

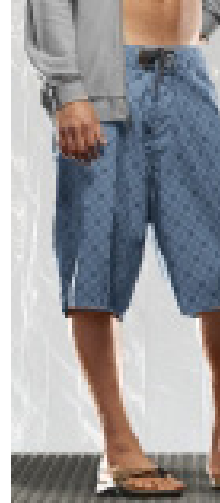
Could it be?

1. Introduction

Belinda and her team work in a forensic science unit. They are asked to investigate whether or not it is possible that a footprint, found at a crime scene, belongs to the person whose partial image is shown in a photograph, also found at the scene.

A photograph of the footprint and the photo found at the scene are given below.

The footprint was measured to be 21 cm in length.



These three pieces of evidence are all that the team has to work on.

2. Dan's first thoughts

Dan, one of the team members, suggests that if they can determine the real-life length of something on the photo found at the scene then they may be able to make some progress.

After some investigation he identifies the brand and style of the board shorts being worn by the person. He also finds that they are made in the following lengths 46 cm, 50 cm and 54 cm.

3. Lucy had a thought

Lucy, another of the team members, then suggests the only thing that can be measured with any certainty from the photo and that may be of use are length of the board shorts and the height of the person's belly button from the floor. She then poses the question:

Is it possible to estimate the height of this person from their 'belly button' height?

4. *Your turn to join the team*

To investigate Lucy's question we could study a group of people for whom we knew their heights and belly button heights. Is such data available?

Approximately 20 000 of Australian students completed and submitted the SeniorSchoolCensusOnline questionnaire in 2004. If you did not you should look at the questionnaire before proceeding. You can see a copy of it at: <http://www.censusonline.net/multi2004/jstest.html>

The collection of students who submitted the survey can be thought of as a [population](#). We are going to name this collection of students the [SSCO Australian student population- 2004 \(SSCO ASP – 2006\)](#).

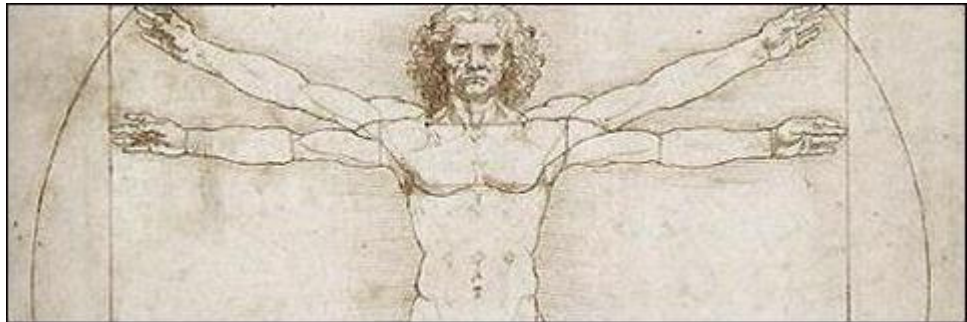
You do not have access to all of the information about the SSCO ASP – 2004. But, you are able to select [simple random samples](#) from the SSCO ASP - 2004. Such samples may be of use to you in investigating Lucy's question. Samples can be obtained from <http://www.censusonline.net/multi2004/sample2004.html>

Investigate Lucy's question and then continue to investigate and see if you can provide some insight to whether or not it is possible that the footprint, found at a crime scene, belongs to the person whose partial image is shown in the photograph.

Be sure to document all your work clearly.

5. *The Vitruvian Man*

Carry out some research about the Vitruvian Man. Who is he? Who made him? When? How is he connected to your earlier work?



For the teacher.

One way to proceed with this investigation would be to:

- develop estimates for the height of the person in the photo based on the belly button height and then
- develop estimates of the height of the person who made the foot print based on the foot print length and then
- compare the two sets of estimates.

In assessing student's work on this task, consideration of how well (if at all) the following things were included may be useful in differentiating between the levels of work presented.

Did the student:

- the reliability of each of the data points in their sample?
- did the students consider sampling variation by averaging the results from a number of like samples (this should be considered a high order inclusion)
- consider gender effects
- consider age effects
- choose the most appropriate sample from the SSCO ASP – 2004
- provide three sets of estimates for the height of the person (dependent on the pant length).