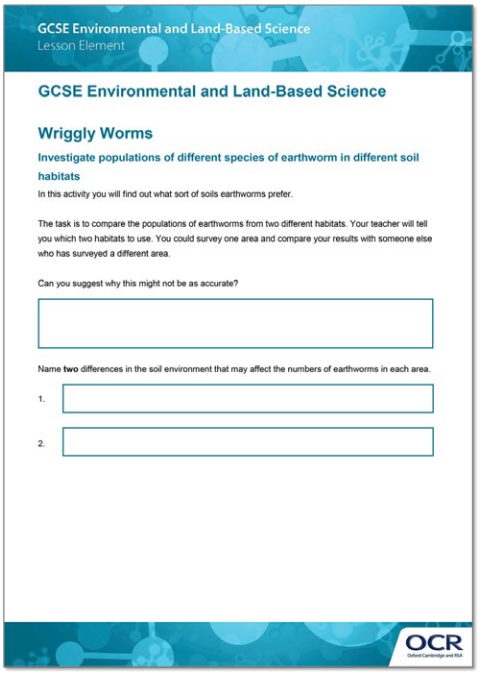
GCSE Environmental and Land-Based Science

Wriggly Worms

Instructions and answers for teachers

These instructions should accompany the OCR resource 'Wriggly Worms' activity *which supports OCR GCSE Environmental and Land-Based Science.*


GCSE Environmental and Land-Based Science
Lesson Element

GCSE Environmental and Land-Based Science

Wriggly Worms

Investigate populations of different species of earthworm in different soil habitats

In this activity you will find out what sort of soils earthworms prefer.

The task is to compare the populations of earthworms from two different habitats. Your teacher will tell you which two habitats to use. You could survey one area and compare your results with someone else who has surveyed a different area.

Can you suggest why this might not be as accurate?

Name **two** differences in the soil environment that may affect the numbers of earthworms in each area.

1.

2.

OCR

The Activity:

This activity offers an opportunity for English skills development.

Associated materials:

'Wriggly Worms' Lesson Element learner activity sheet.

Investigate populations of different species of earthworm in different soil habitats

Introduction

The aims of this activity are to support the teaching of several learning objectives of the B681 unit, Management of the Natural Environment, including sampling techniques (objective 8) and the role of earthworms in improving the soil conditions that influence their population numbers (objective 10).

In addition, this activity can be used as a training activity to prepare students for subsequent assessment of Element 1: Practical Skills, for example, comparing habitats to compare the populations of invertebrates present. The task could potentially be developed into a possible Element 2: Scientific Investigation.

The activity involves students estimating the relative populations of different species of earthworm in different soil habitats. Suitable habitats that could be compared include open soil beds such as vegetable plots with grassland soils or woodland soils; alkaline soils with acid soils; dry soils with moist soil; or organic rich soils with soils low in organic matter. The latter works particularly well and leads on to other teaching points.

Students will need to be told the difference between the two areas of soil chosen, unless they will also be testing for pH, water content or organic matter.

There are various methods that can be used to survey earthworms including: watering an area delineated by a quadrat with various solutions such as soapy water, mustard water and potassium permanganate; worm charming using vibration; removing a measured volume of soil (a spade width and depth is sufficient) and carefully sorting through the soil for earthworms. The worms will require transferring to a beaker where they can be washed and identified.

Worms should be returned to the area after the task has been completed.

Discussion with the class on identifying which method is “best” to sample earthworms could form the basis of a further investigation.

The OPAL website gives students the opportunity to submit their results as part of a national survey: http://www.opalexplorenature.org/soilsurvey. If you are participating in the OPAL project, you can visit the website to download their identification sheets/keys to help identify your earthworms. If working in small groups, different student's results can be combined to increase the repeatability of the results.

The method given below is based on removing a measured volume of soil. However, you can adapt this to whichever method is chosen.

Apparatus (per group or individual)

- two lab trays or similar (soil is transferred from one to the other during sorting for worms)
- a spade or trowel to dig up the soil sample
- old spoon or spatula to sort through the soil
- beaker to collect worms and wash them
- worm identification sheets

Safety

Normal laboratory safety should be maintained.
Students must be reminded to wash their hands after doing the task.

Expected results

Earthworms prefer:

- neutral/alkaline soils to acid soils
- organic rich soils to soils low in organic material
- moist soils to dry soils.

Extension activities

If this activity is being used as an investigation, the survey could be extended to identify why populations vary in different habitats. For higher ability students a statistical technique such as Simpsons Diversity Index could be used to compare the different populations rather than crude numbers of different species.

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Method

1. Construct a results table ready for your results.
2. Collect a sample of soil from each of the areas you are going to survey. It is important that the soil samples are the same size.
3. Place your soil sample into an empty tray.
4. Carefully sort through the soil removing any earthworms you find to a beaker. It works best if you sort through a small amount of soil at a time. Transfer soil you have checked to a second tray as you go.
5. Once you have sorted all your soil, carefully rinse the earthworms and place on a damp paper towel.
6. Identify each earthworm and keep a record of the numbers of each species you find. Your teacher will give you an identification key to use.
7. Soil and earthworms can now be returned to where they were collected.

Once you have tidied away all your equipment and washed your hands, answer the following questions.

1. Suggest **one** possible risk when carrying out this investigation.

2. How could you reduce this risk?

3. Look at the data you have collected.
   Construct a graph on the graph paper provided to display the data you have collected.

4. Compare the results from the two different habitats.

   (i) Which habitat had the greatest number of earthworms?

   (ii) Which habitat had the greatest number of different earthworm species?

5. Suggest a possible reason for the differences in the two populations.

6. Suggest why it would be better if the soil samples from each area were taken at the same time on the same day.

7. Why was it important to put the earthworms back where they were found?

8. If you were to repeat this activity, suggest some improvements that you would make to the method.


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