Abiotic and Biotic Factors - activity 3

Sampling

- **Learning Intentions**
- I can describe a technique used to sample organisms (biotic factors)
- I can identify 2 abiotic factors
- I can describe a technique used to sample abiotic factors
- I can state the effect of an abiotic factor on the distribution of organisms
- Some may also be able to
- State sources of error and how to over come these when sampling

- **Success Criteria**
- I can state the definitions of habitat, community, population and eco-system.
- I have a note of at least two abiotic and biotic factors
- I have measured 2 abiotic factors and can describe how I did it
- I have used a quadrat and can describe how it is used for sampling
- I can use problem solving skills to complete a sheet on a pitfall trap and a transect survey.
- During a class discussion I can offer ideas as to why it is important to sample environments

Biotic and Abiotic Factors

- The distribution of animals and plants is effected by both biotic and abiotic factors
- What are biotic factors?
  - Biotic factors relate to other living things in plants and animals habitats, including;
    - Amount of available food
    - Number of predators
    - Disease (micro-organisms)
    - Competition for necessities of life

Abiotic factors are **non-living conditions** which can affect where plants or animals live.

Examples of abiotic factors include;

- **temperature**
- **light intensity**
- **water content of soil**
- **the oxygen concentration of water**
- **the level of pollution**

- A living organism is only able to survive in a certain habitat and play its part in the ecosystem if a combination of abiotic factors are present

fangtooth fish catches its prey by luring them in with glowing light organs called photophores. In such a dark abyss, fish are attracted to the light put off by the organ and once they are close enough the fangtooth fish catches them in his numerous large teeth

Sampling Techniques

- We obviously cannot collect all the organisms within a habitat, so we must take a sample.
- What methods can we use to take samples
  - Pitfall trap
  - Quadrat
  - Beating tray and stick
  - Netting

Sampling animals

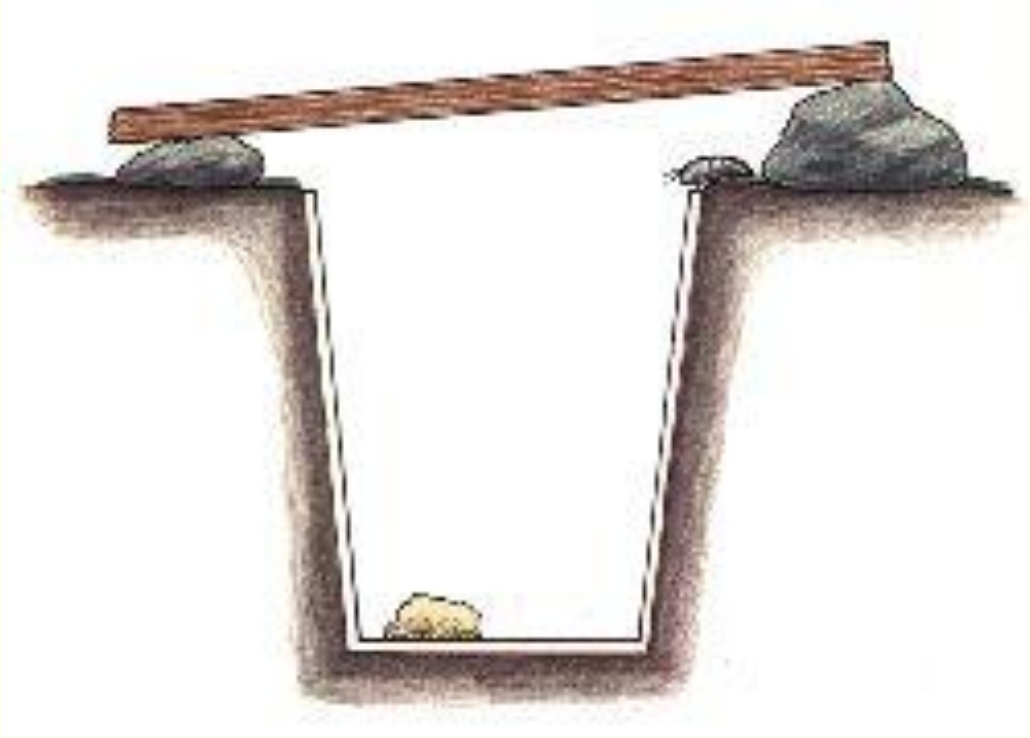
Pitfall traps are often used to sample the small invertebrates living on the ground.

You are likely to trap beetles and other insects, as well as spiders and slugs

Pitfall traps must be properly set up.

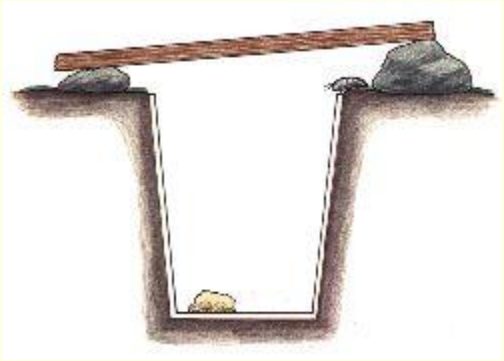
The top of the yoghurt carton should be **level with the soil surface.**

Cover the trap with a stone or piece of wood to keep out the rain, to make it dark and to stop birds eating your catch.



Pitfall Trap

- Animals that move across the soil surface and amongst the leaf litter fall into the trap and cannot climb out.



- However might not catch a true representative or some might be eaten by others caught within the trap.

The traps must be **checked often** to avoid the animals escaping or being eaten before they are counted.

As with most methods a **large number** of traps makes results more **reliable** and minimises the effects of unusual results.

Quadrats

- This is a wooden frame or square made of string and is thrown randomly down
- The number of plants in this area are then counted (can also be used to count very slow moving animals like shellfish)
- This is repeated several times and an average result is calculated

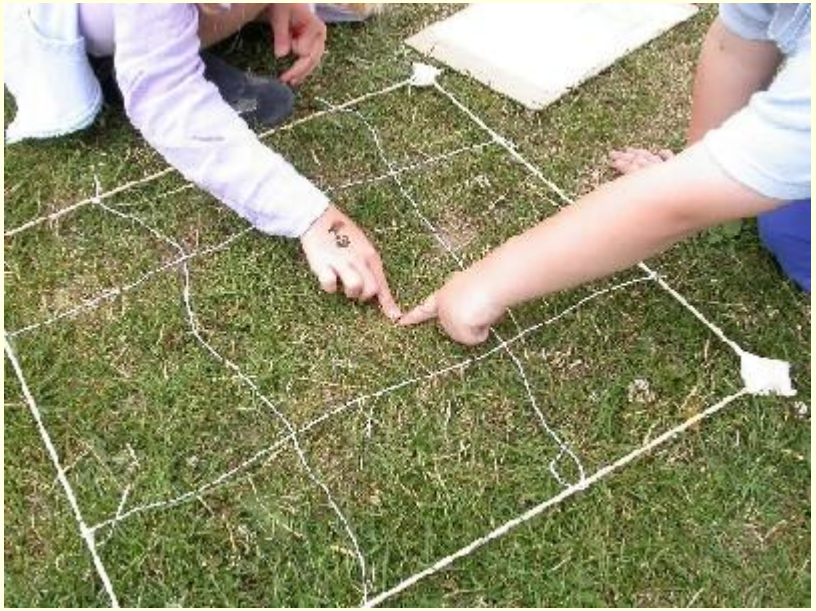
Sampling plants

It is impossible to count all the plants in a habitat, so a **sample** is taken.

The technique that is often used to sample plants is a **quadrat**.

The plants inside the quadrat can be identified and counted.

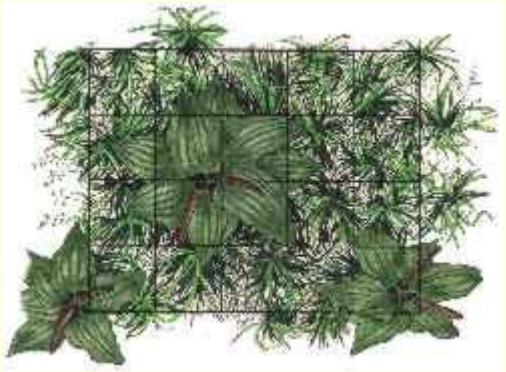
1m² quadrat

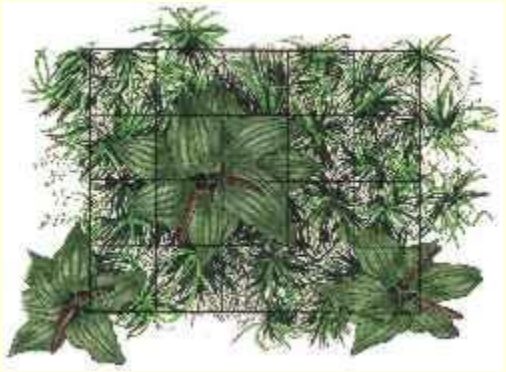


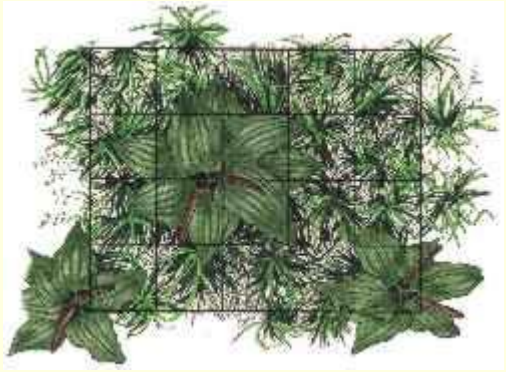
Quadrats should be placed **randomly** so that a representative sample is taken.

You should look at the results from several quadrats in an area to reduce the effect of an unusual distribution.

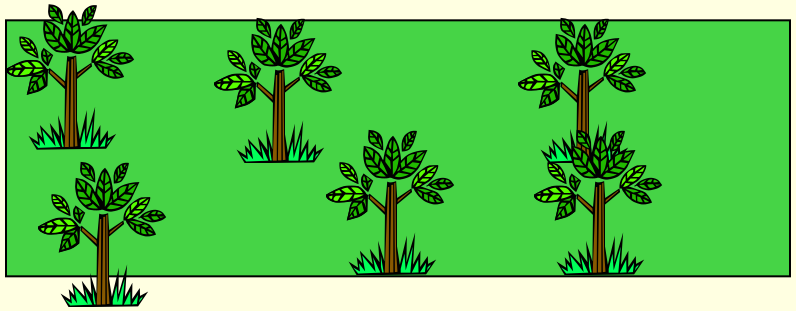
The results are more **reliable** when you look at the results from **many quadrats**.







Calculations



- Total plants in
  10 quadrats = 57
- Average per
  Quadrat (per m^2) = 5.7

Area of whole field = 1000 m^2

Quadrat	Number of plants
1	6
2	0
3	5
4	15
5	1
6	7
7	3
8	7
9	9
10	4

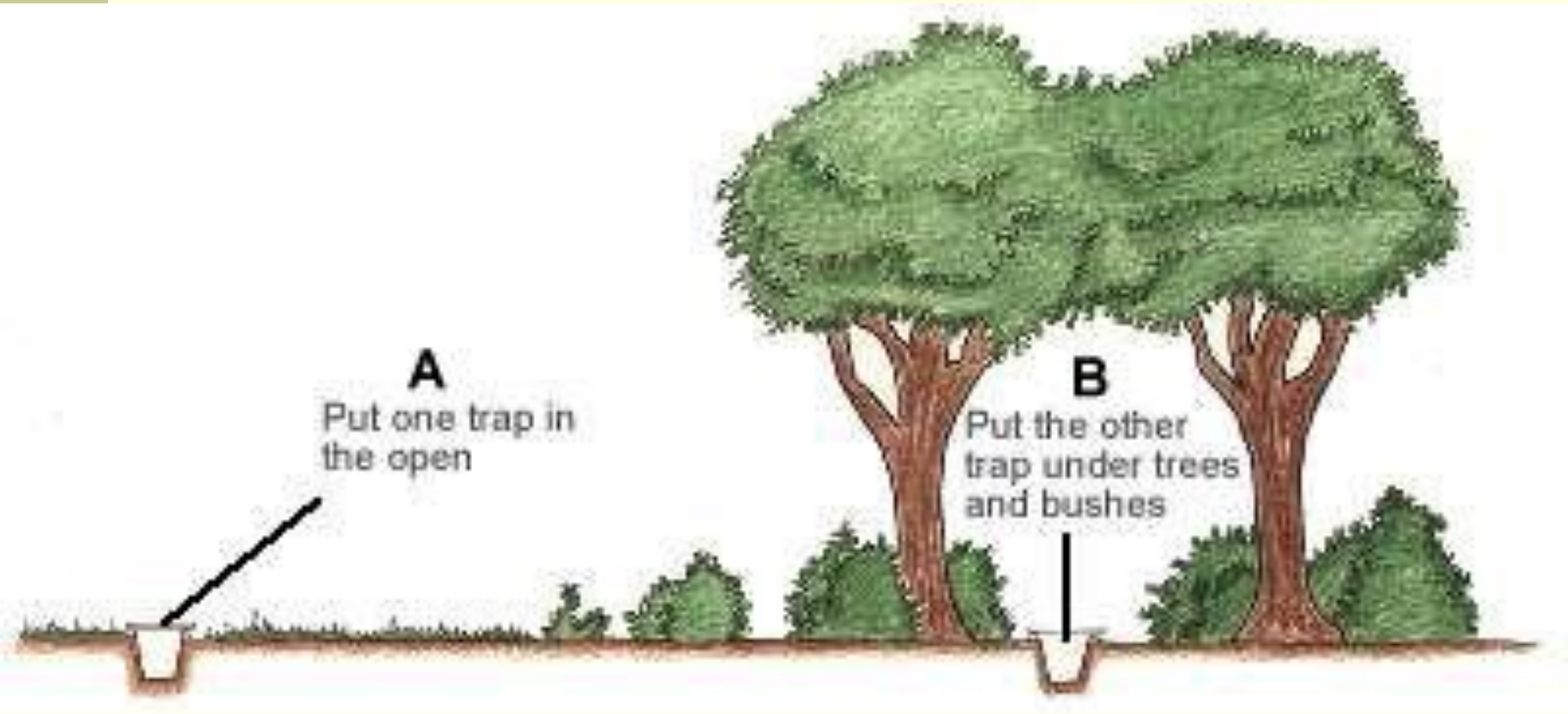
So Estimate of number of plants in the whole field is 5.7 x 1000 = 5700

Light meters can be used to measure light intensity. The meter is held at the soil surface and pointed in the direction of the maximum light intensity, then the meter is read.

Soil moisture and **Soil pH meters** (measures acidity / alkalinity) are also available - both are used by simply pushing the probe into the soil and reading the meter.

Question 1

A group of pupils carried out an investigation to compare the number of invertebrates found in pitfall traps in areas A and B shown in the diagram below.



The number of invertebrates in each pitfall trap were sampled each day for five days. The results are shown in the table below.

Day	No. of Invertebrates	
	Area A	Area B
1	13	27
2	7	16
3	21	35
4	14	22
5	20	30
Average		

(a) Calculate the average number of invertebrates in Area A and B over the five days.

(b) Suggest a reason why there seems to be more invertebrates in Area B.

(c) How could these pupils have improved the reliability of their results?

The answer for (a)
You should add up all the values and then divide by the number of days. In this example it is 13 + 7 + 21 + 14 + 20 = 75 then divide by 5 for the number of sampling days giving an answer of **15**

The answer for (b)
The most likely answer to this question is that there is more food, or that the woodland provides more habitats for the invertebrates.

The answer for (c)
The pupils should have set **more** pitfall traps in the two areas.