**Investigation: Can You Estimate a Person’s Height from the Length of Their Bones?**

At a nearby construction zone, workers have made a startling discovery. They uncovered several bones that look like they were buried some time ago. You are part of a team of forensic anthropologists who have been called in to analyze these bones. Unfortunately, the bones were heavily damaged by the construction equipment. The bones have all been mixed up, and several have been crushed. However, you think you can use the bones that are left to determine the number of bodies and the height of each individual.

When a body is discovered, it is important to learn as much as possible from the remains.

**Forensic anthropologists**​ use mathematical formulas to estimate someone’s height from the lengths of certain bones in their body.

**Construction Site**



The following bones were recovered from the construction site. A fellow forensic anthropologist has already classified the bones by sex and race. ​***Using the mathematical formulas, calculate the approximate height of each individual.***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Bone #** | **Bone Type** | **Length (cm)** | **Race** | **Sex** | **Calculated Height (cm)** |
| 1 | Humerus | 38.2 | Caucasian | Male |  |
| 2 | Femur | 44.0 | African-American | Female |  |
| 3 | Ulna | 25.4 | Caucasian | Male |  |
| 4 | Femur | 52.4 | Caucasian | Male |  |
| 5 | Femur | 43.9 | African-American | Female |  |
| 6 | Tibia | 45.7 | Caucasian | Male |  |

**Discussion Questions:**

1. Is it possible that any of the bones came from the same person? Which bones do you think might be the same person and provide an explanation for WHY you think so.
2. What is the minimum number of bodies buried at this site? What is the maximum number of bodies buried at this site? Explain your reasoning.
3. Consider a case where two females have the same femur length. Would you expect those females to be the exact same height? Why or why not?
4. On the formula table, there is a symbol shown as ± . What does this symbol mean?
5. Consider your calculated heights and your actual height. Are they within the range that was expected. Suggest a reason for why a person’s calculated height might not be accurate.

page2image3759456

|  |  |  |  |
| --- | --- | --- | --- |
| **Formulas for Calculating Height** | | | |
|  | Race | Male Equation | Female Equation |
| Femur | Caucasian | 2.32 x femur + 65.53 ± 3.94 cm | 2.47 x femur + 54.10 ± 3.72 cm |
| African-American | 2.10 x femur + 72.22 ± 3.91 | 2.28 x femur + 59.76 ± 3.41 |
| Asian | 2.15 x femur + 72.57 ± 3.80 cm | 2.15 x femur + 72.57 ± 3.80 cm |
| Tibia | Caucasian | 2.42 x tibia + 81.93 ± 4.00 cm | 2.90 x tibia + 61.53 ± 3.66 cm |
| African-American | 2.19 x tibia + 85.36 ± 3.96 cm | 2.45 x tibia + 72.56 ± 3.70 cm |
| Asian | 2.39 x tibia + 81.45 ± 3.24 cm | 2.39 x tibia + 81.45 ± 3.24 cm |
| Ulna | Caucasian | 3.76 x ulna + 75.55 ± 4.72 cm | 4.27 x ulna + 57.76 ± 4.30 cm |
| African-American | 3.20 x ulna + 82.77 ± 4.74 cm | 3.31 x ulna + 75.38 ± 4.83 cm |
| Asian | 3.48 x ulna + 77.45 ± 4.66 cm | 3.48 x ulna + 77.45 ± 4.66 cm |
| Humerus | Caucasian | 2.89 x humerus + 78.10 ± 4.57 cm | 3.36 x humerus + 57.97 ± 4.45 cm |
| African-American | 2.88 x humerus + 75.48 ± 4.23 cm | 3.08 x humerus + 64.67 ± 4.25 cm |
| Asian | 2.68 x humerus + 83.19 ± 4.16 cm | 2.68 x humerus + 83.19 ± 4.16 cm |

|  |  |  |  |
| --- | --- | --- | --- |
| **Formulas for Calculating Height** | | | |
|  | Race | Male Equation | Female Equation |
| Femur | Caucasian | 2.32 x femur + 65.53 ± 3.94 cm | 2.47 x femur + 54.10 ± 3.72 cm |
| African-American | 2.10 x femur + 72.22 ± 3.91 | 2.28 x femur + 59.76 ± 3.41 |
| Asian | 2.15 x femur + 72.57 ± 3.80 cm | 2.15 x femur + 72.57 ± 3.80 cm |
| Tibia | Caucasian | 2.42 x tibia + 81.93 ± 4.00 cm | 2.90 x tibia + 61.53 ± 3.66 cm |
| African-American | 2.19 x tibia + 85.36 ± 3.96 cm | 2.45 x tibia + 72.56 ± 3.70 cm |
| Asian | 2.39 x tibia + 81.45 ± 3.24 cm | 2.39 x tibia + 81.45 ± 3.24 cm |
| Ulna | Caucasian | 3.76 x ulna + 75.55 ± 4.72 cm | 4.27 x ulna + 57.76 ± 4.30 cm |
| African-American | 3.20 x ulna + 82.77 ± 4.74 cm | 3.31 x ulna + 75.38 ± 4.83 cm |
| Asian | 3.48 x ulna + 77.45 ± 4.66 cm | 3.48 x ulna + 77.45 ± 4.66 cm |
| Humerus | Caucasian | 2.89 x humerus + 78.10 ± 4.57 cm | 3.36 x humerus + 57.97 ± 4.45 cm |
| African-American | 2.88 x humerus + 75.48 ± 4.23 cm | 3.08 x humerus + 64.67 ± 4.25 cm |
| Asian | 2.68 x humerus + 83.19 ± 4.16 cm | 2.68 x humerus + 83.19 ± 4.16 cm |