Life Cycles

Activity Pack for Primary Teachers

LinneanLearning

Discovery Kits

Discovery Kits

Incorporating practical activity into science lessons can be tricky at a primary level, particularly for non-specialist teachers. A recent SCORE (Science Community Representing Education) report found that many schools lack sufficient resources for teaching practical science. These Discovery Kits not only provide some of the equipment necessary for practical lessons, but also provide ideas and guidance for teachers - we hope you find them useful!

The activities suggested in the packs are by no means an exhaustive list of the possible lessons you could carry out using the kit provided. We have tried to provide a variety of indoor and outdoor practical activities, suitable for pupils in Key Stages 1&2. Many of the activities are cross-curricular, providing opportunities to develop skills in literacy, mathematics, art and ICT.

If you have an idea for using the equipment in this kit, we would love to hear about it! If you'd like your idea added to this activity pack then full credit will of course be given to you.
Email us with your suggestions: learning@linnean.org.

Please check at our website for full details of other available kits, covering topics such as **plants**, **habitats**, **classification** and **evolution** - www.linnean.org/discovery-kits.

ALSO! We love seeing your pictures. Tweet us @LinneanLearning #DiscoveryKits

Disclaimer: The Linnean Society is pleased to lend these kits to schools, and believes each kit to be suitable for its suggested use. However, we recommend that teachers thoroughly examine and check each kit to make sure it is fit for the purpose intended, making any risk assessment that is appropriate. The Linnean Society excludes any liability for injury or damage howsoever caused by the use of the kits, is not responsible for the standard of development or safety of any of the products used in the kits, and makes no warranty against errors and omissions in any kit or accompanying material.

Objectives & Links

The activities in this pack encourage students to:

- Observe and recognise some simple characteristics of a variety of living things
- Develop curiosity and interest by exploring their surroundings using their senses
- Treat animals in the environment with care and sensitivity
- Work together in pairs or groups, taking turns and sharing fairly
- Communicate through conversation by sharing experiences, ideas and information
- Develop scientific and research skills, either individually or in groups

We've designed the pack to help teachers cover the following curriculum areas:

Year 2

- Explore and compare the differences between things that are living, dead and things that have never been alive
- Observe and describe show seeds and bulbs grow into mature plants
- Notice that animals, including humans, have offspring which grow into adults

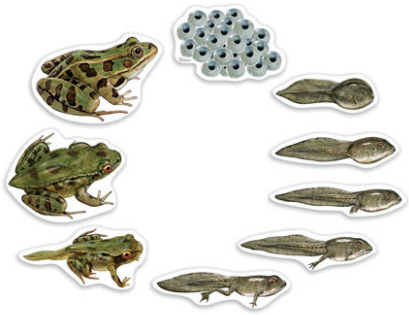
Year 3

- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

Year 5

- Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird

What's in the Kit?



Butterfly Life Cycle Specimen in Acrylic

Frog Life Cycle Specimens in Acrylic

Corn Life Cycle Specimen in Acrylic

Inflatable Butterfly Life Cycle
(**4 parts** and an instruction booklet)

Magnetic Frog Life Cycle (9 pieces)

Butterfly Garden Pop Up Tent

5x Magnifying Glasses

10x UV Marker Pens

UV Lamp

MRS. NERG Cards (**12 cards**)

Pollination Cards (**5 cards**)

Studying Seeds Cards (**3 cards**)

Can You See It? Cards (**4 card sets**)

Save Our Bees! Cards (**5 cards**)

Life Cycle Treasure Hunt Cards (**14 cards**)

Activity ideas

MRS. NERG

Students will learn how to categorise objects as alive, dead or non-living and can then create a poster illustrating one of the seven essential life processes.

In the Kit:
MRS. NERG cards

You need to provide:
Paper
Pencils, pens etc.

Let's go!

Explain that all things on earth can be placed into one of three groups:

- Alive - cow, grass, mouse etc.
- Used to be alive - wood, fossil, paper etc.
- Non-living - stone, glass, metal etc.

Ask students to separate the pictures provided into these three groups - some of them are trickier than others!

All living things carry out seven essential processes, and these can be remembered using the acronym **MRS. NERG**:

Movement: Animals move their whole bodies, plants move their leaves and roots
Reproduction: Animals have babies, new plants grow from seeds
Sensitivity: Plants and animals both respond to what is happening around them

Nutrition: Animals eat plants or other animals, plants produce food through photosynthesis
Excretion: Plants and animals both get rid of waste products
Respiration: Plants and animals use oxygen to help turn food into energy
Growth: Babies grow into adults, seedlings grow into bigger plants

Take it further!
Ask students to create a poster illustrating one of the seven essential life processes. Once they are complete, create a MRS. NERG display in the classroom.

Seeds go POP!

This activity helps students understand how some plants disperse their seeds by explosion.
NOTE: This activity can be a little messy!

You need to provide:
A balloon
Confetti or the contents of a hole punch
A pin

Let's go!

Ask children how they think plants disperse their seeds. Discuss some of the different ways this can occur. Explain to the children that you are going to demonstrate one of the methods of seed dispersal, using a balloon as a seedcase. You may wish to gather suggestions as to what may be used as seeds.

Fill the balloon with the confetti or paper clipping - you may need to use a funnel or paper cone. Blow up the balloon and tie it. Make sure the children are a safe distance away from the balloon and then pop it using the pin. The seeds should disperse, scattering over the whole area.

Take it further!

Go on a seed search - locate as many seeds as possible and record your findings. Use a microscope to look at the seeds more closely - can you work out how each seed type is dispersed?

Do students think glitter would work well in this experiment instead of confetti? Why? Can you test your theories? This might be better done outside!

Find out about the squirting cucumber - how does it disperse seeds?

Pollination roleplay

Students learn about the parts of a flower and their role in the plant life cycle by taking part in this role play activity. Students will also gain an understanding of the role insects play in pollination.

Let's go!

Discuss with children why bees visit flowers and what happens there when they do. Look at the photos of bees - what are the similarities and differences? Do these bees do different jobs?

Explain that bees are a bit like flying Velcro, and you're going to play a game to demonstrate this. Dress children up as the various parts of the flower and organise them into two flowers and one bee. A flower with five sepals, five petals, five stamens and one stigma involves sixteen children - you can adapt the number of flower parts to suit the number of children in your class.

You need to provide:

Photos of types of bees
Video clip of bees pollinating a flower

Dress up:
Sepals and petals (*cut out of card and attached to clothes/ headbands*)
Stamens (*empty yoghurt pots to hold pollen grains*)
Pollen grains (*ping pong balls with sticky Velcro hooks*)
Stigma (*woolly hat*)
Nectar (*drinks carton with straws*)
Bee (*a headband/hat with antennae, striped trousers, sunglasses and wings*)

Explain the roles each part of the flower plays - petals attract the bee and offer it nectar as food, stamens transfer pollen onto the bee and the stigma takes pollen from the bee.

Now the 'bee' will visit the first flower, making buzzing noises. It collects pollen by removing a pollen grain from the pot. It flies to the second flower, which is waving its petals to attract the bee. The bee deposits the pollen on the stigma, by brushing the Velcro hooks against the woolly hat. This can be repeated several times until children fully understand the process.

Take it further!

Show a video clip of bees pollinating flowers, or go and watch some bees in the garden. Discuss pollination in more detail and talk through any concepts the children are struggling with. Explain the importance of insects in plant reproduction and that some plants would not be able to reproduce without them.

Studying seeds

Students will study plants to discover where seeds come from. This can be extended to what is needed for a seed to germinate.

You need to provide:
Halved peppers, tomatoes and apples
Pictures of pepper and tomato plants and apple trees in blossom
Colouring pencils

Let's go!

Show students the pictures of the pepper and tomato plants and apple trees. Ask where the fruit comes from, and ascertain that it comes from the flowers of the plant.

Show students the various sliced fruits and ask about the seeds - why are they inside the fruit? What will happen to them when the fruit is eaten? This leads well into a discussion about seed dispersal.

Students should then choose a picture of the pepper, tomato plant or apple tree and underneath draw the associated fruit. The diagram should be labelled and students should write a short explanation of how the flowering part of the plant produces the seeds.

Take it further!
Students can conduct an experiment to see what is necessary for a seed to germinate. Ask for their ideas - what factors do they think are important, what equipment do they need, how do they want to run their experiment and how will they make sure it's a fair test? You may wish to provide a science investigation framework for children to fill in.

Teacher tip:

The extension experiment is investigating germination not growth. Light is not required for germination as seeds contain their own food source and do not use photosynthesis.

Tiny tadpoles

Students will observe the development of frogspawn and witness the frog life cycle first hand.

Note: Frogspawn is delicate and requires care. You should never remove all of the frogspawn from a pond, and you should collect your frogspawn from the closest possible pond to prevent the spread of amphibian diseases. It is illegal to sell frogspawn.

In the Kit:
Magnifying glasses

You need to provide:
A tank full of pond water
Frogspawn
Rocks & pondweed
Fish food

Let's go!

Prepare the tank for the frogspawn. You'll need to put in large rocks that stick out of the water or your tadpoles will drown. Remember to add some pondweed or algae for the tadpoles to hide amongst. Pond water should be used - if you cannot obtain pond water, use fresh filtered water that has been left in a bottle overnight. Keep the tank away from radiators and windows.

Collect your frogspawn from a local pond. You'll need around a tablespoon-full. Take as little as possible, and never remove all of the frogspawn as you'll change the available gene pool in the pond. Put the frogspawn into a cup with some of the pond water. When you get back to the classroom put the cup into your tank and allow the water temperatures to equalise. The most common reason for frogspawn death is sudden temperature change. Once the temperatures have equalised tip the cup gently into the tank water.

When the tadpoles hatch start feeding them. A little bit of boiled shredded lettuce (allowed to cool) is good, as is commercial fish food. Be careful not to overfeed - they don't need much! As soon as the water becomes cloudy it will need to be topped up. Remove around half of the water and replace it with fresh. Never change all of the water at once as the shock can kill your tadpoles. Allow the water to come to room temperature before you add it to the tank.

When the tadpoles grow legs they become carnivorous. You either need to feed them a suitable food or release them back into the same pond that the frogspawn came from. Again, you'll need to allow the froglets to adapt to the water temperature etc. before you release them, or they may die of shock.

Take it further!

If you have more than one class in a year group you should arrange a shared frogspawn tank among the classes. This will help reduce the demand for frogspawn in the local area.

Bottle butterfly feeder

Students will make their own butterfly feeder using an old plastic bottle and sugar water.

You need to provide:
Plastic bottle and cap
String or garden wire
Sugar
Warm water
Pliers or scissors
Small nail or drawing pin

Let's go!

Cut 20cm of the string or wire. Place the neck of the bottle in the centre of the string/wire and tie or twist it (using pliers) around the bottle neck until it is held tightly. Join the ends of the string/wire to make a loop so you can hang the bottle in the garden.

Use the nail or drawing pin to very carefully make two holes in the bottom of the bottle. Try to make the holes as small as possible.

Make the sugar water by dissolving sugar into warm water. Don't make it too sweet - 1 part sugar to 10 parts water is about right. Place the bottle into a bowl or take it outside to avoid making a mess. Pour the sugar water into the bottle and fix the cap back on.

Hang the bottle in an area where you have seen butterflies. The sugar water will slowly drip from the bottle creating a puddle on the ground that the butterflies can drink from. Try to place the feeder in a place where butterflies will be protected from predators - it's best away from trees and bushes where cats or birds may hide. Once the feeder is empty remember to rinse and recycle the bottle.

Take it further!
Students may wish to decorate their feeder to attract more butterflies. Blue and yellow are good colours to use, but avoid red as butterflies don't see it very well. Butterflies and other insects use ultraviolet markings on flowers to guide them to the nectar. There are UV pens provided in the kit so students can add markings to their butterfly feeder.

Teacher tip:
You may need to supervise younger children while they are making the small holes in the bottom of the feeder bottle.

Can you see it?

Students will look at images of flowers displaying ultraviolet (UV) trails. Insects use these trails to guide them to the nectar within the flowers. Students can then use a UV light to detect trails on some common garden flowers.

In the Kit:
Can you see it? cards
UV lamp

You could provide:
Common flowers - try sunflower, daffodil, marigold, bellflower, campanula, cranesbill, crocus, dandelion or lily

Let's go!

Show students the flower images taken under normal light. Ask them what they see - do they know the name of the plant or can they name any of the parts of the flower. Ask how they think insects find the nectar in the flowers.

Show students the images taken under UV light, and ask what they see. They should be able to spot the differences! Explain that lots of insects can see a wider spectrum of light than humans can, including parts of the UV spectrum. They use the markings on the flowers to guide them directly to the nectar.

Take it further!
Try looking at a range of common garden flowers under the UV lamp. The best way to do this is to punch a small eye hole in a shoebox, then place the flower and the UV lamp inside. This should create a dark enough space to highlight any UV patterning on the flowers. Bear in mind that not all flowers show these UV markings - you might need to look at a few before you see anything!

Teacher tip:

You may wish to explain to older students that the colours they can see in the UV images are intended to highlight the differences under UV light - these are not the colours the insect will see. However, the patterns are exactly as the insect will see.

Attracting insects

Students will create an insect garden and observe the insects which can be found there.

You need to provide:
Flowerpots
Trowels
Spades
Stones, bark or logs
Seeds or seedlings

Let's go!

The garden needs to be well planned before you start planting. Think about the flowers and plants you will grow - what shape, size and colour are they? When will they flower? Does your school have a garden that students can work in or will they need to plant in pots? This may affect your choice of flowers. You'll also need to think about other features to include in your garden, such as stones, puddles or a water feature.

Once you've decided on the design for your garden you'll need to get your hands dirty! Plant your chosen flowers and keep them well watered. Observe the butterflies that come to visit the garden - can you identify them? Try keeping a log of all the creatures you see.

Teacher tips:

Butterflies like sun-loving flowers that produce lots of pollen and nectar. They are also attracted to brightly colour flowers, particularly blues and yellows. Try to get a good mixture of plants in your garden to attract the most butterflies. If you are planting your garden in pots place them as close together as possible. Remember if you plant in pots they will need daily watering to continue producing nectar. If possible avoid watering plants in direct sunlight.

Suggested plants and flowers:
Bluebell, buddleia, busy lizzie, buttercup, chives, chrysanthemum, clover, cornflower, daisy, dahlia, dandelion, forget-me-not, heather, hebe, honeysuckle, hydrangea, lilac, lavender, lobelia, marjoram, mint, nasturtium, onion, pansy, primrose, parsley and thyme all produce lots of nectar and attract many different butterflies.

To provide food for caterpillars you may want to include some of these:

Cabbage (or other Brassicas), cowslip, grasses, heather, honeysuckle, nasturtium, nettles, oak, primrose, thistle, thyme, and violets.

Butterfly garden

Students will watch as Painted Lady caterpillars grow, pupate and emerge as beautiful butterflies.

Note: This activity takes 3-5 weeks. You must plan for any long weekends or holidays that may interrupt this period. There is a small postage cost associated with this activity.

In the Kit:
Expanding butterfly habitat
Caterpillar cup (ordering instructions provided)

You need to provide:
Patience!

Let's go!

Extensive instructions and FAQs can be found at www.insectlore.co.uk.

Order your caterpillar cup following the instructions on your certificate. When the parcel arrives unpack the caterpillars, keeping them in their cup. Keep the caterpillars indoors, out of direct sunlight and drafts. There is sufficient food and moisture available for them to grow into butterflies. Be careful when handling the cup and do not shake it under any circumstances.

The caterpillars will eat the food provided within the cup and begin to grow, shedding their exoskeletons up to 4 times. After around 10-12 days they will climb to the top of the cup and pupate. After another 2 days the chrysalides will be fully formed. You can now move them into the butterfly habitat. Open the cup and remove the paper disk with attached chrysalides. Carefully remove any silk strands or frass that are stuck to the disk - this is very important! Pin the paper disk to the inside of the butterfly habitat, around 2 inches from the ground.

7-10 days later the butterflies will emerge. It's very important that you don't disturb the butterflies while they are emerging and drying their wings. They will be hungry once they have emerged, so provide a sugar water soaked napkin, orange slices or fresh flowers for them. Do not leave an open container of sugar water in the habitat, or your butterflies may fall in and drown.

Once you have observed your butterflies for a day or two it's time to let them go. Open the habitat outdoors and wait for the butterflies to fly away. You can also let the butterflies crawl onto your hand and then fly from there.

Teacher tip:

We have provided an acrylic butterfly life cycle specimen and an inflatable butterfly life cycle kit to assist in explaining the stages of the butterfly life cycle.

Sowing sunflowers

Students will grow their own sunflowers, learning about the plant life cycle from direct observation.
Seeds should be sown March-May.

You need to provide:
Sunflower seeds
Pots - large yoghurt pots may do to begin with
Empty plastic bottles
Compost

Let's go!

Fill the pots with compost to 1cm below the rim. Tap each pot to settle the compost and firm gently with the back of the hand.

Sow one seed per pot - sunflowers form large seedlings. Poke the seed around 1.5cm down into the compost, and cover it over with more compost.

Label each pot with student's name and place pots onto trays on a sunny windowsill. Water so that the compost is moist throughout - make sure you don't overwater!

Cut the moulded bottom off of the plastic bottle and use the remaining top half to cover the seedling in the pot. This will help keep seedlings warm. Water your seedlings regularly. Once the last frosts are over (May - June) you can take your pots outside, or plant your sunflowers directly into the garden. Now wait to see how tall they will grow!

Take it further!
Hold a tallest sunflower competition - ask students to set a date for the judging, and then use metre sticks to measure each others sunflowers. Once your sunflowers are grown why not try brining the flower heads into the classroom and studying the arrangement of the petals and the seeds.

Teacher tip:
Ask students to collect large yoghurt pots a week or two before you intend to plant your seeds (the 450g pots are ideal). It's always worth planting an extra pot or two - some of the sunflowers might not germinate properly.

Cartoon life cycle

Students will design their own cartoon depicting the life cycle of their chosen organism.

In the Kit:
Acrylic butterfly, frog and corn life cycle specimens

You need to provide:
Paper
Pencils/pens
Books and/or internet access

Let's go!

Students should research life cycles of various organisms - try and encourage students to use a life cycle that's a little out of the ordinary! We have included acrylic butterfly, frog and corn life cycle specimens for inspiration.

Once students have carried out their research, they should create a cartoon to show their chosen life cycle. Students should use any technique they wish to complete their cartoon - they may want to base a short story around the life cycle or simply create a cartoon-style diagram. After they are finished, set up a classroom display using the cartoons.

Take it further!

Why not create a flap book depicting a chosen life cycle? Fold an A4 sheet of paper in half down the long side. Cut three slits into one side of the fold to create four flaps. Place the book landscape and draw the life cycle stages on each flap. Underneath write a short explanation of what's happening at each stage.

If students are unsure of their drawing skills, encourage them to lightly trace their first image and then make changes to it.

Teacher tip:

You may wish to remind students that it is not artistic ability which matters most in this activity, but rather the skill is to depict a life cycle in a clear and simple format. For very young students you could provide images of life cycles as inspiration, or to cut out and stick into their cartoons.

A root with a view

Students will grown their own bean plant and observe the root system that develops.

You need to provide:
Clear plastic cups
Sand (optional)
Cotton wool balls
Butter beans (dried from the supermarket is fine)
Water

Let's go!

Weight the bottom of the cup with some sand (optional). Fill the cup past half way with cotton wool balls, and gently compress them. Press a butter bean down the side of the cup, making sure it doesn't hit the bottom.

Water gently until the cotton wool balls are damp but not soaked, and place the cup on a sunny windowsill. You'll need to keep an eye on the moisture level and top up with water when necessary. Within 2-3 days the bean should have germinated, and you'll begin to see roots and shoots. Eventually the plant will develop leaves - make sure the cup doesn't topple over at this stage!

Once you've finished watching the development of the plant, take it out of the cup and gently remove the cotton wool balls. You should be able to examine the root system that has developed. If you have access to a microscope try looking at the root hairs.

Take it further!

Students may wish to keep a 'bean diary'. This could take the form of explanations, drawings, measurements and/or photographs of the observations made by the student throughout.

You could also transplant the developing beans into larger pots and put them into the garden/playground. Have a look every now and again to see if any insects have stopped by, or if the plant has flowered or begun to develop pods.

Teacher tip:

Your beans will be fine over the weekend without watering, but make sure they are topped up on a Friday before you head home.

Save our bees!

Students will gain an understanding of the importance of pollination by bees, and learn why it's so important to maintain bee population sizes.

In the Kit:
Save our bees! cards

You need to provide:
Notebook

Let's go!

Have a discussion about pollination - can students explain the process of pollination? Do they know why bees and other insects are important in this process? Show students the supermarket photographs, and play a game of 'spot the difference.'

Ask students to keep a food diary for a week. They should write down all foods and drinks that they consume. You may need to remind students during the week that they are meant to be completing this task! Mention to students that if possible they should double check food packaging and recipes for all ingredients. The following week chat about which foods would no longer be available if bees were to become extinct - would they be missed? How many are staple foods?

Take it further!

Calculate the percentage of meals eaten by each student over the week that would no longer be available if bees were to become extinct. Collate the class data and create some graphs to display this information. Every year roughly two-thirds of the US bee population is moved to California to pollinate almonds. Research almond production in California. Create a wall display explaining the production process.

Bee pollinated crops:
Almonds, apples, apricots, artichokes, asparagus, aubergines, avocados, beans, beetroots, blackberries, blackcurrants, blueberries, brazil nuts, broad beans, broccoli, Brussels sprouts, cabbages, carrots, cashews, cauliflowers, celery, cherries, chestnuts, chillies, chives, cinnamon, clover, coconuts, courgettes, coriander, cranberries, cucumbers, elderberries, fennel, garlic, grapes, hazelnuts, kiwi fruits, leeks, lemons, mangos, melons, nectarines, onions, oranges, papaya, passion fruit, peaches, pears, peppers, plums, pomegranates, pumpkins, raspberries, redcurrants, squash, strawberries, tangerines, turnips, vanilla, walnuts and watermelons.

Treasure hunt

Students will move around the classroom hunting for quiz questions.

In the Kit:
Life cycle treasure hunt cards

You need to provide:
Answer sheet/paper numbered 1 - 14
Pencil

Let's go!

In advance of the lesson, hide the quiz cards around the space you will be using. The cards are laminated to protect against moisture damage, but they are still light, so avoid using them outside on a windy day!

Hand out answer sheet/numbered paper and explain the activity to students, then allow them time to hunt for the quiz questions. Once the time is up, come together and work through the answers. Were there any questions that the students couldn't find, or any that nobody could answer?

Take it further!

Ask small groups of students to come up with their own question series based on the work you've been doing in class, then run small quiz hunts using these questions. If you have access to a blank clever catch ball, you could try using the questions provided along with the ball for a slightly different learning experience.

Teacher tip:

You may need to explain any boundaries on the area they can explore, and setting a time limit is also helpful.

Answers:

1 - Water, warmth, air
2 - Stamen
3 - Germination
4 - Petals
5 - Eaten by birds/animals and excreted
6 - Dispersal
7 - Extinct
8 - Nine months
9 - Teenager / adolescent
10 - Pollination
11 - To attract pollinating insects
12 - Movement, Reproduction, Sensitivity, Nutrition, Excretion, Respiration, Growth
13 - Frogspawn
14 - No

The Linnean Society of London

This education resource was developed by Linnean*Learning*, the Education Team at the Linnean Society of London. The Linnean Society is the oldest active biological society in the world. Founded in 1788, the Society continues to provide a forum for the discussion and the advancement of the life sciences.

Our name is taken from the Swedish naturalist Carl Linnaeus who helped to shape our understanding of the natural world through his work in taxonomy and classification of living things. We're proud of our unique collections and of our history. Did you know it was at a meeting of the Society in 1858 that Charles Darwin and Alfred Russel Wallace outlined the theory of evolution?

Linnean*Learning* is working hard to bring brilliant biology alive in the lives of people of all ages and walks of life. We'd love to hear from you if you have any ideas, or would like to collaborate on a project, or just want to give us some feedback.
Contact us at learning@linnean.org.

The LINNEAN SOCIETY of London

Discover more at www.linnean.org/learning