Growing Patterns: Fibonacci Numbers in Nature

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This title deals with the biggest mathematical mystery in nature - Fibonacci numbers! Named after a famous mathematician, the number pattern is simple: 1, 1, 2, 3, 5, 8, 13...Each number in the sequence comes from adding the two numbers before it. What's the mystery? The pattern crops up in the most unexpected places. You'll find it in the disk of a sunflower, the skin of a pineapple, and the spiral of a nautilus shell. No one knows how nature came up with the sequence. Sarah C. and Richard P. Campbell introduce the Fibonacci sequence through a series of stunning photographs. Young readers will soon be seeing nature through new eyes, looking for Fibonacci numbers in daisies, pinecones, leaf patterns, seashells, and more.

Growing Patterns: Fibonacci Numbers in Nature Details

Date	:	Published March 1st 2010 by Boyds Mills Press
ISBN	:	9781590787526
Author	:	Sarah C. Campbell , Richard P. Campbell (Photographer)
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From Reader Review Growing Patterns: Fibonacci Numbers in Nature for online ebook

Kristen Jorgensen says

I grew up watching the cute Disney video "Donald in Mathmagic Land," thanks to my wonderful mother. The message of the movie? Math is all around us and can be interesting... explored..., FUN! Today a growing number of books are geared to provide the same message, and at the helm is Sarah C. Campbell. Growing Patterns: Fibonacci Numbers in Nature with its beautiful photographs and cleaver writing will grab the attention of youngsters. Nature and math collide in a fun way that will have youngsters running about looking for growing patterns in nature. They can practice counting petals and identifying plants all while enjoying the great outdoors. What could be better?

Christine says

Creative and simple approach to introducing the Fibonacci sequence. Chipping away at the year goal.

Helen Costulis says

Growing Patterns is a book that includes very vivid and micro-scoped pictures that show the reader the natural pattern sequence called Fibonacci. Fibonacci numbers are apparent in many plants and objects found in nature including pineapples, sea shells, pine cones, and many flowers. This book is a great way to teach children about this growing pattern and to keep an eye out for these patterns in nature all around them.

Janet Squires says

The Fibonacci sequence begins: 1 1 2 3 5 8 13. Starting with one, each number is the sum of the two numbers that precede it. Campbell notes that one of the mysteries of this number sequence is how frequently it appears in nature -- at the center of a sunflower, on the skin of a pineapple, in the spiral shell of the Nautilus -- for example.

Campbell introduces readers to the sequence via photographs of flowers with petals that represent the numbers. This visual aid invites readers to predict the next number in the series as they proceed from a picture of a single-petaled lily to the two-petaled crown of thorns which is then visually linked to the three petals of the spiderwort and so on. Having established the basic pattern of numbers, Campbell then explores more complex examples.

Colorful photographs and reader-friendly text offers teachers a simple way to introduce the Fibonacci sequence to elementary students.

Sara Check says

1.Junior book, informational.

2.Sarah Campbell explores the math world and the mystery of Fibonacci numbers by finding the patterns in nature such as flower petals, sunflower centers and pineapples.

3.A. Campbell found a way to illustrate the “biggest mathematical mystery” and relate it to the true golden spiral. After reading this beautifully photographed text, readers will be able to recognize and look for patterns that have always been there.

B.The concept of Fibonacci numbers has always seemed to be purely mathematical and concrete by adding the two previous numbers in the pattern to produce the next number and so on and so on but Campbell was able to relate it nature, to plants that have “built-in instructions for how the plant will grow” (p 3). The photographs are the best aspect of this book and are key to her explanations of the “Growing Patterns”.

C.Through pages 3 to 19, Campbell explains the concept of the Fibonacci numbers and how to come to the pattern that is well known, which is 1, 1, 2, 3, 5, 8, 13, etc. and uses gorgeous flowers with the corresponding number of petals to depict it. But the next three examples are exquisite. She highlighted spirals, like the golden spiral, in pinecones, pineapples and sunflowers. Here she allowed the reader to see the patterns she sees and helps point out that without trying these items in nature are all related. Where will you find the next Fibonacci pattern?

4.Curriculum Connection- Wonderful text to share with upper elementary that are exploring patterns. Great way to show how patterns are found in nature. Teachers can have students draw or paint patterns like those found in the book, like flowers.

Lbrown107 says

Numbers in nature! I love the integration of math and science concepts in the book. Children are so curious about the world and this book introduces names of flowers and their parts, such as stem and seed. Most of us are familiar with sunflowers, but we never stop to think about how many disk flowers are in the middle. I loved how this book introduced counting petals and counting spirals of things, such as seashells and snail shells. The activities that could correlate with this book are endless! You could take children on a "numbers and nature" walk outside and have them investigate and count things they notice in their own backyard/playground and I would say that this could be done with children in kindergarten through third grade.

Janet says

I really wanted to give this one star! However, I did learn a few facts: how to pronounce Fibonacci--(fib-uh-NOTCH-ee); the pics showing the spirals in pinecones, pineapples,and sunflowers were good; the info on the golden ratio or golden rectangle is more interesting to me.
The number is 1.61803 which is a proportion in rectangles from the ancient Greeks. Perhaps my disatification with this title is there is no explanation as to why not all plants in nature conform to this

pattern, while 90% may what is the reason for the exceptions and is there a math explanation for that? This is my second title on this subject and I will ontinue to look for clarification.

Gabrielle says

Title: Growing Patterns
Award: None
Appropriate grade levels: 2nd grade - 4th grade
Summary: In this book we learn about Fibonacci numbers and how they relate to items in nature.
Review: I would give this book a 3, I found that it was kind of interesting, but I found that this math would not be very useful.
Possible in class uses: A possible use for this book is reading this and then having the students pick an item and try doing the math, another activity could be talking about different patterns found in nature.

Elizabeth says

Sarah and Richard Campbell combine photos and a fun layout with simple text to present the idea of Fibonacci numbers to children. This is a nice introduction to the topic and will interest elementary school students in the topic.

The use of nature photos and the layout of the photos on the pages contribute to real life contextualization and understanding of what the text is telling you. Simple language makes it easy to understand the concept, making this an excellent resource for math and science teachers.

The husband and wife team take us from flowers to pinecones to nautilus shells, which effectively expands the knowledge of the many places the reader might find the pattern in nature. They also take a moment to explain that the number is not always around, using garden snails as an example. By showing the reader both where to find them and where they won't, the authors allow the reader to feel confident about looking for the pattern on their own.

This book would be helpful in several classes. While science and math classes seem an obvious fit, this would also be a great supplement to an art class or computer coding. This book is recommended for any public or elementary school library that does not already have a similar level title on the topic. If they do have one, Growing Patterns is a good supplement.

Judy says

This nonfiction picture book could be the basis for an extremely interesting library or classroom lesson showing the relationship between math and the natural world. By bringing in objects described in the book, and also using manipulatives, students could gain an appreciation for both mathematical sequences and patterns found in nature.

Whole And says

Absolutely love this book to look at nature as a math source through the Fibonacci method.

Sticking photos and simply layout to fully grasp the patterns and teaching.

Wonderful to use as a subtle or intentional tool of combining lessons in nature and math.

Betsy says

One of the more interesting requests I receive at my library's reference desk comes from parents seeking math books for their kids. Generally speaking, they don't want math textbooks or worksheets of math problems. No, they want books in a picture book format that incorporate math in some original manner. Now it is fortunate that there are a slew of such books out there. You can find them in any good children's library if you know where to look and with the right teacher or parent, such books can make concepts like fractions or division or subtraction make perfect sense. Fibonacci numbers are a little trickier. Unlike addition or multiplication they are difficult to show to kids as having practical applications in real life. You could discuss how Fibonacci numbers apply to music, but that's still tricky territory. Nature, however, is a natural complement. Kids understand flowers. Kids can understand duplicating numbers. Put the two together and you've the newest picture book format math book to add to your shelves. It does contain a couple difficult concepts, but with the right grown-up by their side, there's very little in *Growing Patterns: Fibonacci Numbers in Nature* that a child won't be able to figure out on their own.

Take a look at these flowers and count the petals you see. One. Two. Three. Five. Eight. Notice anything? These petal numbers add on to one another. One plus two equals three. Two plus three equals five. These numbers are called Fibonacci numbers, and what's crazy is that as they go they keep showing up in nature and it's not just in flowers either. If you count spirals on pinecones or sunflowers or pineapples, no matter how you look at them they equal one of these numbers. With brilliant bright photography and simple words, Sarah and Richard Campbell make a math concept understandable. A section on "More About Fibonacci Numbers" and a Glossary of terms appear at the end.

It may sound as if this is a fairly simple and straightforward concept, but how do you write an entire book about duplicating numbers found in nature for youngsters? The Campbells have opted for starting out easy and getting slowly more complicated as the book goes on. So at the start the child reader is handed a really easy idea. They look at pictures and count the petals. By the time they get to the eight petals on the cosmos they learn about doubling the numbers and we see the same flowers all over again. Then the numbers get higher. The ideas get harder. It's clear that some adult help may be needed to explain along the way.

I suppose the real question here is whether or not kids are gonna get all the concepts the book is throwing out. At the start it's pretty clear but when it starts getting into counting the number of spirals, that's when things begin to get wonky. You have to realize that spirals on pinecones and sunflowers and pineapples can go a variety of different ways. What would be fun is if grown-ups turn it into a game. What if you bought a pineapple and had the kids identify the spirals and then count them? That's pretty cool. Of course then you start getting into the golden spiral concept and that gets kind of complicated. And, of course, if your child attempts to understand The Golden Ratio explanation at the end of the title, sign that kid up for instant math lessons pronto. It makes sense if a grown-up breaks it down, but otherwise this might be information best gleaned by the math-hungry. A six-year-old will be out to sea, but I'd bet there are 10-year-old math whizzes out there that'd get it in a heartbeat.

I found myself wishing that the book explained more about the concept of that aforementioned golden spiral, though. In the book you are given a vision of boxes representing the Fibonacci numbers laid out together in a specific pattern. Why they are placed in this pattern is unclear, though, which makes the fact that a single spiral connects them seem a little haphazard. Of course I know that I can't have it both ways, saying the book is too complicated sometimes and then complaining that other sections don't explain enough. Just the same, a sentence or two to explain why these boxes were in this pattern (are they double the size of one another and the only way they fit together is in a rectangle?) would not have been out of place.

I did appreciate that the book makes an effort to be a little subtler than a Fibonacci book for children in the past might have been. In the old days a non-fiction title for kids would be more than happy to merrily proclaim that Fibonacci was an Italian fellow who discovered these numbers and published a book on them in 1202, end of story. Ms. Campbell, however, mentions more than once that before Fibonacci was strutting about, these numbers were known in India by a variety of scholars (and she even names them by name). There's also a note at the end of the book that says, "Not all numbers in nature are Fibonacci numbers. A dogwood has 4 petals, and an amaryllis has 6." You'd be forgiven if your natural reaction to this was an outraged, "So what's the point then?" Fortunately, if you read the extra text in the back there's an actual little section there called "Why Fibonacci Numbers?" that says that these numbers show up 90 percent of the time in plants with multiple parts around a single stem. It's not perfect, but it's there.

There is no non-fiction subject so interesting that full-color photographs taken post-1990 cannot improve. Would Nic Bishop be the star he is today if he didn't have the power of his lens to work with? The Campbells gave Bishop a run for his money a couple of years ago when they photographed one of the world's more slimy denizens in Wolfsnail: A Backyard Predator. The obvious difference here is that while most of these photographs are taken in nature, just as *Wolfsnail* was, others have been doctored for teaching purposes. The most obvious example is a two-page spread that shows the same pinecone three times but with different digitally darkened spirals in two of the shots. It's a good thing the text says that "All the pictures on these two pages show the same pinecone" because otherwise it would ruin the whole purpose of the shots. Of course all the photos are lovely, but it's nice to also see that they serve to drill home certain points.

There's a simply lovely book out this year for the 9-12 year old crowd called Sugar and Ice by Kate Messner that touches upon this very subject. In that book the heroine decides to do a school project on Fibonacci numbers in nature. Would that she had *Growing Patterns* to help her along. After all, this book lays down the law of Fibonacci in a fun and informative way. Consider pairing it alongside Joseph D'Agnese's Blockhead: The Life of Fibonacci for a full Fibonacci-inspired unit. It's math made interesting. Creativity wins the day once again.

For ages 6 and up.

Kristine says

This is aimed for a middle aged elementary audience, grades 3 and up. These grades are the time they are learning about different types of flowers etc. and this connects with mathematics in a way you wouldn't think. It helps keep attention with the different images and vivid images. NSTA Outstanding Science Trade Book

E-Book from Pebblego
Nocturnal Animals/Bats
This is aimed for a grade range of 1st through 4th. This has very detailed information which would be used for reports or research of these animals. It has neat pictures with riveting information that keep kids'

attention.

Jill says

One way to get kids interested in math is to point out all the ways in which numbers have special and very cool properties that are reflected in nature.

This book focuses on the way Fibonacci numbers can be found in everything from sunflowers to pineapples. The Fibonacci sequence is a series of numbers in which you get to the next number by adding up the two numbers before it. For example, starting with 1 and adding it to get the next number, and then continuing in this way, you get: 1+1=2, 1+2=3, 2+3=5, 3+5=8, and so on. Thus the first 12 numbers in the Fibonacci sequence are 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, and 144. Amazingly enough, you can see the Fibonacci pattern everywhere in nature, such as in more than 90 percent of plants in which multiple parts are arranged around a single stem.

The author provides a number of photographs in which you can see the Fibonacci sequence, with help on how to count the sections of the pineapple or the spirals of a pinecone.

After showing you how the Fibonacci sequence works, the author includes some background on other fascinating numbers, like the Golden Ratio, Lucas Numbers, and the Golden Spiral. And she could have added more! For example, Euler's number, or e. With the possible exception of Pi, e is the most important constant in mathematics. The numerical value of e is approximately 2.718281828459045... (It has been calculated to 869,894,101 decimal places.)

E is used to calculate changing amounts like compound interest and radioactive decay and much, more more. You can also have fun with it: for example, you can select at random any number from 1 to 1000; do it again until the sum of the numbers selected is greater than 1000. On average, the number of times you have to pick a new number will be e!!!

There are so many magical patterns in math. It leads one to wonder, as Mario Livio does in his book, *Is God a Mathematician?* - did humans invent math, or did they just discover this possibly divine order? Is our universe like it is because it cannot be any other way? *Is God in the Equation* as suggested in the book by Corey S. Powell?

A glossary is at the end of the book.

Photographs in the book were contributed by both the author and her husband Richard Campbell.

Evaluation: Often kids can't understand why they need to know about math or science. So it's important to get kids to understand the way it structures our universe; it can enhance their appreciation of the unique and evoke excitement and curiosity to learn more.

David Molnar says

A photographic essay, nicely arranged, with the appropriately modest goal of describing the role of Fibonacci numbers in nature. That's nature, so no rabbits here. Flowers, pineapples, pinecones, nautilus

shells. I love this excerpt from the first page:

"The seed has built-in instructions for how
the plant will grow.
What shape will it be?
What size?
What color?"

There's not much more I can say without exceeding the number of words in the book. I don't know if I can say what the target age range is, but it is expended by the cute little glossary at the end, which defines both botanical and mathematical terms, with `spiral' proving particularly difficult to define. Think about it.

(*from my not-really-a-blog at https://sites.google.com/site/molnarm...)*
