



T Level Technical Qualification in Science

Occupational specialism assessment (OSA)

Laboratory Sciences

Assignment 3

Assignment brief

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Scenario

You are a laboratory scientist working for a company that specialises in environmental monitoring. The company has a contract for the monitoring of water quality, including the pH in a group of lakes used for recreation.

A fieldwork team uses a field pH meter at the lakes as part of their weekly on-site analysis. The pH probe must be calibrated before use. Recently, the fieldwork team have commented that pH values at sampling sites seem to be low for the time of year.

These low values may reflect true environmental values, but there is a possibility that the field pH meter is producing inaccurate data.

Each month a batch of samples from the same sites are returned to the laboratory for full chemical analysis. The pH is measured in the lab using a bench pH meter. All pH values are recorded on the laboratory information management system (LIMS).

As a laboratory scientist for the company, you have been asked to investigate the low pH values. It is possible to access the pH data from both the bench and field pH probes using the LIMS. This data is provided for your use in this task. A summary of the data (means and standard deviations) is also provided.

Task 1

Using the information provided, comment on the accuracy of the data obtained from the field pH meter.

Evaluate whether recent low field pH values reflect true conditions in the lakes or are due to inaccurate readings produced by the field pH probe.

Use the LIMS data and data summary to inform your judgement.

(8 marks)
(30 minutes)

Task 2

Using the information provided, comment on the type of errors in the data obtained from the field pH meter.

Explain the evidence for any random or systematic errors. Use the LIMS data and data summary to inform your explanation.

(6 marks)
(30 minutes)

Task 3

Identify factors that could cause data errors in measurements made with a field pH meter.

Justify which factors are likely to cause the data errors measured.

Use the information provided, as well as your own knowledge, to help you.

(8 marks)
(30 minutes)

Task 4

Describe the steps that should be taken to find out what is causing the error in the field pH meter.

You should also describe the actions that should be taken to improve techniques for using the field pH meter in order to minimise future errors.

Use the information provided, as well as your own knowledge, to help you.

(8 marks)
(30 minutes)

Task 5

The field pH meter was recalibrated. The pH of a series of samples were then measured using both the field pH meter and laboratory pH meter. This data is provided in the LIMS for your use in this task.

- (a) use the LIMS data to calculate the mean and standard deviation for the field and lab pH meters, you should use the spreadsheet to carry out your calculations
- (b) explain how a named statistical technique could be used to test if there is a significant difference between the 2 sets of measurements

The formula and calculations are not required.

(11 marks)

(1 hour)

Document information

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Change History Record

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v1.0	Post approval, updated for publication.		January 2021
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