

The Dragon Curve - A Mathematical Math Journey - Lesson Plan / Fractal Exploration



Preparation and Materials:

*The book (either hard copy or digital copy)

*Prepare long, skinny strips of paper. Cutting long strips and taping the ends together will work. Till tape works even better. Each student should have a strip of paper to fold along with Aiyana.

*Have the students designate one end of the strip as the head and draw eyes on it. The other end is the tail and needs a tail drawn on it. This will help them remember to always fold the same way, from the head to the tail, for example or from the left end over to the right. Another idea is to have them tape one end of the strip to their desk or to a wall and always fold to the taped end.

*When they open their strips, they may need help opening them to form 90-degree angles or “walls” and “floors”.

*Some students may be interested in drawing the fractal. Graph paper would be helpful for this.

Instructions/Suggestions:

*Start reading the book, stopping to ask questions along the way.

-Do you see what Aiyana sees?

-Do you see something different?

*Invite the students to ask questions as well. Keep a list of questions that come up, to explore later.

-What do you notice?

-What do you wonder?

*Keep reading the book, doing the folds along the way, stopping when you or your students feel inspired to discuss, ask questions, or explore.

There are more questions to explore on page ?

Learn more about fractals on page ?

Learn more about folding paper on page ?

Further Research:

There is lots on the internet. Search for images, examples, animations, and information.

Here are some of my fractal favourites:

Dragon Curve to Music by Numberphile <https://youtu.be/NajQEiKFom4>

Doodling in Math Class by Vi Hart <https://youtu.be/EdyociU35u8>

Fractals in Nature by Kyle Pearce <https://www.diygenius.com/fractals-in-nature/>

Explorations and Animations by Mathigon <https://mathigon.org/course/fractals/introduction>

How to Draw a Dragon Fractal by Jessica Strom https://youtu.be/Js_z10ymR2c

How to Create a Koch Snowflake Design with Triangular Graph Paper by Flipping Algebra <https://www.youtube.com/watch?v=4SiXyp-0-x0>

Drawing Fractals in Paint by CodeParade <https://youtu.be/sFEYQMrWNHU>

Here are some of my paper-folding favourites:

Folding Paper with a Hydraulic Press by Science Alert

<https://www.sciencealert.com/watch-what-happens-when-you-try-to-fold-paper-more-than-7-times-with-a-hydraulic-press>

World Record <https://fb.watch/4a5BOyq7hF/>

Paper Folding Record Attempt by Students: <https://youtu.be/vPFnlotfkXo>

Mythbusters Folding Paper https://youtu.be/65Qzc3_NtGs

13 Folds <https://www.youtube.com/watch?v=ZQ0QWn7Z-IQ>

Folding Paper Animation by Yenji Jem <https://youtu.be/FeKr-VRNH58>

Exponential Growth:How Folding Paper Can Get You to the Moon by TED-Ed

<https://www.youtube.com/watch?v=AmFMJC45f1Q>

*Students may wish to explore how the fractals can fit together to create art. There are beautiful examples of this on the internet. Explore by rotating (turning), tessellating (sliding), and reflecting (flipping).

*Students can also use computer programs and interactive sites to create and play with fractals. Geogebra, Mathigon, and Geometer's Sketchpad are some examples.

Important/Interesting Information:

*If they can't fold anymore, another fractal of the same size can be added to make the next step.

*I started with a strip of till tape 6 feet long.

*Lots of questions mathematicians of all ages ask start with "What if".

-What if I didn't always fold the same way?

-What if I folded in thirds instead?

-What if I opened to a different angle?

I can't wait to hear what your mathematicians come up with! Please share your questions, ideas, experiences with me at aliciaburdess@gmail.com.

