Biology

7. Ecology

Revisiting Booklet

Name:

Communities

Describe the biology meaning of the term 'community'.

_____

Define the term 'interdependent'.

_____

Describe six ways in which animals and plants are often 'interdependent'.

_____

_____

Describe an example of a stable community.

_____

_____

What do plants within an ecosystem often compete for?

_____

What do animals within an ecosystem often compete for?

_____

Abiotic factors

Define the term 'abiotic factor'.

_____

Give seven examples of abiotic factors.

_____

Biotic factors

State four biotic factors.

_____

_____

How would the decreased availability of grass effect the population of rabbits in an ecosystem?

_____

How would the increased availability of grass effect the population of foxes in an ecosystem?

_____

How would the introduction of domestic cats effect the numbers of flightless birds on an island?

_____

How would the introduction of a new disease effect the numbers of bees living in an ecosystem?

_____

_____

Explain how two similar species competing for the same food source will ultimately lead to one of them becoming extinct.

_____

_____

Adaptations

State the term given for organisms that can survive in extreme environments.

_____

Describe how bacteria are adapted to live in high temperatures and high pressure.

_____

Describe how bacteria are adapted to live in very salty conditions.

_____

Describe how animals are adapted to live in very dry conditions.

_____

Describe three methods plants use to reduce water loss and help them survive in dry conditions.

_____

_____

Describe how animals use camouflage to survive.

_____

Describe how animals are adapted to survive in cold climates.

_____

Adaptations, interdependence & competition

An ecosystem includes the interactions of a c…………………… of living organisms with each other and with the non-living parts of their environment.

Within a community each species depends on other species for f………….., shelter, p…………………………, seed dispersal etc. If one species is removed it can affect the whole c……………………….. This is called i……………………………….. A stable community is one where all the species and environmental factors are in balance so that the population sizes remain fairly c……………………...

To survive and reproduce, organisms require a supply of material from their surroundings and from other living organisms there.

Plants in a community or habitat often compete with each other for l……………. and space, and for w………………… and m……………………….. ions from the soil. Animals often compete with each other for f…………., mates and t……………………

A……………….. (non-living) factors which can affect a community include light intensity, t……………………….., moisture levels, soil …………….. and mineral content, wind intensity and direction, carbon dioxide levels for p…………….. and o……………… levels for aquatic animals.

Biotic (l………………..) factors which can affect a community include the availability of f……………………., new p…………………….. arriving, new pathogens, and one species outcompeting another so the numbers are no longer sufficient to b…………….

Feeding relationships within a community can be represented by food chains. All food chains begin with a p……………………….. which synthesises molecules. This is usually green plants or alga which make g……………………… by p……………………………. The energy in the glucose is then passed on through the food chain by f……………….. The arrows in a food chain show the d…………………….. of the flow of e………………….

Producers are eaten by primary c…………………………., which in turn may be eaten by s………………………… consumers and then t………………………… consumers.

Consumers that kill and eat other animals are called p…………………………., and those eaten are called p…………….. In a stable community the numbers of predators and prey rise and fall in c…………………… As the number of prey organisms increases the number of predators will increase as there is more f………………. available. As the number of predators increases the number of prey will ……………………. as more are being e………………. This fall in the number of prey organisms will lead to a lack of f…………………….. for the predators so their population will ……………………., which will then allow the population of prey organisms to …………………….. again.

Organisms have features (a…………………………..) that enable them to survive in the conditions in which they normally live. These adaptations have arisen over many years through e……………………………….. changes.

Adaptations may be s……………………….., behavioural (e.g. m…………………….., breeding behaviour) or f……………………….. (such as the way that enzymes work).

Some organisms live in environments that are very extreme, such as high t……………………………., pressure, or salt concentration. These organisms are called e…………………………. Bacteria living in deep sea vents at very high temperatures are examples of extremophiles.

Q1.

The lynx is a wild cat which lives in Canada. The table shows the number of lynx trapped in a part of Canada in certain years.

| Year	Number of lynx in thousands
1918	45
1920	25
1922	10
1924	20
1926	40
1928	50

The snowshoe hare is another wild animal found in Canada. The graph shows the number of snowshoe hares trapped in the same years. The lynx eats the snowshoe hare.

(a) Draw a graph of the data in the table. The first two points have been plotted for you.

(2)

(b) From your graph, predict how many lynx were trapped in 1925.

_____ thousand

(1)

(c) Use the information to answer the following.

(i) What would you expect to happen to the number of lynx trapped in 1930?
Draw a ring around your answer.

rise   fall   stay the same

(1)

(ii) Give a reason for your answer to part (c)(i).

_____

_____

(1)

(d) The lynx is a predator. What is a predator?

_____

_____

(1)
(Total 6 marks)

Random sampling

Sometimes it is difficult to record every individual in the whole area. Random sampling is used to find a representative sample of a whole.
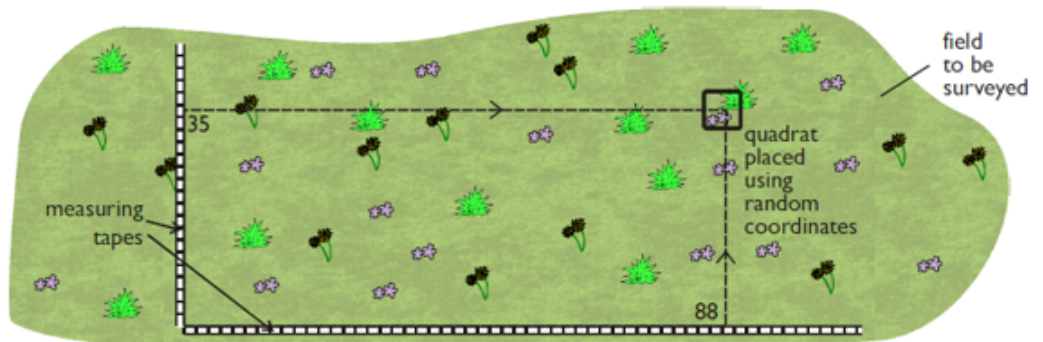
Random sampling should in theory be representative, but there are a few reasons why it may not be.

- **Sampling bias** – to avoid this, we should use random number generators to generate coordinates on a grid of the area to be sampled.

- **Chance** – even if bias is avoided your results may not be representative. In ecological studies you would conduct a stats test to test the probability that your results could have been due to chance.

How do you decide how many samples are representative?

Example – Estimate the population number of buttercups in a field measuring 30 x30m. Equipment 0.25m^2 quadrat (50cm x 50cm).

Cumulative mean method – estimating minimum sample size. *Complete the table to determine the minimum sample size.*
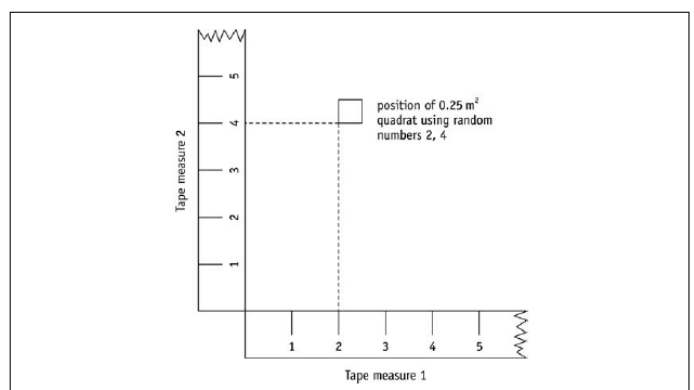

▲ Figure 1 Using measuring tapes to define a sample area.

Quadrat number	No. of buttercups present per 0.25m^2	Cumulative total	Cumulative mean per 0.25m^2
1	10	10	10.0
2	15	25	12.5
3	5	30	10.0
4	36		
5	16		
6	17		
7	19		
8	16		
9	15		

Scaling up.

Once you have your sample you need to scale it up to estimate the total population size for the whole area.

a) Calculated mean = _____per 0.25m^2

b) Total size of the field = _____ m^2

c) How many quadrates would fit in the whole sample area?

= _____

d) Multiply the answer from part a) and answer from part c)

total population estimate = _____

Types of quadrats

A frame quadrat – record the abundance of species present within a fixed sample area
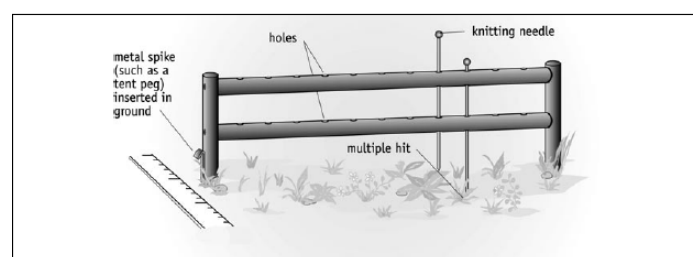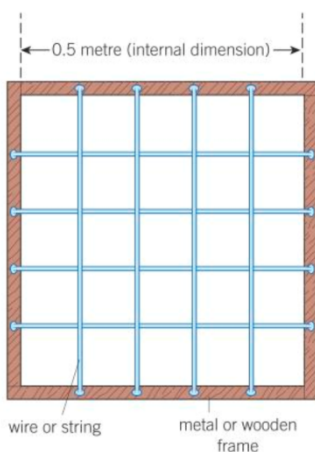

Figure 2 A point quadrat frame. Each plant species touched by the needles is recorded.
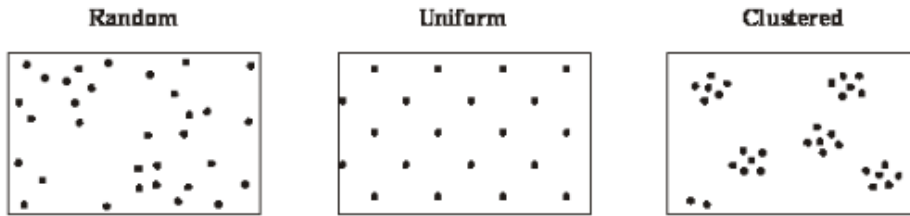
QUESTION: How could we increase sample size without more placements of point quadrat?

A point – pins are lowered onto the vegetation below.

Each species touched is recorded as a hit. The percentage cover for a particular species is calculated using the equation:

10 pins

20 pins

40 pins

$$\% \text{ cover} = \frac{\text{hits}}{\text{hits} + \text{misses}} \times 100$$

The diagrams show three types of plant distribution.

Random   Uniform   Clustered

(a) Describe how you would use quadrats to determine whether a particular plant species has a clustered or a random distribution.

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....

....

....

(3)

(b) Some plants in a dry, hot desert have a uniform distribution and are widely spaced. Suggest how this type of distribution is an advantage to the plants.

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(2)

(Total 5 marks)