

## Episode: “*Judgment Day*”

Original airing: *September 23, 2005*

### How tall is the criminal?

**Topic:** Scatterplots

**Objective:** Create and use a scatterplots to make predictions.

**Materials:**

- graphing calculator or spreadsheet
- meter stick(s) with centimeters marked

#### Introduction

Two-dimensional scatterplots are often used to compare two sets of data and to see whether there is any relationship, or correlation, between the data. These relationships may show a *positive correlation*, a *negative correlation*, or *no correlation*. Give examples of these situations.

#### **Example**

- An example of two sets with positive correlation—temperature and the number of air conditioners sold. As the temperature increases, you would expect more air conditioners to be sold.
- An example of two sets with negative correlation—temperature and the number of heaters sold. As the temperature increases, you would expect fewer heaters to be sold.
- An example of two sets with no correlation—temperature and the number of dishwashers sold. There is no relationship between temperature and number of dishwashers sold.



In “**Judgment Day**”, Charlie shows FBI agents a scatterplot of data from their case files in order to quickly see which cases are relevant to their current investigation and which are not. By looking at where and how the data is spread on the graph, Charlie may find a rule or pattern that describes this cluster of data.

The scatterplot allows Charlie and the agents to easily see which cases fit the criteria without having to go through each one individually. They can see more than one characteristic of the case based on where it lies.

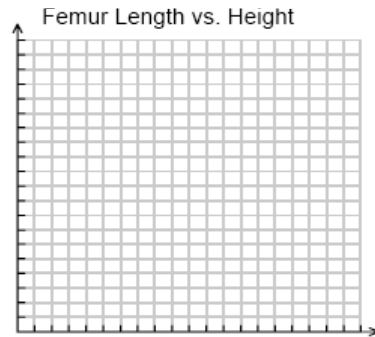
## Assignment: How Tall Is the Criminal?

Agent Eppes is tracking an unknown criminal. As the criminal was escaping the crime scene, witnesses saw him jump out of a window and land on his side in wet grass. Much of the impression of the criminal is obscured by footprints, but the criminal's leg from knee to hip was measured to be 47 cm. Agent Eppes has taken this information and thinks that there is a relationship between the height of a person compared to the length of his or her femur (the bone in your leg from your hip to your knee). Here is your chance to help.

**Step 1:** Measure your leg from the center of your kneecap to the bone on the outside of your hip. Record this length and your own height in the table below. Fill in the table with similar measurements from your classmates. Use the chart below to record your data.

<b>Femur Length (cm)</b>								
<b>Height (cm)</b>								

**Step 2:** Plot the data on a scatterplot, using a graphing calculator or by hand. Label your axes.



1. Describe the pattern you see in the scatterplot. Explain the relationship.
2. Based on the data, what is your estimate for the height of the criminal?
3. Anthropologists have developed a formula to determine the height from femur length. In cm, a man's height is given as  $2.59 \cdot (\text{femur length}) + 66.4$ . Use this formula to determine the height of the escaping criminal and compare it to the height that you found in #2.
4. How many feet is this height?
5. What might explain the differences in the height that you found using the scatterplot and the height you found using the formula?
6. Draw a line that best fits your data in the scatterplot.
7. Find the equation of the line in the form  $h = mf + b$ , where  $h$  is the height and  $f$  is the length of the femur.