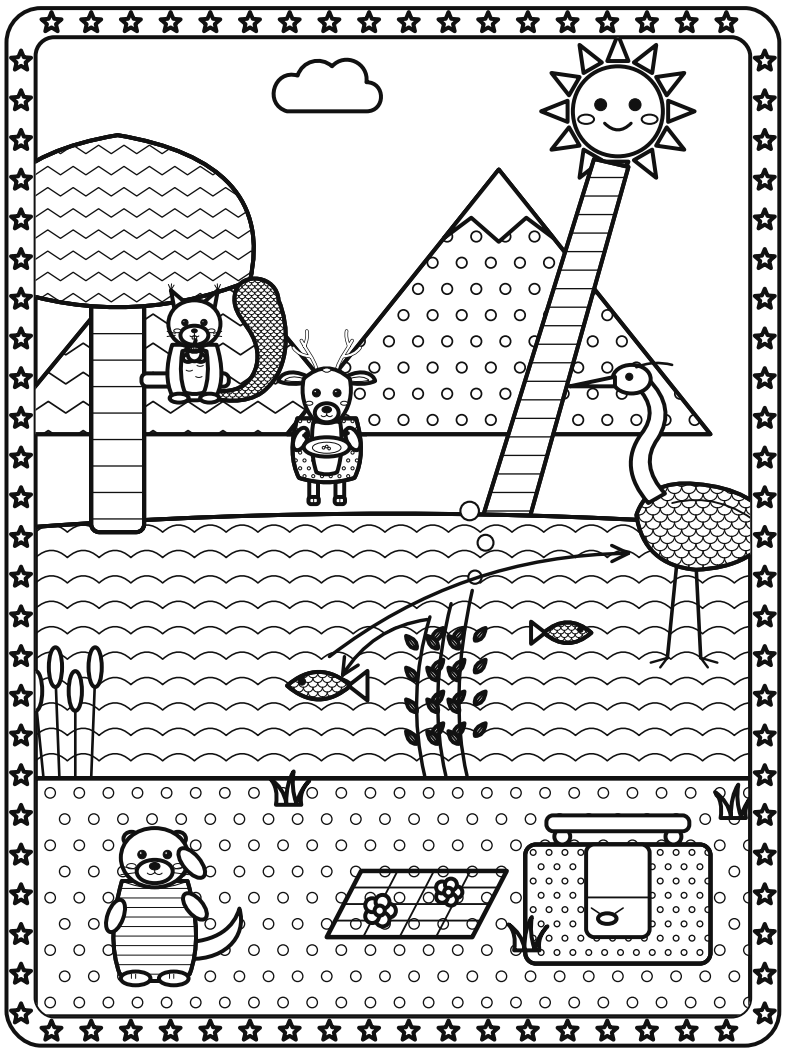
REAL-LIFE BIOLOGY

Life on Earth

Workbook for National 5 Biology

Unit: Life on Earth



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Blewis LEARNING

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How to use this book

This book covers Life on Earth for National 5 Biology: ecosystems, distribution of organisms, photosynthesis, energy in ecosystems, food production and evolution of species. Each topic follows the same pattern, so you always know what comes next.

EACH TOPIC HAS

Opener	the story for the topic, what you will learn and the key words
Learn pages	short explanations with diagrams, and questions to try
Practical	You plan the investigation yourself, carry it out safely, take repeat readings, draw a graph and evaluate your method.
Brain break	a calm puzzle or colouring page
Check-up	a few questions to show what you know, and a checklist

PRACTICAL WORK: STAY SAFE

- Only start a practical when an adult says it is OK.
- Read the whole method and the Stay safe table first.
- Tell your teacher about anything that might affect you, like asthma or an allergy.
- Stop and tell an adult if you feel unwell or something goes wrong.

NO LAB TODAY?

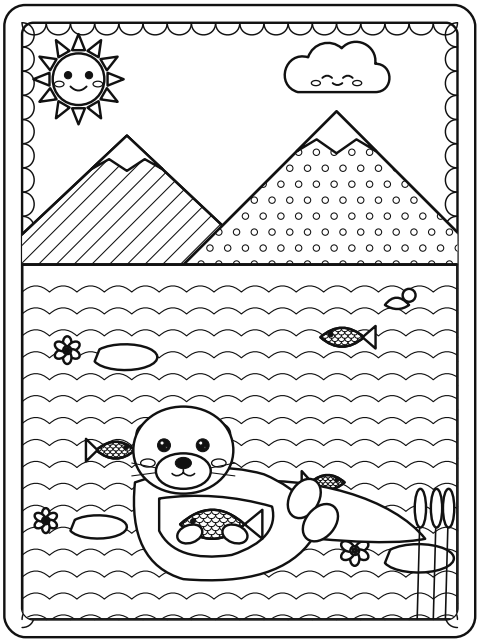
Every practical has a set of example results. If you could not do the experiment, use these to finish the results, graph and conclusion.

DOODLE CORNERS

Some pages have a doodle corner. Colour it or doodle in it when you need a short break.

Ecosystems

One otter, two hundred trout and a million mayfly larvae all share the same loch. How do they all fit together?



Theme: the Loch Arrin wildlife survey. Mhairi is helping the ranger at Loch Arrin with a wildlife survey. She has to describe who lives where, who eats whom, and what would happen if one species disappeared.

IN THIS TOPIC YOU WILL LEARN TO

Skill 1	use the key ecosystem terms correctly, from species and population to community and niche
Skill 2	read food webs and predict what happens when one population changes
Skill 3	explain the difference between interspecific and intraspecific competition

KEY WORDS

Ecosystem	all the organisms in an area and their environment
Population	all the members of one species in an area
Community	all the populations of different species in an area
Niche	the role an organism plays in its community
Producer	a green plant or alga that makes its own food
Competition	organisms trying to get the same limited resource

❶ Living together

Biologists use a small set of words to describe where organisms live and how they are linked. A **producer** makes its own food by photosynthesis. A **consumer** eats other organisms: a **herbivore** eats plants, a **carnivore** eats animals and an **omnivore** eats both. A **predator** hunts and eats other animals, called its **prey**.

Term	Meaning	Loch Arrin example
Species	organisms that can breed together to produce fertile offspring	brown trout
Population	all the members of one species in an area	
Community	all the populations of all the species in an area	every plant and animal in the loch
Habitat	the place where an organism lives	
Ecosystem	the community and its environment (water, rocks, light)	the whole loch
Biodiversity	the variety of species in an area	how many different species the loch holds

1 Fill in the two empty Loch Arrin examples in the table.

2 The ranger counts 34 grey herons around the loch. Is this a count of a population or a community? Explain your answer.

Answer:

3 Water voles eat grass and reeds. Otters eat trout, frogs and water voles. Name a herbivore, a carnivore and a predator–prey pair from these sentences.

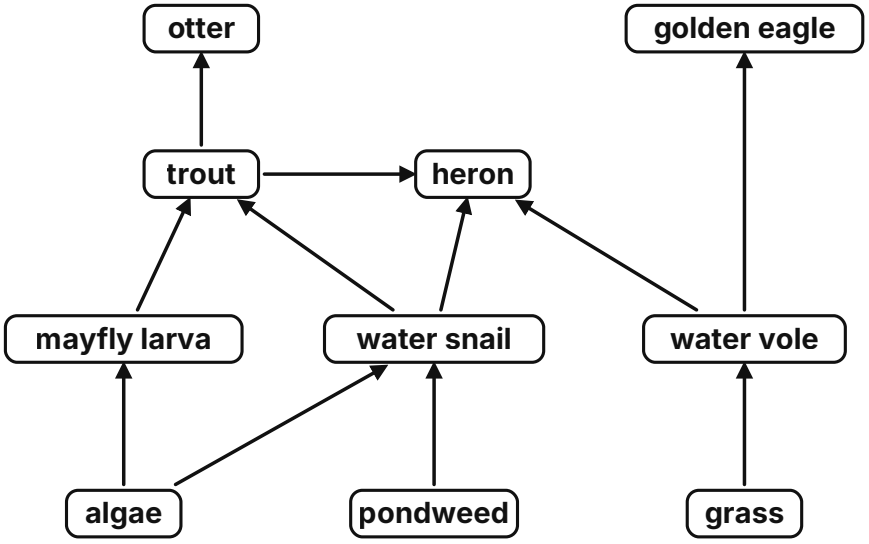
Answer:

4 Explain why a loch with 40 species has a higher biodiversity than a farm pond with 8 species, even if the pond holds more animals.

Answer:

❷ Food webs

A **food chain** shows one feeding path. The arrows point from the food to the organism that eats it, so they show the direction that **energy** flows. Most animals eat more than one food, so food chains join up into a **food web**. If one population changes, the change spreads through the web.



PREDICTING A CHANGE

Follow the arrows in both directions. **Less food**: the animals that eat it may fall in number or switch food. **Fewer predators**: the prey may rise in number, then eat more of their own food. Always say **which** organism changes and **why**.

1 Write out one food chain from the web with four organisms in it.

Answer:

2 Name the producers in the food web.

Answer:

3 Disease kills most of the water snails. Explain what could happen to the number of mayfly larvae.

Answer:

4 Mhairi says the golden eagle will starve if the water voles disappear. Use the web to explain whether she is right.

Answer:

PRACTICAL 1

Plan it: does crowding slow down growth?

AIM To find out how the **NUMBER OF CRESS SEEDS SOWN IN A DISH** affects the **MEAN FRESH MASS PER SEEDLING** after 7 days.

1 Variables

I will change the independent variable	
I will measure the dependent variable	
I will keep the same controlled variables (give three)	

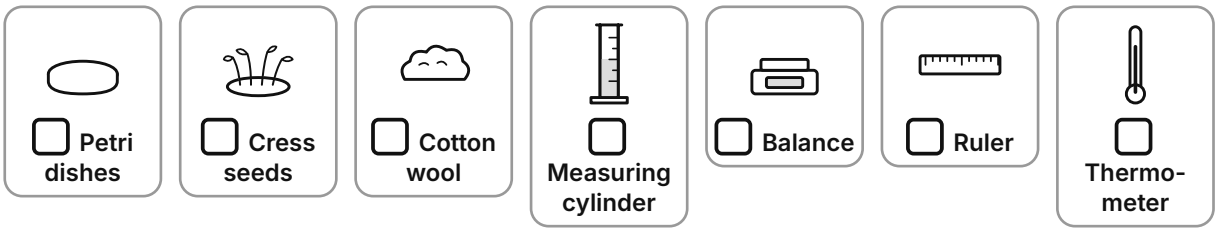
2 Prediction

I think that .....

because .....

3 Equipment

Tick the equipment you need. Not everything here is useful.



4 Stay safe

The first row is done for you. Add two more hazards.

Hazard What could cause harm?	**Risk** What could happen?	**Control** How will I stay safe?
Water spilt on the bench or floor	Someone slips	Wipe up spills at once and carry dishes flat.

Method and results

5 Write your method

1. How will you set up each dish so only the number of seeds is different?

2. Where will you keep the dishes, and for how long? How much water will each get?

3. How will you find the mean fresh mass per seedling in each dish?

4. How many dishes for each number of seeds? How will you work out the mean?

6 Results

Complete the headings, including units.

				Mean mass

NO LAB TODAY? USE THESE RESULTS

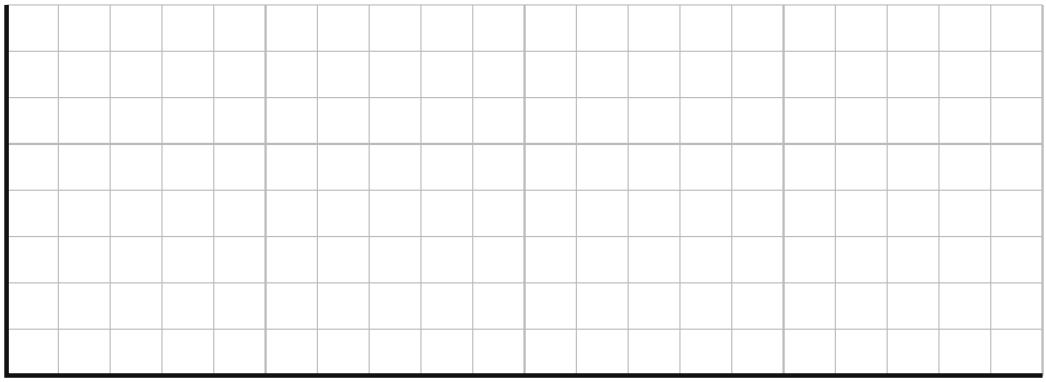
Seeds per dish	Dish 1 (mg)	Dish 2 (mg)	Dish 3 (mg)	Mean mass (mg)
10	42	45	39	
20	38	36	40	
40	31	33	29	
80	24	22	26	
160	15	17	13	

Each value is the mean fresh mass per seedling after 7 days on a windowsill: all the seedlings in the dish (all 10 in the 10-seed dishes) were cut at the cotton wool and weighed together, then the total was divided by the number of seedlings. Work out the means yourself.

Analyse and evaluate

7 Draw a line graph

Plot mean fresh mass per seedling against seeds per dish. Choose your own scales, label both axes with units and draw a line or curve of best fit.



8 Conclusion

As the number of seeds increased, the mean fresh mass per seedling

9 Evaluate

a Which type of competition did this experiment investigate? What resources were the seedlings competing for?

Answer:

b Why were three dishes used for each number of seeds?

Answer:

c Give one way to make the results more valid.

Answer:

> **ASSIGNMENT LINK**
> For an assignment you could compare your results with data on crop spacing from a seed company or a farming website, and give a reference for the source.

FREE SAMPLE

Life on Earth (N5 Biology)

This sample shows a few pages. The full printed workbook is available from Amazon.

blewislearning.co.uk

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