The Spark Magazine

PUZZLES, QUIZZES, OUTDOOR LEARNING

ISSUE No6

GO ON A SPIRAL SCAVENGER HUNT

DESIGN THE ULTIMATE DINOSAUR

MEET SCOTLAND'S CHIEF SCIENTIFIC ADVISER

With support from the Inspiring Science Fund provided by BEIS, UKRI and Wellcome

GLASGOW SCIENCE CENTRE

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This issue

WELCOME

Welcome to the sixth edition of The Spark!
Every issue has exciting experiments for you to try at home, fascinating facts to ponder over, and puzzles and quizzes to challenge your family.

This week we are designing the ultimate dinosaur, using maths to find patterns in nature, and we meet physicist and Chief Scientific Adviser, Professor Sheila Rowan.

You can watch the videos that go along with the experiments this week on the Glasgow Science Centre Facebook page or YouTube channel.

And look out for the next issue, where we'll have a special edition focusing on energy and powering the future.

Best wishes,
Glasgow Science Centre

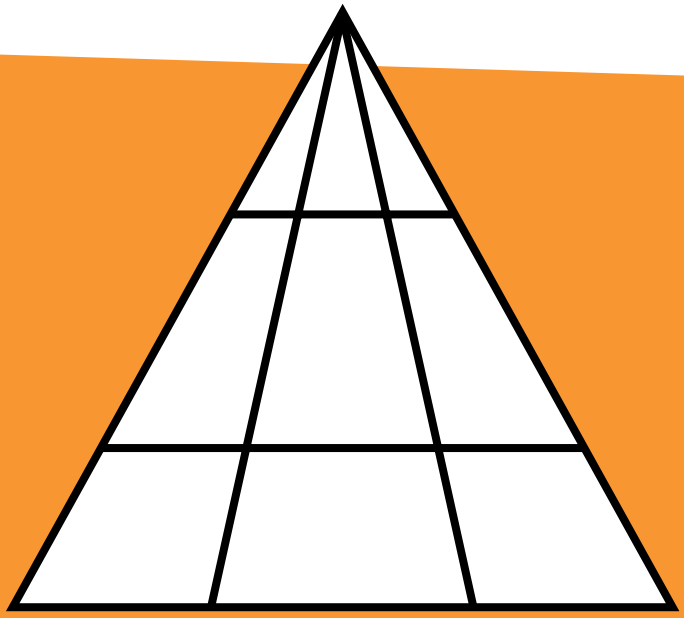
SHARE YOUR PICS WITH US

If you try any of our activities this week, please show us how they turned out. Send your favourite pictures to contact.us@gsc.org.uk or share with us on our social media channels with #GSCAtHome. We'll print a selection of your pictures in the next magazine.

Share on social #GSCAtHome
email to contact.us@gsc.org.uk

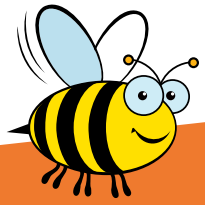
BRAINTEASER

How many triangles can you find in the picture opposite?



FAMILY QUIZ

All questions linked to activities in this issue



DID YOU KNOW?

Bees can't see the colour red, but they can see ultraviolet light, which humans cannot...

... so bees can see a colour that is invisible to us!

QUESTIONS

Answers on back page

1. Which number comes next in the Fibonacci Sequence: 0, 1, 1, 2, 3, 5, ... ?
2. Paleontologists use fossilised poo to learn about dinosaurs' diets. What is this fossilised poo called? (Hint: it begins with C.)
3. True or False: Sunflowers are good for attracting bees to your garden.
4. What does the word dinosaur mean? a) Giant monster b) Scaled lizard c) Scary monster d) Terrible lizard
5. Tyrannosaurus rex ate meat - but what is the scientific word for a meat eater?
6. True or False: if you count the number of spirals of seeds at the centre of a sunflower, you will always get a Fibonacci number.
7. Which of the following dinosaurs had horns? (And which ate meat?) a) Diplodocus b) Carnotaurus c) Styracosaurus d) Triceratops
8. What does a paleontologist study?

HINT You may find some answers throughout this magazine or in our #GSCAtHome videos.

I'M A... PHYSICIST

Meet Sheila Rowan

from the University of Glasgow, Physics Professor and Chief Scientific Adviser to the Scottish Government.

"I work on big, international experiments that help us understand more about how gravity works, and how that helps us understand space and our own world too. I work on projects that detect tiny waves of gravity that are generated by dead stars colliding with one another far out in our Universe including colliding 'black holes'. By measuring these 'gravitational waves' we learn more about the history of our Universe.

I also work at the Scottish Government, making sure that Ministers know about science that might affect the decisions they make. When I was at school I wanted to know more about the world, I just found it fascinating to look up at the stars and wonder what was up there. I've always wanted to be a scientist – in particular a physicist and to study the Universe. I really like working with people from lots of different countries. It gives you a new way of looking at things, and it also means you can make friends all over the world!"

Hobbies: Reading, cooking and combining both by collecting cookery books.
Favourite Food: MMMMMmmm, cheeeeese...

ACTIVITY

Spiral Scavenger Hunt

Watch the Patterns in Nature video on #GSCAtHome Facebook or YouTube page

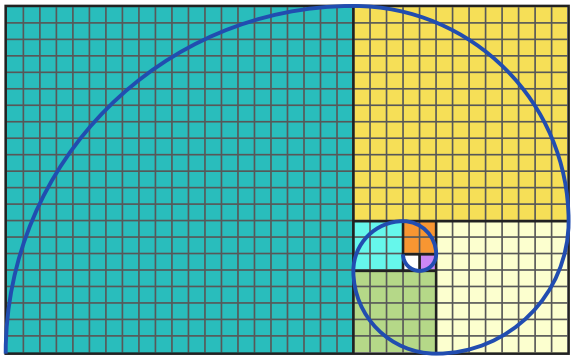
What will you do?

In this activity you will learn about the Fibonacci sequence and spirals, and go on a scavenger hunt to find Fibonacci sequences hidden in nature!

What is the Fibonacci sequence?

The Fibonacci sequence is a special series of numbers where each number is the sum of the two previous numbers. For example, from the picture below, when you add the first two numbers in the sequence (0 + 1) you get 1, when you add the second and third numbers (1 + 1) you get 2, add the third and fourth numbers (1+2) you get 3, and so the sequence continues. Test it out!

This sequence can be used make a Fibonacci spiral. By drawing a series of adjoining squares, where the length of the squares follows the Fibonacci sequence, you can see a spiral shape, like the one to the right. This one uses the sequence from 1 to 21: 1, 1, 2, 3, 5, 8, 13, 21.

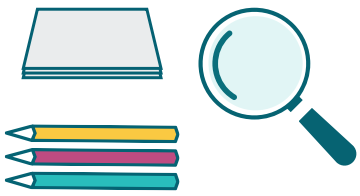


You can find this sequence - and spiral - in nature in the way that leaves, branches, flowers and seeds are arranged in plants. Or maybe you recognise the shape of a seashell in the spiral? Now it's time to go on a scavenger hunt and find Fibonacci numbers hidden outside for yourself!

Ensure you have permission from an adult and their supervision before starting.

What will you need?

- Space outside with lots of plants to investigate (trees and flowers)
- Paper
- Pencil or pen
- Colouring pencils
- A magnifying glass (optional: to look at the centre of flowers)



How to do this activity

Flower Challenge 1

Head outside and find as many different types of flower as you can. Often the number of petals on a flower is a Fibonacci number: you might have seen flowers with 3, 5, or 8 petals, maybe even 34 or 55! Look at the different flowers you have found and count the number of petals – do any of them match a Fibonacci number? Take a picture or draw what you have found.

Helpful Hint: buttercups have 5 petals.

Flower Challenge 2

With any flower you find, look closely into the centre of it. Can you see the tell-tale spiral of the Fibonacci sequence hidden in the flower? If you can, take a picture or draw what you've found. How many flowers can you find with that spiral pattern in the centre?

Helpful Hint: The seeds in the head of a sunflower are arranged in a spiral pattern. And if you count the number of spirals, you are likely to get a Fibonacci number!

Bonus Challenge: The Leaf Challenge

Leaves often grow in a spiral arrangement around a stem. The number of leaves it takes to make a complete circle of the stem is often - you guessed it - a Fibonacci number! Look for a plant which has leaves growing around a stalk or a branch in a spiral. Count how many leaves it takes to go around the stem until you make a complete circle. Can you find any plants with leaves that spiral in a Fibonacci sequence? Take a picture or draw what you can see.

More to try

- What's the longest Fibonacci sequence you can make?
- Can you find the Fibonacci sequence or spiral anywhere else in nature?
- Can you create art using the Fibonacci spiral?

Fun facts

- It is believed that the Fibonacci spiral might be the best arrangement for leaves to get maximum light to grow or to fit the greatest number of seeds into the space available in a flower or fruit.
- Fibonacci was the nickname of a mathematician called Leonardo Pisano who lived over 800 years ago. He gave his name to the Fibonacci sequence. He also made popular the Hindu-Arabic numeral system we use today. Thank goodness or we might still be writing really long Roman numerals like XXVIII instead of just writing 28!

Send your pics to contact.us@gsc.org.uk or share with us on social #GSCAtHome

ACTIVITY

Design-a-saurus

What will you do?

In this activity you will design the ultimate dinosaur.

Ensure you have permission from an adult and their supervision before starting.

What will you need?

- Paper
- Colouring pens or pencils
- Lots of creativity!

How to do this experiment

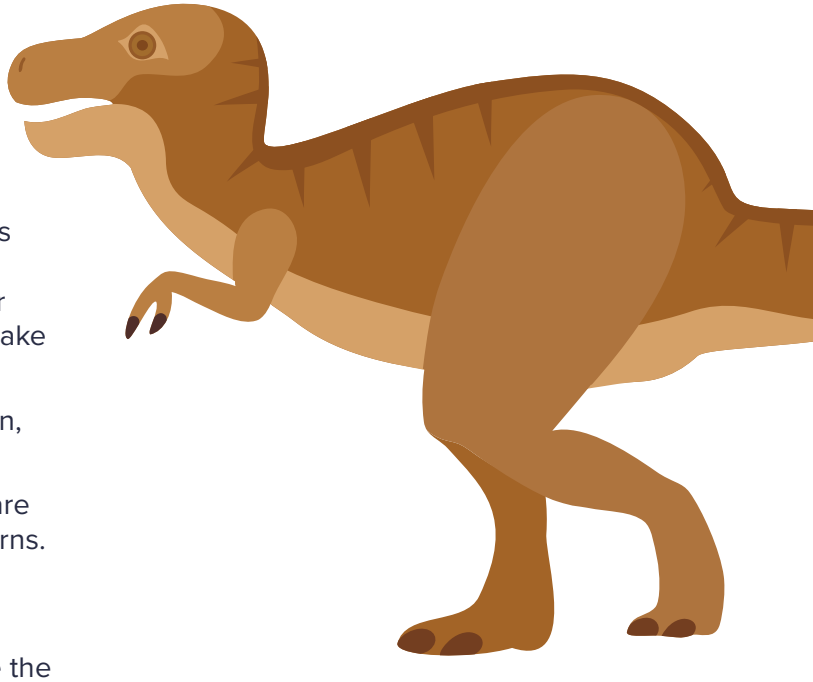
Just like humans, different dinosaurs were good at different things. Some dinosaurs were good at running, some were good at fighting and some were even good at flying. Dinosaurs' bodies looked different depending on what they were good at - these are called adaptations - some had horns or big claws, while others had feathers or scales.

Step 1. Think about these important questions to get to know your dinosaur and write down your answers.

- Where might your dinosaur have lived? Maybe in the sea or in the forest?
- What might your dinosaur have eaten? Leaves and seeds, or even... other dinosaurs?
- How did your dinosaur get around? Maybe it crawled slowly or flew through the sky?

Step 2: Now we know what your dinosaur was good at and where it lived, think about what it's body might look like. **Example:** If your dinosaur could fly what might it need? Big wings or feathers? Write down your answers.

Step 3: Now you've got your answers, it's time to draw your ultimate dinosaur! Think about the shape of its head and body. Does it walk on four legs or only two? Will your dinosaur need a long neck to reach into the tallest branches? Will it have horns or a spiky tail? Does it need feathers or scales, or maybe even fur to keep warm? What kind of home would it have?



More to try

Scientists called palaeontologists have learned all about dinosaurs by looking at their fossils. In fossils we only see the really hard parts of the dinosaurs, like their bones. Try to draw what a fossil from your dinosaur might look like. You could even try and make it out of play-doh.

Tip: some fossils show the whole dinosaur skeleton, while others only show little parts.

Head outside and try and find any animals that share features with your dinosaur like claws, wings or horns.

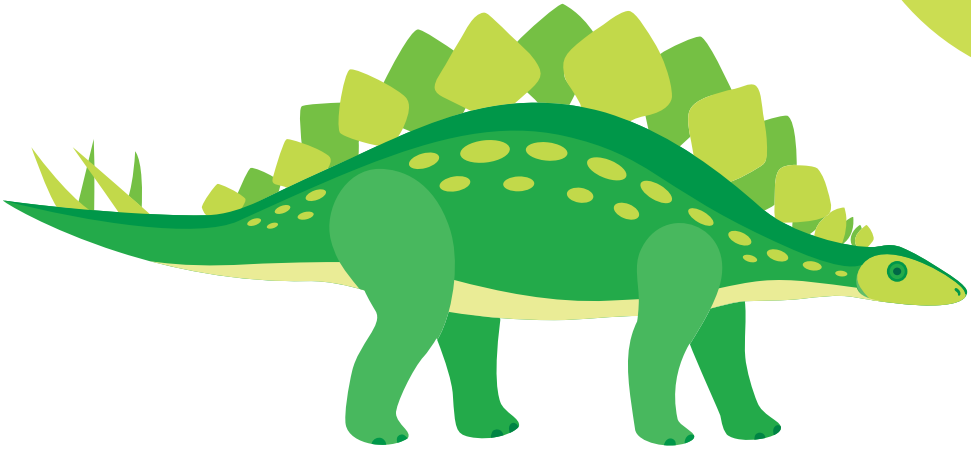
Fun facts

Surprisingly, most of the largest dinosaurs like the Brachiosaurus and Apatosaurus only ate plants, because they were herbivores.

Palaeontologists have found all sorts of fossils including teeth, eggs, footprints and even fossilised poo - called coprolite. Luckily it doesn't still smell!

Scientists think dinosaurs roamed Earth for about 180 million years whereas humans have only been here for about 300,000 years! We've got some catching up to do.

Watch the Design-a-saurus video on #GSCAtHome Facebook or YouTube page



Send your pics to contact.us@gsc.org.uk or share with us on social #GSCAtHome

ABOUT US

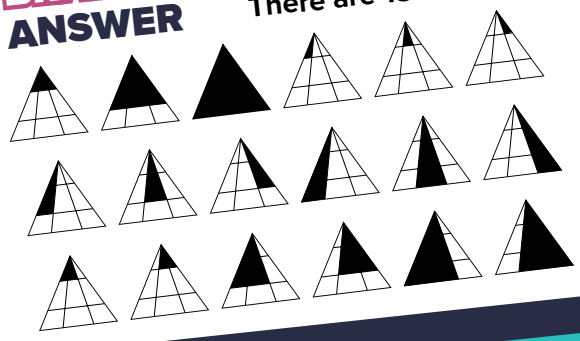
Glasgow Science Centre is a 5-star visitor attraction located beside the River Clyde. We are home to hundreds of interactive exhibits where you can discover how the world works. Explore the inner workings of the human body, find out how we can power the future, challenge your family and friends to solve puzzles, explore technologies of the future and marvel at the wonders of the solar system under our fulldome Planetarium. Our team of passionate presenters are always on hand to bring you exciting experiences in our hands-on workshops and live demos in our spectacular Science Show Theatre.

During these challenging times while we are unable to open our doors to you, we are bringing you the excitement of Glasgow Science Centre through GSC At Home. We're online every morning at 10am on our Facebook page and YouTube channel.

YOUR PICS

BRAINTEASER ANSWER

There are 18 triangles



QUIZ ANSWERS

1. The number 8 comes next. Each number in the Fibonacci sequence is the sum of the two previous numbers.

2. Coprolite is fossilised poo. It can tell us what dinosaurs might have eaten. If it contains tiny bits of bone, the dinosaur was a meat eater. But if it contains seeds and bark, the dinosaur was probably a herbivore and ate plants.

3. True. Sunflowers are rich in pollen and nectar, making them attractive to bees. Other bee-friendly flowers are lavender, honeysuckle and bluebells.

4.d) Dinosaur is a combination of two Greek words: 'deinos' which means terrible and 'sauros' which means lizard. We now know that dinosaurs aren't lizards (but they are a type of reptile). The name comes from 'Dinosauria', a term invented by British anatomist and palaeontologist, Sir Richard Owen in 1842.

5. Carnivore is the scientific word for a meat eater. (Does this give you a clue to which of the dinosaurs in question 7 ate meat?)

6. False. The number of spirals of seeds in a sunflower is usually a Fibonacci number, but not always. Nature does not always follow an exact pattern.

7. b), c) and d). Carnotaurus, Styracosaurus and Triceratops all had horns on their head. (Carnotaurus is the carnivore.)

8. A paleontologist studies fossils to find out about the history of life on Earth.

WE WANT YOUR FEEDBACK

We would love to hear what you think!

We hope you liked this issue, but if you didn't, what should we change? What other things would you like to see or what topics are you most interested in? Don't forget to send us photos of your creations, discoveries and experiments. **Send your favourite pictures to contact.us@gsc.org.uk or share with us on our social media channels with #GSCAtHome.** We'll print a selection of your pictures in the magazine.

KEEP IN TOUCH

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