	.51		
3	3.06	2.16	1.53	1.09	.77			
3 1/2	3.19	2.25	1.60	1.13				
4	3.28	2.32	1.64					
4 1/2	3.35	2.36						
5	3.39							