



Case File 1

Tracks of a Killer: Using footprints to estimate height

Analyze the relationships between shoe size, stride length, and height, and then use that information to identify the likely killer.

The body of famous pop music producer Jonathan Wallace was found in his bathtub. It is our hypothesis that an intruder surprised the victim and drowned him. The only clue at the crime scene was a set of muddy footprints leading from a nearby window to the bathroom and back again. The footprints were smeared, so their exact size could not be determined. The soles of the shoes had no pattern. It will be difficult to match the footprints to any particular pair of shoes.

Three suspects were questioned immediately following the murder:

Penelope Paige, pop star: 5'4"/green eyes/blond hair

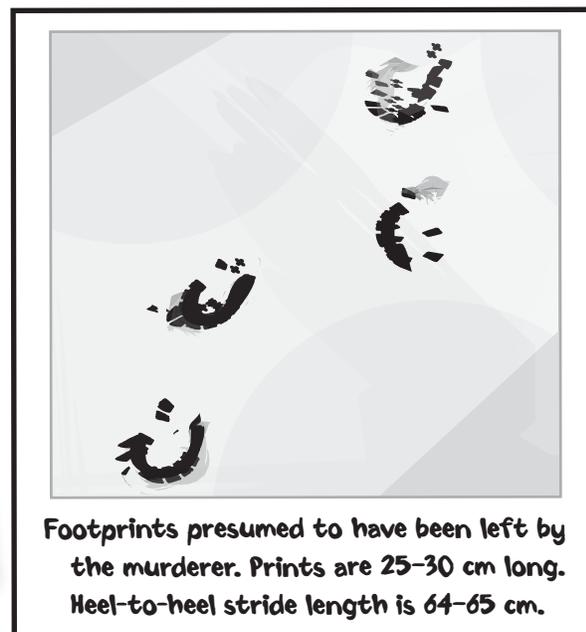
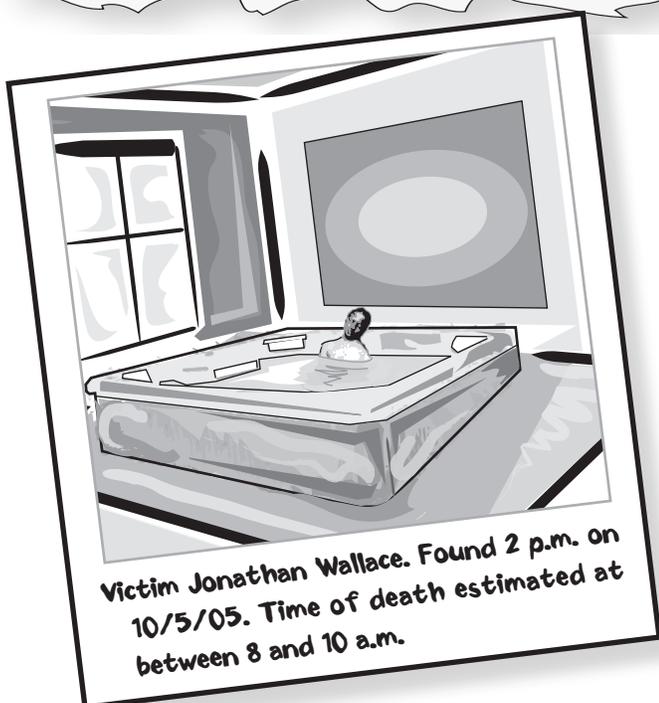
Possible motive: She is suing Wallace over the failure of her last album.

Rex Chapman, rock guitarist: 5'8"/brown eyes/brown hair

Possible motive: He accused Wallace of stealing profits from his hit single "Walk It Off."

Dirty Dawg, rapper: 6'0"/brown eyes/black hair

Possible motive: He wants out of a record contract with Wallace.



After you have your own data, enter into the Teacher's Computer.

A) Student Name	B) Height (cm)	C) Shoe Length (cm)	D) Stride Length (cm)
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- Equation describing the relationship between the height and stride length r^2 value:
- Equation describing the relationship between the height and shoe size r^2 value:

Case Analysis

1. Based on your data, is there a linear relationship between height and stride length?
2. What is the value of r^2 for the straight line that best describes your data for height versus stride length? Do you think the straight line fits the data well?
3. Based on your data, is there a linear relationship between height and shoe size?
4. Do you think that it is possible to infer a person's height from his or her shoe size? Explain your answer.
5. Using the relationship between height and stride length that you calculated, determine the approximate heights of people with the following stride lengths: a) 75.5 cm, b) 45.5 cm, and c) 50.0 cm
6. Using the relationship between height and stride length that you calculated, predict the stride length of a person who is not a student in your class (for example, your teacher) based on his or her height. Then measure the person's actual stride length. How close was your prediction to the actual stride length?
7. Suppose you measure the stride length of a set of footprints, you predict that the person who made the footprints is 175 cm tall, and you later find out that the person who made the footprints is actually only 152 cm tall. Give one possible reason that your prediction was incorrect.
8. Using the relationships that you calculated, determine which of the three suspects **most likely** left the footprints to and from Jonathan Wallace's bathroom. Show all your calculations.