

<b>Topic</b>	The danger of means	<b>Level</b>	GCSE (or any course for students aged 11-14)
<b>Outcomes</b>	1. To calculate a mean 2. To understand why a mean value can be misleading 3. To describe how to measure the pH of soil		

## How Long is a Worm?

Five worms were collected from a field and measured with a ruler. It was decided that the worms would be measured to the nearest 5 mm, i.e. 0.5 cm

Worm	Length (cm)
1	11.5
2	10.0
3	9.5
4	8.0
5	12.5

1. How long is the longest worm? [1 mark]
2. How long is the shortest worm? [1 mark]
3. What is the range? [1 mark]
4. Calculate the mean length of the five worms [1 mark]

In a second experiment, five, 500g samples of alkaline, acidic and neutral soil were collected and the number of worms found in each sample was recorded. The results are in the table below.

Sample number	Number of worms found in alkaline soil	Number of worms found in acidic soil	Number of worms found in neutral soil
1	10	4	30
2	8	5	38
3	17	5	39
4	5	1	35
5	14	200	35
<b>Mean</b>			

1. Calculate the mean number of worms in each soil type. [3 marks]
2. Describe how the pH of the different soils could have been found out. [4 marks]
3. Plot a graph of these results using the mean number of worms and soil type. [5 marks]
4. Looking at your graph, do worms prefer alkaline, acidic or neutral soil? Explain your answer. [2 marks]
5. Looking at the table, do worms prefer alkaline, acidic or neutral soil? Explain your answer. [2 marks]
6. Can you think why it may **sometimes** not be a good idea to use only the mean when analysing (looking at) results? Explain. [2 marks]

**Progress:** further resources on scientific skills are available here:

<http://thescienceteacher.co.uk/scientific-skills/>