Patience: a slowdown book

This is one of a series of activity sheets to use alongside the books which have been shortlisted for the Royal Society Young People's Book Prize 2025.

CENTRE *for* INDUSTRY EDUCATION COLLABORATION

Each activity sheet contains ideas for activities to do with your pupils, provides information relating to careers, and has a maths focus to help pupils understand the importance of mathematics education across the curriculum.

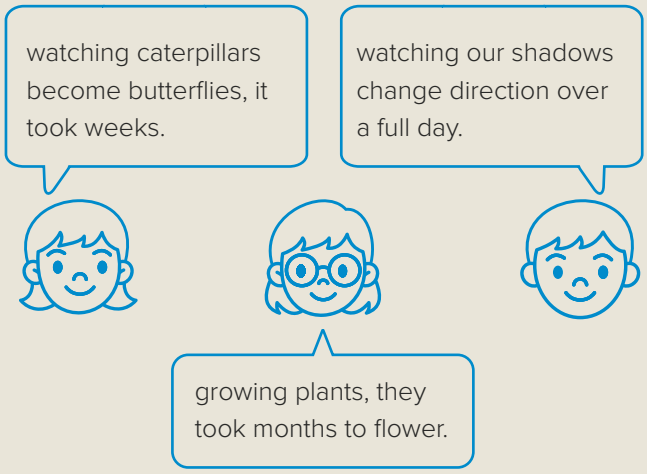
Working with scientists

These investigations can be done as standalone activities or carried out as an in-depth sequence to develop pupils' disciplinary and substantive knowledge. The deeper learning and science capital development of your pupils could be made more memorable through collaboration with a scientist such as a biologist or ecologist. You could do this by applying for a Royal Society Partnership Grant of up to £3,000. For more information, visit: **royalsociety.org/grants-schemes-awards/grants/partnership-grants.**

Wait a minute

Pupils will have taken part in many investigations where they observed changes over time. Ask them to think about any investigation they can remember from their time in school. Use the talking heads image below to prompt them.

I remember ...



In small groups, ask pupils to make a list of the investigations they remember, noting what changed, how long it took, and what they learned. Encourage them to discuss similarities and differences between investigations asking:

- Which changes happened quickly?
- Which took weeks or months?
- How did we measure or record those changes?

Ask each group to choose one investigation to share with the class and explain what they observed, what patterns they noticed, and why observing these changes over time is important. If there is time, pupils might like to plan and carry out their chosen investigation again or vote on one to try as a class.

Time for growth

Page 70 introduces some of the ways humans grow and change as they age. In this activity, pupils investigate how human height changes as they grow. Sample data has been provided but pupils can collect their own by measuring pupils at school and collecting them in a table like the one shown. With several height measurements for each age, the mean average can be calculated to provide one overall value for each age group.

Average values can then be plotted on a line graph to show how height up to adulthood increases over time. Once finished, ask pupils to write a couple of sentences to explain any patterns they find and what it tells them about how humans grow.

This Oak National Academy video (**https://shorturl.at/mhDua)** has some great tips on how to support pupils to work scientifically during this activity. For more context about this activity take a look at the Oak lessons: Finding out about human height and Representing data about human height **(https://shorturl.at/fyyeE)**.

age (years)	height (cm)				
	first person	second person	third person	fourth person	mean average
2	86	88	82	87	
4	100	95	102	101	
6	110	116	116	112	
8	129	125	124	122	
10	130	138	139	138	

Changes over time

Everything takes time, be it a minute, a year, a century, or an eternity. Ask pupils to explore how different processes take different amounts of time, building on the idea of observing changes over minutes, hours, and longer. Ask pupils to choose a simple process to observe for one minute, such as counting how many breaths they take, how many steps they can walk, or how many words they can read. Next, select a process to observe for one hour, like tracking cloud movement, recording traffic on a nearby street, or monitoring how many different birds visit a feeder.

Pupils should record their observations carefully using notes, drawings, or photographs. Encourage them to compare the changes they saw in one minute versus one hour and describe what changed, what stayed the same, and what they might notice over a day, week, a month, or a year. Pupils then create a simple timeline or table showing the processes, the time observed, and the changes noted. They can discuss why some changes happen quickly while others take much longer.

Evolution takes time

The Galápagos Islands have witnessed many wonders of evolutionary nature, like the Galápagos giant tortoise we meet on page 75. When the world-famous English naturalist Charles Darwin explored the islands in 1835, he noticed differences in beak shapes of finches living there, which had adapted over generations to suit the types of food in this specific environment. These observations played a key role in the development of his theory of evolution by natural selection.

Guide pupils in an investigation exploring how beak shape affects a bird's ability to feed. Provide a range of 'beaks' (tweezers, pegs, spoons, chopsticks, tongs, knitting needles, crochet hooks) and assorted 'food' items (rice, raisins, pasta, beads, marbles, and lentils). Ask pupils to predict which beak type will be most effective for each food before testing their ideas. Pupils carry out time trials, counting how many 'food' items they can collect in 30 seconds with each beak type. Pupils record their results in a comparative table to allow them to identify patterns. Ask the class to use their evidence to explain how certain beak shapes are better suited to particular environments. Conclude by linking their findings to adaptation, natural selection and the evolution of different finch species.

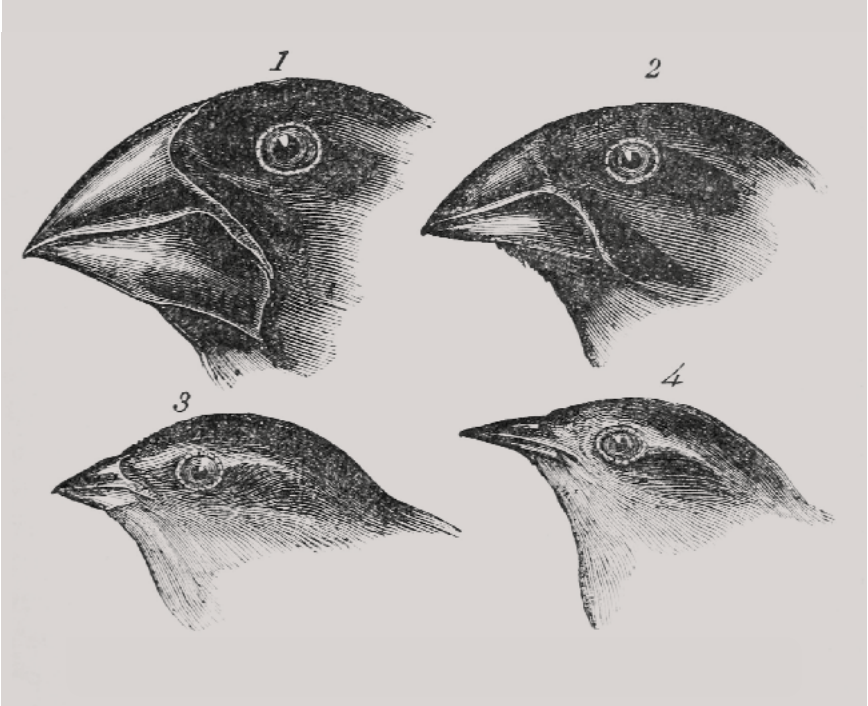


Image: *Voyage of the Beagle*. Charles Darwin, 1845.

Career links

- **Coral reef ecologists** study how coral reefs work, including the animals, plants, and tiny organisms that live there. Their research focuses on the biodiversity, and ecosystems which can be found there, and they investigate to find out what keeps reefs healthy and what harms them, such as pollution, warming oceans, and overfishing. The ecologists' work helps to protect and restore these colourful underwater ecosystems so they can survive for the future.
- **Phenologists** study when natural events in nature happen and how they are affected by weather and climate. They watch for changes in the seasons and record things like when flowers bloom, when birds migrate, and when animals go into hibernation. Their work helps us understand how nature is changing over time, including the effects of climate change.
- **Gerontologists** study how people grow older and what helps them stay healthy as they age. They look at things like how bodies and minds change over time. Their work helps older people live safer, happier, and more comfortable lives.

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"From a single minute to a full century, hearts beat, trees bloom – and a human lives a lifetime. Follow the life cycles of plants, trees, animals and people, as you discover that good things are worth the wait."

Have you ever wondered what can happen in just one minute, or what might change over a whole century? *Patience* is a book that takes you on a journey through time, from the tiniest moments to the longest lifetimes on Earth. You'll encounter a heart beating, watch a seed push through the soil, and discover how forests, animals and entire landscapes grow and change over years, decades and beyond.

This book shows that some things happen fast, some things take ages, and some things are worth waiting for. Patience reveals the hidden stories happening all around us, even when we're not looking. If you're curious, you enjoy discovering how the world works, or just like seeing amazing things unfold, this is the book for you. Take your time... and prepare to see nature in a whole new way.

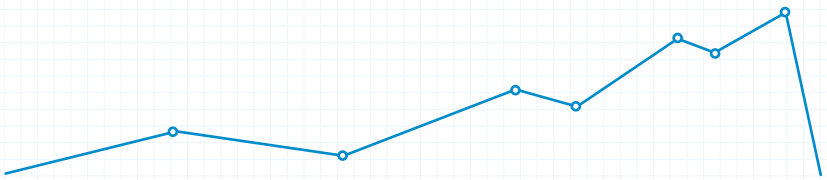
Mathematics challenge: How long?

On page 70, we start thinking about how time passes, but can you feel how long a minute is without checking a clock? To test how accurately you can sense 60 seconds:

- start a timer
- stop it when you think a minute has gone by
- write down the time you reached

Repeat this at least five times. Then work out your 'mean average error' by adding up how far away each attempt was from 60 seconds and dividing your total by the number of tries. Plot your result on a line graph with your age on the x-axis and your mean average error on the y-axis. Ask your teacher for some squared paper if you don't have any at home.

Next, ask family members of different ages to have a go and add their results to your graph. Finish by writing a short explanation about whether age seems to make a difference to how well people can sense time.



Just a minute

A lot can happen in our bodies in one minute; page 6 tells us our hearts beat 60 – 100 times a minute. Explore those changes for yourself by investigating how your heartbeat responds to different levels of exercise.

Find your resting pulse by counting your heartbeats for 60 seconds while sitting still. Next, repeat the measurement after some exercise. You could go for a gentle walk, do star jumps, try skipping, play your favourite sport, sprint on the spot, or anything else you can think of. Make sure you measure your heartbeats for exactly one minute each time.

Record all your results in a table, then turn them into a bar chart to show how your pulse changes with activity level. Finally, write a short explanation of why your heart beats faster during exercise, linking it to how your body moves oxygen around.

Patience in the kitchen

Change happens all around us, all the time. Some changes are quick, some take longer. Some changes can be undone and some cannot. The kitchen is a great place to explore reversible and irreversible changes using everyday processes. With adult supervision, observe five simple actions: boiling water from cold, melting chocolate, freezing juice, cooking an egg and dissolving sugar. For each one, record what happens and decide whether the change can be undone (reversible) or cannot be reversed because a new material has formed (irreversible). Make notes explaining the evidence you used to make your decision. Use your observations to create a table showing each process, the type of change, and any new materials produced. You could sketch or photograph each change and make a changing materials collage with captions. Imagine how many millions of years of being buried underground would be needed before plant material could ever turn into fossil fuels!

A week of watching

On page 62, we discover how gradual change over time can result in the regrowing of a tropical rainforest. What things are gradually changing in your local area? Pick one thing outdoors to observe for seven days: a plant bud, a bird feeder, a patch of soil, weather, the moon, etc. Record what you observe, using drawings, notes, photographs, and any questions you now have.

Think about these questions and discuss them with your classmates back in school:

- What changed in a week?
- What didn't?
- What might you see if you observed for a month or a year?
- What wouldn't you have noticed if you'd only observed for a day?

Feeling patient? Choose a tree in your garden, street or local park, observe it changing over a full year. Take a photo or sketch your chosen tree at regular intervals - every month would work well. At the end of your observation period, look at all of your images together.

Scientist profile

Dr Eleonora Moratto is a type of scientist called a biologist who studies tiny living things that can make plants sick, and she works on clever ways to protect important crops without using ingredients which damage soil. She also investigates how electricity might help stop plant diseases, which means her research could help farmers grow more food and keep our favourite plants healthy. Her work is a bit like being a plant detective; she has to uncover how diseases attack and find new ways to fight them.

Dr Moratto isn't just a scientist in a lab, she's also a professional ballet dancer who started the SciBallet Project **(https://shorturl.at/b8GUE)**, where she uses dance to explain scientific ideas. She performs at events where science and art come together, showing that you can follow more than one passion and that science can be creative, active, and full of surprises. Her story proves that being a scientist can take you in all kinds of exciting directions, and that your own talents might help.