St. Ninian's High School

S2 Biology

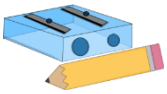
Planet Earth

HOMEWORK BOOKLET

DO NOT WRITE ON BOOKLET

Homework Success Guide

In order for you to successfully complete your homework, you should remember the following tips!

- Read all questions carefully. 
- If you are unsure of the question, ask your teacher.
- All homework should have a **heading** and a **date**, which should be underlined using a **ruler**. 
- Answers should be written in **full sentences.**
- Homework should be completed in ink (blue or black).
- **Diagrams**, **tables** and **graphs** should be completed in pencil.
- **All lines** should be drawn using a **ruler.** 
- **All work should be completed to the best of your ability at all times!** ☺

If you follow all of these tips then you should be successful in completing your homework to a high standard.

Homework Exercise 1 : Biodiversity

1. The average heights of some tree species are given in the table below.

Species of tree	***Average height of tree species (m)***
Douglas fir	50
Beech	40
Common oak	28
Mountain ash	8
Scots pine	36

i) Draw a bar chart **on graph paper** to show the average height of each of the tree species. **(3)**

ii) How many species of tree have an average height greater than that of Scots pine?

_____ **(1)**

iii) Calculate the ratio of the average height of a beech tree to that of a mountain ash. Express your answer as a simple whole number ratio.

Ratio _____ Beech : _____ Mountain ash **(1)**

2. (a) A rockpool is an ecosystem that contains different habitats which support several populations of organsisms.
Copy and complete the table below. **(3)**

Word	*Definition*
Ecosystem	
Habitat	
Population	

(b) Which term is used to describe the total number of populations living in an area?

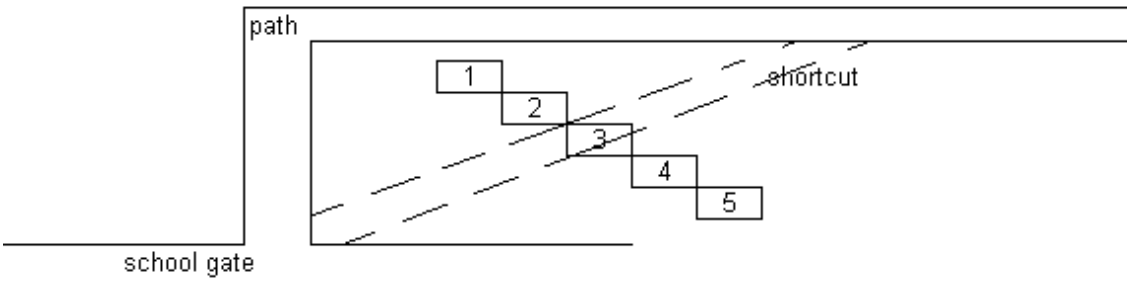
_____ **(1)**

3. Choose the correct option in the following definition of biodiversity. Copy the correct sentence into your jotter.

Biodiversity is the **total number/variety** of living things in an **ecosystem/habitat**. **(1)**

Homework Exercise 2 : Biodiversity

1. A grass area is used as a short cut by pupils leaving a school. An investigation was carried out on the effect this trampling has on the distribution of three types of plants.
The diagram below shows the five quadrat positions.



The number of plants found in each quadrat is shown in the table below.

Quadrat number	*Number of plants*		
	Daisies	*Plantains*	*Buttercups*
1	30	23	18
2	10	22	8
3	3	23	1
4	8	20	9
5	65	21	24

a) Calculate the average number of buttercups found per quadrat. **(1)**

Average number of buttercups _____

b) Using the information in the table, copy and complete the sentences below choosing the correct option each time. **(2)**

Using the shortcut **increases / decreases** the number of **daisies/plantains** found in the grass area.

The number of **plantains / buttercups** is unaffected by the use of the shortcut.

c) The investigation was repeated several times.
Explain why this would be done.

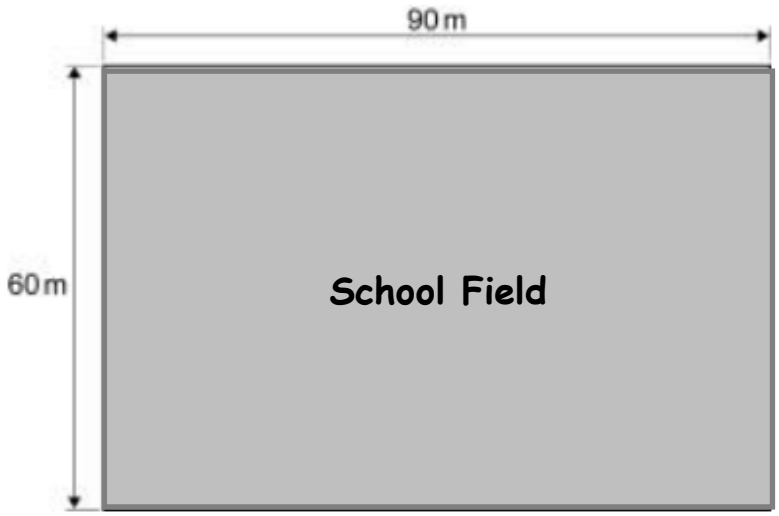
_____
_____ **(1)**

d) Provide one source of error associated with using quadrats and one way to minimise this error.

Source of error: _____

How to minimise error: _____ **(2)**

2. A class of students was set the task of estimating the number of dandelions on the school field using quadrats. Each quadrat had an area of $1m^2$. The diagram shows the dimensions of the school field.



(a) Calculate the area of the field. *(Remember to include units)*

_____ **(1)**

(b) Select one method from the list below which states the best method of using the quadrats to sample this area. **(1)**

- Place all the quadrats where there are lots of plants
- Place all the quadrats randomly in two different sample areas
- Place all the quadrats randomly in at least 10 different areas.

(c) The average number of dandelions per $1m^2$ quadrat was calculated to be 2.8. Estimate the number of dandelions in the whole field using the equation below. Show full working. **(2)**

The average number of thistles per quadrat	X	How many quadrats would fit in the field	=	Estimate of total number of thistles in the field

Homework Exercise 3 : Biodiversity

1. Six pitfall traps were set in a woodland to sample the soil living organisms living there. The results are shown in the table below.

Pitfall trap	Number of each type of organism caught			
	Spiders	Woodlice	Beetles	Snails
1	6	3	3	1
2	8	5	5	3
3	7	0	5	2
4	5	4	7	3
5	9	3	0	1
Average				

(a) What kind of organisms are pitfall traps used to sample? **(1)**

(b) Copy and complete the table, calculating the average number of each organisms caught. (Use a pencil and ruler) **(2)**

(c) Express the total numbers of woodlice and beetles trapped as a simple whole number ratio. **(1)**

_____ : _____
Woodlice Beetles

(d) Draw a diagram into your jotter to show the correct way that a pitfall trap should be set up. Your diagram should include labels. Remember to use a pencil and ruler. **(2)**

Continues on next page

(e) State one possible source of error when using pitfall traps and provide one way in which this error can be minimised.

Source of error _____

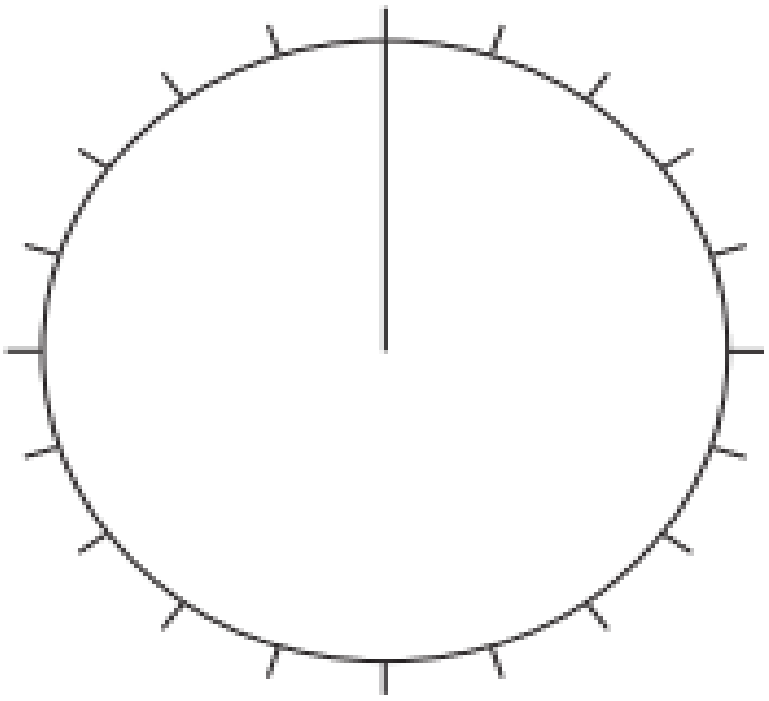
_____

How to minimise error _____

_____ **(2)**

2. Centipedes eat small soil living invertebrates.
It was calculated that woodlice make up 10% of their diet and spiders account for 20%. Beetles make up 10% of their diet and other invertebrates make up 60%.
Complete the pie chart **on the blank provided** to show this information.

DO NOT WRITE ON THIS BOOKLET. **(2)**

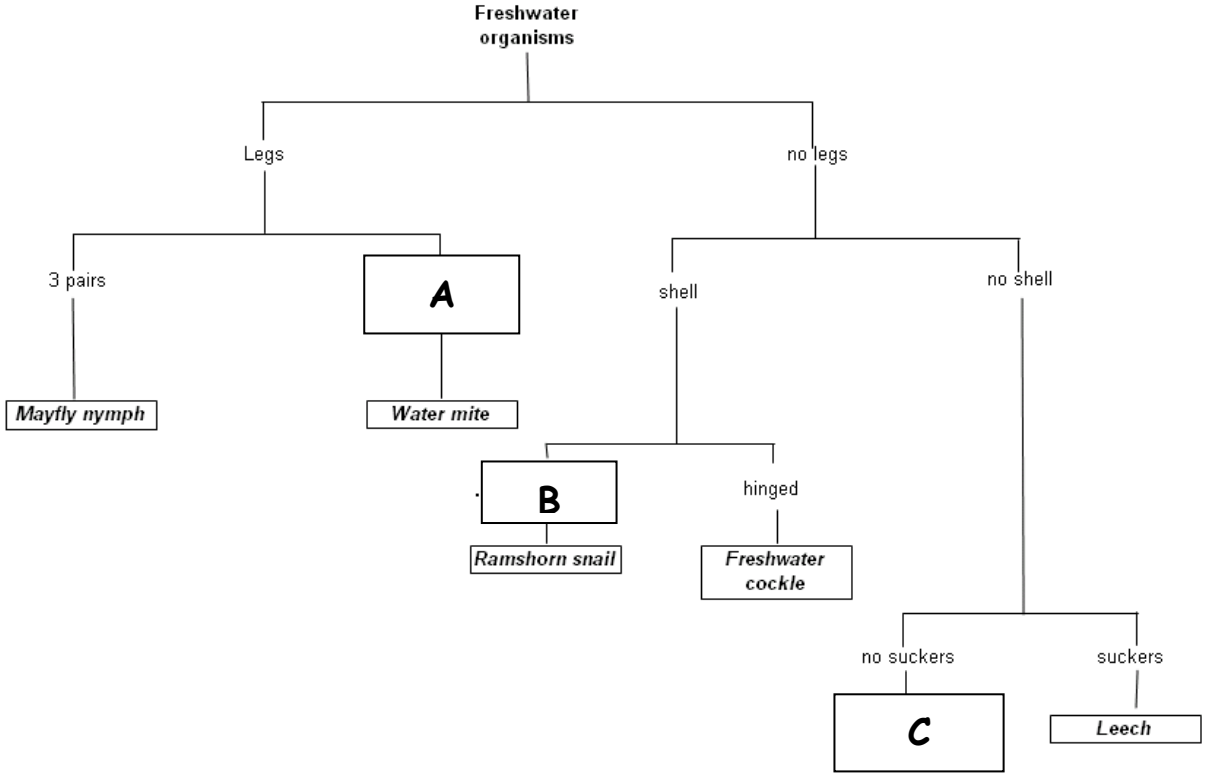


Homework Exercise 4 : Biodiversity

1. Some features of six fresh-water organisms are shown in the table below.

Organism	*Legs*	*Shell*	*Suckers*
Ramshorn snail	none	coiled	none
Flatworm	none	none	none
Water mite	4 pairs	none	none
Freshwater cockle	none	hinged	none
Mayfly nymph	3 pairs	none	none
Leech	none	none	present

a) Using the information in the table, state the name or features of the organisms which would be found at A, B and C on the diagram. **(3)**



b) What name is given to this type of diagram? **(1)**

_____

c) Which feature could be used to distinguish between a freshwater cockle and a ramshorn snail?

_____ **(1)**

Continues on next page

2. The key gives information about some water plants growing in a pond.

1	Plant is fully submerged in water	Go to 2
	Plant has leaves on or above surface	Go to 3
2	Grows in deep water	*Elodea*
	Grows in shallow water	*Starwort*
3	Plant has roots in soil	Go to 4
	Plant is free floating on water surface	*Water hyacinth*
4	Long and thin leaves	*Water hawthorn*
	Round leaves	Go to 5
5	Resistant to frost	*Water lily*
	Cannot survive frost	*Lotus*

(i) Use the key to identify the plant from the photograph and its description.

Photograph

Description

The plant has its roots in the soil at the bottom of the pond and does not tolerate frost very well.

Name of plant _____ **(1)**

3. Which plant grows submerged in **deep** water?

_____ **(1)**

4. Give **three** features that the Water lily and the Lotus have in common. **(3)**

Feature 1 _____

Feature 2 _____

Feature 3 _____

Homework Exercise 5 : Biodiversity

1. Measurements of soil moisture levels were taken in an area of grass using the meter shown in the diagram below.

Six readings were taken at sites chosen at random on two different days.

The results are shown in the table below.

Moisture readings on day 1 (units)	*Moisture readings on day 2 (units)*
4	7
5	6
4	8
3	6
5	7
4	8

a) Soil moisture is an example of which type of factor?

_____ **(1)**

b) Suggest a reason why the readings on day 2 are all higher than the readings on day

_____ **(1)**

c) Calculate the average of the moisture readings on day 2.

Average moisture reading _____units **(1)**

Continues on next page

d) Explain why six readings were taken each day, rather than one reading.

_____

_____ **(1)**

e) State the precaution which should be taken when using the soil moisture meter, to make sure that the results are accurate.

_____ **(1)**

2. (a) Below is a list of different abiotic and biotic factors.

Oxygen content	Disease
Amount of available food	Air humidity
Light intensity	pH
Temperature	Competition.
Number of predators	Wind speed

Organise the factors into a table under the headings ABIOTIC and BIOTIC factors. Remember to use a **pencil and ruler** for your table. **(3)**

(b) Select one of the abiotic factors listed in your table. State the type of abiotic factor chosen and how this can be measured. **(2)**

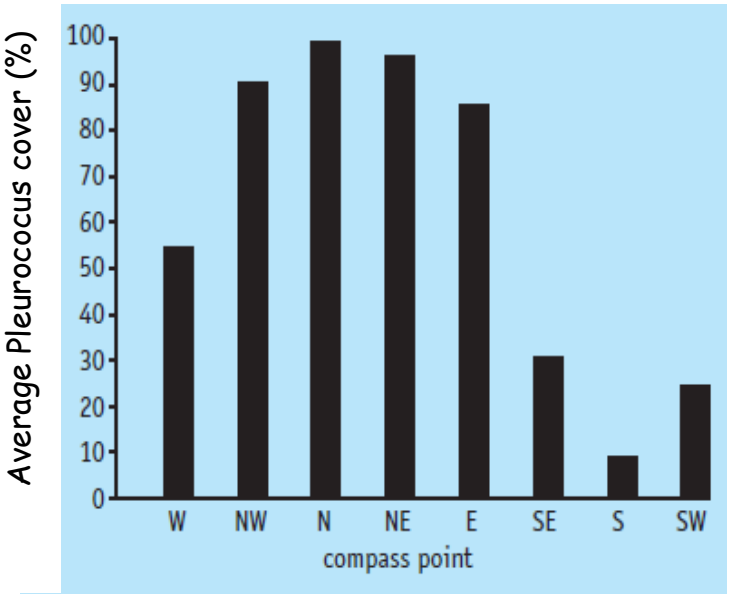
Abiotic factor _____

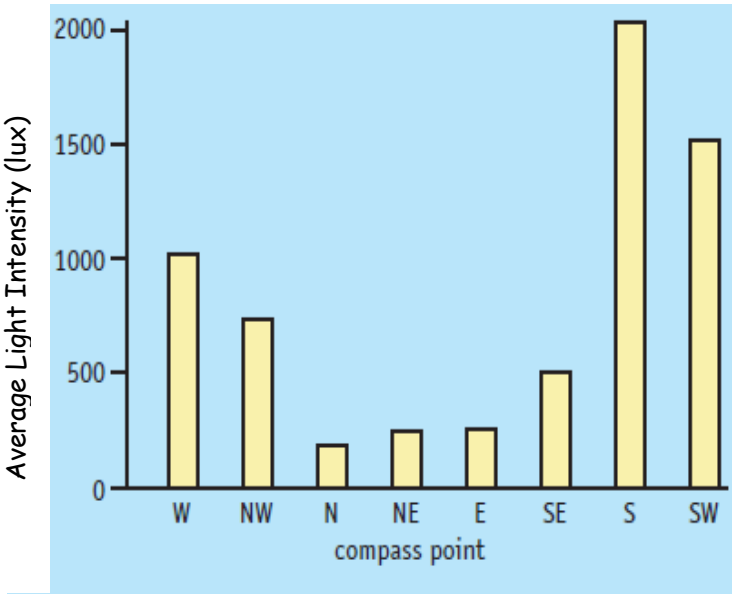
Method _____

_____

Homework Exercise 6 : Problem Solving

1. Algae are simple green plants that normally live in aquatic (water) ecosystems. *Pleurococcus* is an alga adapted to life on land provided that its habitat (e.g. the surface of a tree trunk) remains damp. The graphs below show the results from an experiment in which the percentage *Pleurococcus* cover and light intensity were measured at 8 compass points round a tree.





a) Ten measurements of percentage *Pleurococcus* cover and light intensity were made at each compass point and averages calculated.
Why is this better scientific practice than simply making one measurement each time?

_____ **(1)**

b) What percentage *Pleurococcus* cover was found to occur on the south-east (SE) side of the tree?
(1)

_____

c) At which compass point was the percentage *Pleurococcus* cover found to be
(i) highest? _____
(ii) lowest? _____ **(2)**

d) What light intensity was recorded on the northwest (NW) side of the tree? **(1)**

_____

e) At which compass point was light intensity found to be at

(i) its highest level? _____

(ii) its lowest level? _____ **(2)**

f) (i) In general what relationship exists between the distribution of *Pleurococcus* cover and light intensity? **(1)**

_____

_____

(ii) Give the ratio of *pleuroccocus* to light intensity on the south side of the tree.

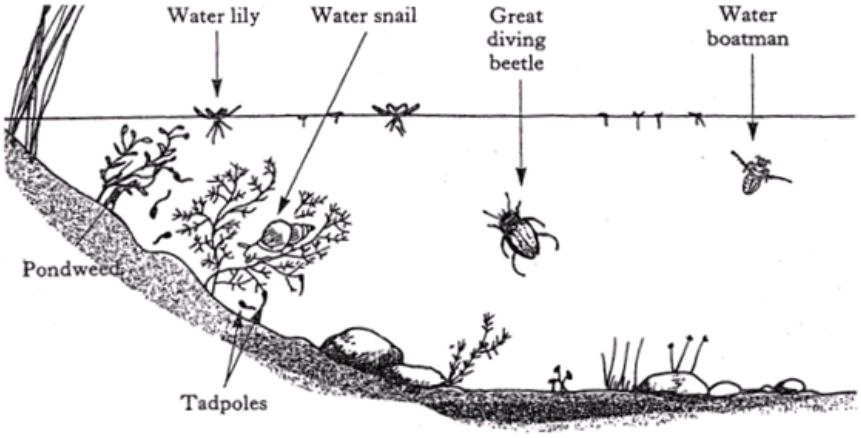
_____	:	_____	
Pleurococcus	:	Light intensity	(1)

(iii) How many times greater is the light intensity on the south side of the tree compared to the west?

_____ (1)

Homework Exercise 7 : Interdependence

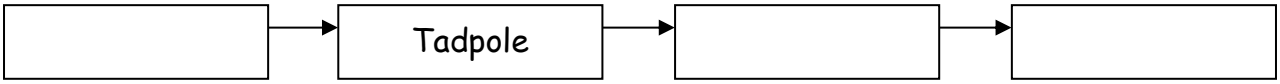
1. The diagram below shows part of a freshwater pond.



The table below contains information about organisms in the pond.

Organism	*Information*
Pondweed	Carries out photosynthesis
Water boatman (an insect)	Attacks tadpoles and sucks their juices
Tadpole	Feeds on pondweed
Water snail	Feeds on pondweed
Great diving beetle	Fierce predator, kills and eats other insects

a) Complete the food chain below, using information from any part of the table. **(1)**



b) In terms of energy, what do the arrows in the food chain show?

_____ **(1)**

c) Which type of organism would be found at the start of a food chain? **(1)**

_____

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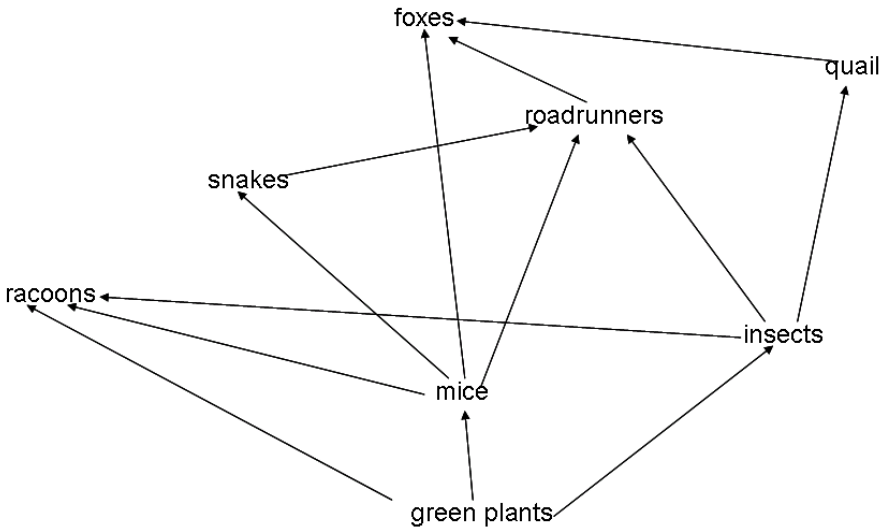
2. The following diagram shows part of a food web in Californian scrubland.



a) What term is used to describe the diet of the mice in the food web above?

_____ **(1)**

b) Name **two** animals in the food web that are **not** eaten by other animals in the food web.

_____ and _____ **(1)**

c) Omnivores eat both plants and animals.
Name the omnivore in the food web above.

_____ **(1)**

d) Using information from the food web, complete the food chain below.

_____→_____→snakes→_____→_____ **(1)**

e) How many individual food chains in the food web include roadrunners?

_____ **(1)**

f) Mice obtain energy from the food they eat. Some of this energy is used for growth.
State **two** other ways in which the mice waste this energy.

1 _____

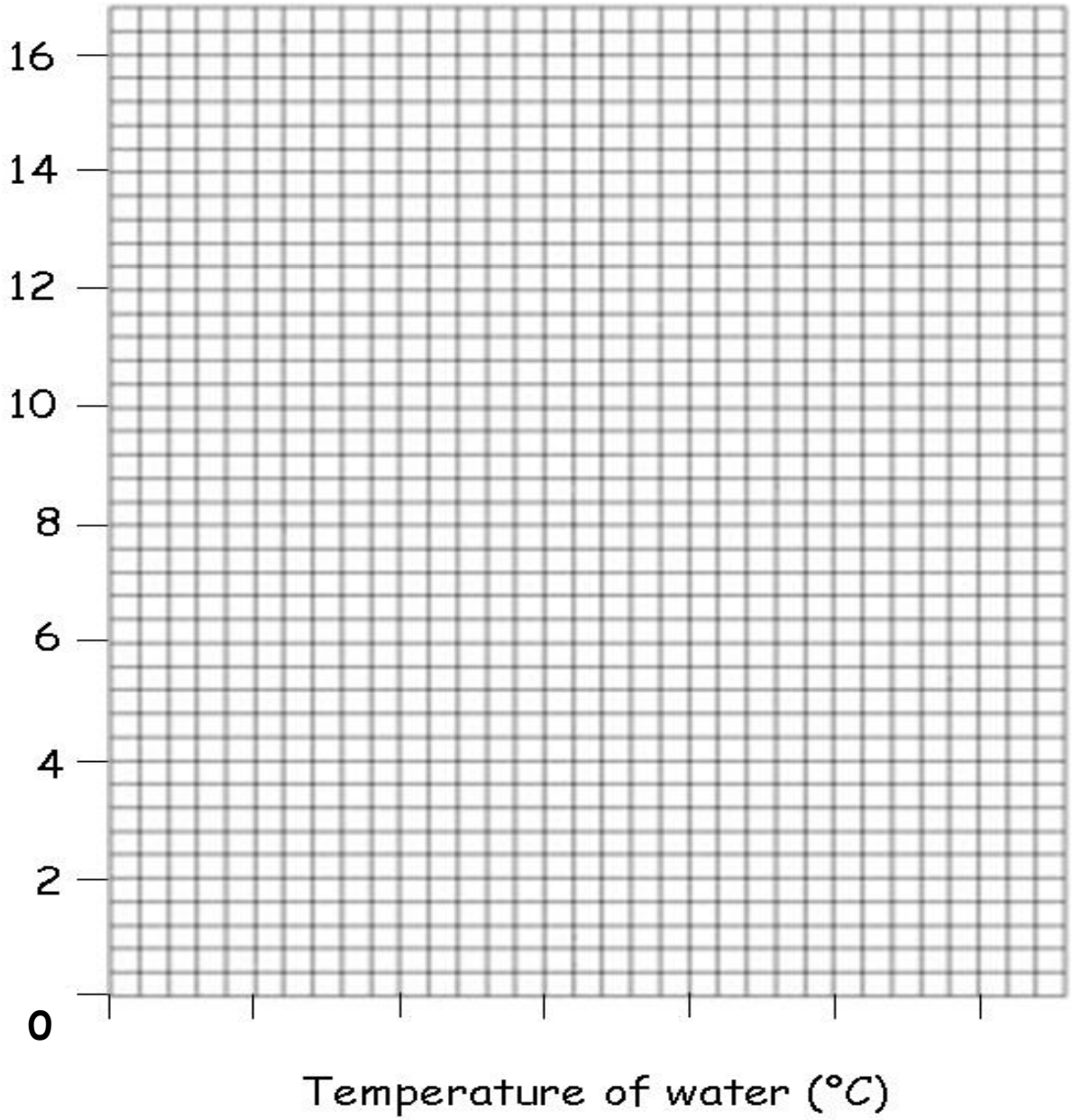
2 _____ **(2)**

Homework Exercise 8 : Interdependence

1. A group of pupil carried out some survey work on a freshwater pond over a period of time. The results in the table below show some of their findings.

Temperature of water (°C)	*Oxygen concentration (mg/l)*
0	15
10	13
15	12
20	10
25	8

a) On the **graph paper** provided, complete the axes and plot a line graph to show the effect of temperature on the oxygen concentration found in the water. Use the grid below to help you. Remember to use a **pencil and ruler**. **(3)**



b) Using the information from the table copy and complete the sentence below choosing the correct option each time.

As the temperature of the water **increases / decreases** the oxygen concentration **increases / decreases.** **(1)**

c) The pupils also sampled organisms in the pond and used books to find out their feeding relationships.

"Pond snails, shrimps, mayfly larvae and stonefly larvae feed on weeds and plant plankton in the pond. The shrimps are eaten by water beetles. The water beetles are eaten by minnows and sticklebacks. The pond snails are eaten by leeches which in turn are eaten by trout."

Use the information in the passage to complete the food chain below.

_____→ pond snails → _____→ _____ **(1)**

d) What name is given to describe a green plant at the start of a food chain? **(1)**

_____

e) Name **two** organisms that are in competition with each other for the same food.

_____ and _____ **(1)**

f) Some organisms in the pond are producers and others are consumers. Describe what is meant by each of these terms.

Producer _____ **(1)**

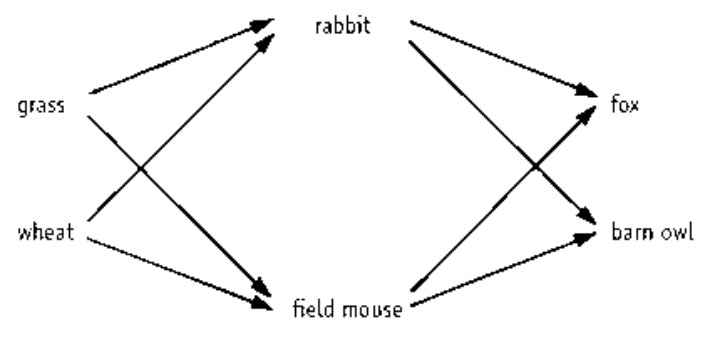
Consumer _____ **(1)**

g) State the term used to describe an animal which is found at the top of the food chain and hunts other animals for food. **(1)**

_____

Homework Exercise 9 : Interdependence

1. The diagram below shows a simple food web. Use the diagram to answer the following questions.



(a) Decide whether each of the following statements, which refer to the food web above, is **true** or **false** and then use **T or F** to indicate your choice. Where a statement is false, give the word(s) that should have been used in place of the word(s) in **bold print**.

i) Each arrow in the food web represents flow of **energy** from one organism to the next.

ii) The primary consumers are **larger** in body size than the secondary consumers.

iii) Foxes and barn owls are the **rarest** organisms in the ecosystem.

iv) Both rabbits and **foxes** are examples of primary consumers.

v) The producer is always eaten by a **secondary** consumer. **(5)**

(b) If rabbits were removed from the food chain, what would happen to:

i. The number of foxes?

_____

ii. The number of wheat plants?

_____ **(2)**

(c) State the predator(s) in food web above. **(1)**

(d) Food webs are made up of many food chains, with different organisms interacting with one another. Using the diagram above, select one food chain and use it to compose a pyramid of numbers. (2)

Homework Exercise 10 : Interdependence

1. Each of the statements below defines one of the words in the list. Copy and complete the following statements using the list provided. **(3)**

Statement

i) The place where an organism lives.

Word from list _____

ii) A natural biological unit made up of a community of living things and their habitats

Word from list _____

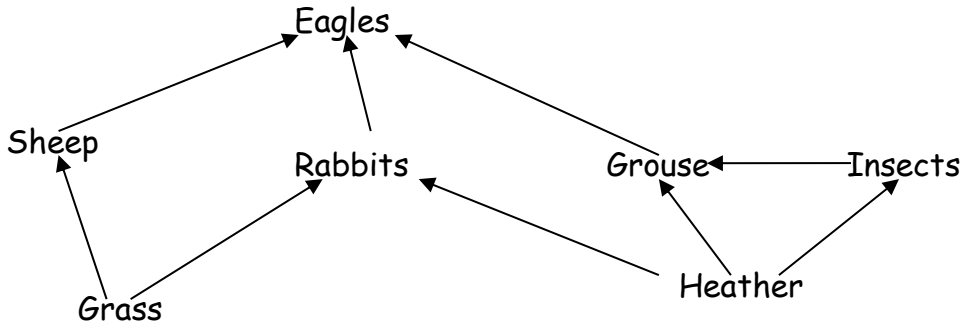
iii) The total number of populations living in an area.

Word from list _____

List

Community
Producer
Habitat
Population
Consumer
ecosystem

2. The diagram below shows part of a food web in Scottish moorland.



Using information from the food web, answer the following questions.

(a) Name **two** organisms that are in competition with each other. Give a reason for your answer.

Organisms _____ and _____

Reason _____
_____ **(2)**

(b) State **two** ways by which energy can be lost from food webs.

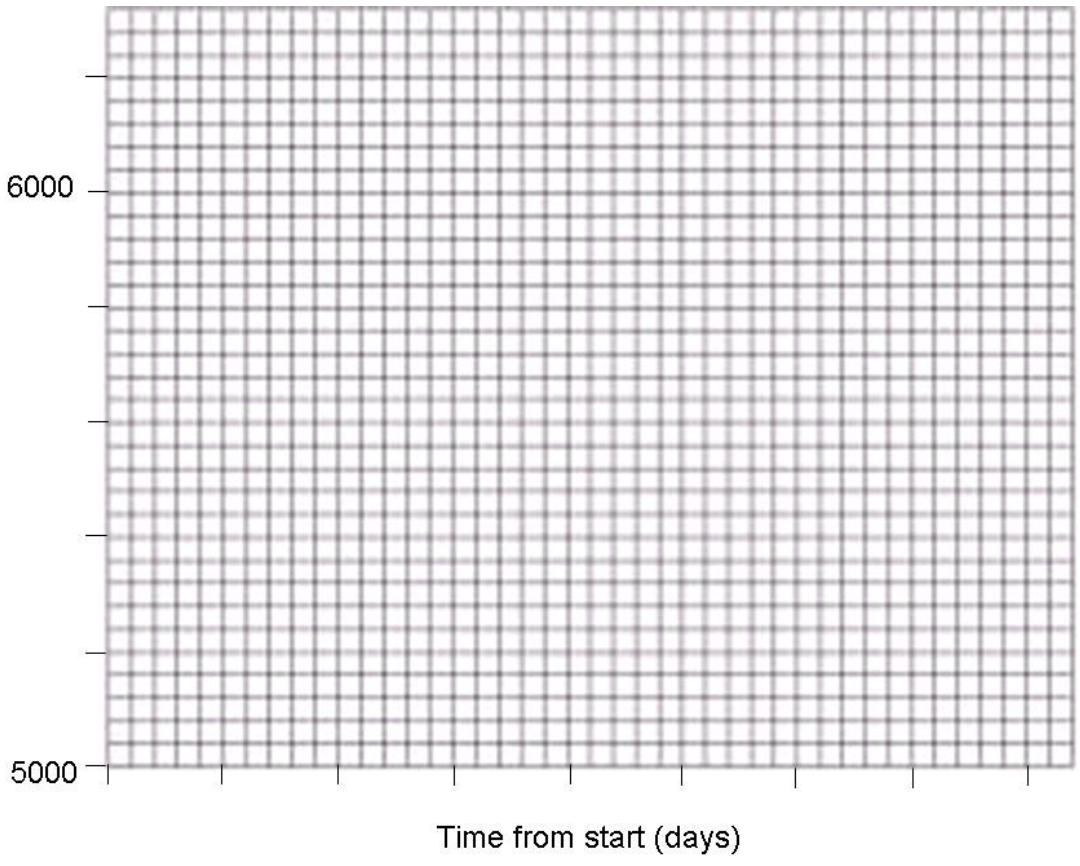
1 _____
2 _____ **(1)**

3. A pupil carried out the following investigation into the feeding of caterpillars.

Each day, the mass of the caterpillar was measured. The results are shown in the table below.

Time from start (days)	*Mass of caterpillar (mg)*
0	5000
1	5300
2	5600
3	5800
4	6000
5	6200
6	6200

(a) On the **graph paper** provided, **complete both axes and draw a line graph** to show the mass of the caterpillar during the time of the investigation. **(3)**



b Calculate the average daily increase in mass of the caterpillar. (Hint – how much has it increased and over how many days)
Space for working

Average daily increase in mass _____mg **(1)**

Homework 11 : Interdependence

Research Project on the Introduction of an Exotic Species

An introduced species (also known as naturalized species or exotic species) is an organism that is not indigenous to a given place or area and instead has been accidentally or deliberately transported to this new location by human activity. An introduced species can often be damaging to the ecosystem that it is introduced to.

Your task

At home you are going to carry out a piece of research into the introduction of an exotic species. You will produce a written report that will be handed in and assessed. Your report can be hand written or produced on a computer. It should be no longer than two sides of A4 paper.

You should consider the following points within your report.

- Why was the organism introduced? Was it for a particular reason or was it by accident;
- How was it introduced;
- What effect did the introduced foreign species have upon the ecosystem;
- Is it still there or has it gone; and
- What control measures, if any, have been put in place to try and control it

Your teacher will tell you which one of the following species that you are to look at.

- Introduction of Grey Squirrel to Britain
- Japanese Knotweed
- Introduction of European rabbit to Australia
- Water hyacinth
- The seaweed *Caulerpa taxifolia*
- Introduction of the Cane Toad (Australia)
- Possum into New Zealand
- The American Mink
- Stoat into New Zealand
- Free choice

Remember to include a list of the references used.