# Dr. William McWorter, Jr.

Dr. William McWorter, Jr. is the first Black person to earn a PhD in Mathematics from The Ohio State University. He was born (1932) and raised in Cleveland, Ohio and is a hidden part of history from the state of Ohio. His love for mathematics showed in his research and teaching, and is an example of someone who believed that persistence was more important than anything else for those who loved math and science.

Dr. McWorter graduated from Glenville High School in Cleveland in 1958. He then went on to earn three degrees from The Ohio State University in 1958 (BS), 1959 (MS), and 1963 (PhD). After he earned his doctoral degree he started work in Canada at the University of British Columbia before returning to The Ohio State University where he worked until 2009. He was an expert in studying shapes called fractals using computing algorithms.

## Some things to think about…

- Dr. William McWorter, Jr. was the first Black person to earn a PhD in mathematics from The Ohio State University. What do you think this was like for him? What other Black mathematicians have you learned about? What other Black people do you know that were the 'first' to do something?

- Dr. William McWorter, Jr. was born in Cleveland, Ohio and went on to attend college and then graduate school also in Ohio at The Ohio State University. Have you ever considered going to college in Ohio?

- Dr William McWorter, Jr. did math research that allowed him to move to Canada to work with other mathematicians before returning to Ohio. If you were a researcher, where would you like to travel for work?

- Dr. William McWorter, Jr. loved teaching math in creative ways at The Ohio State University. What have some of your favorite math classes been like?

- What do you imagine it is like to be a mathematician? Dr. McWorter was a professor, what other kinds of jobs could you do with a math background?

# His math ideas

Dr. McWorter explored algorithms to create fractals. One of the fractals he studied arises from folding paper!
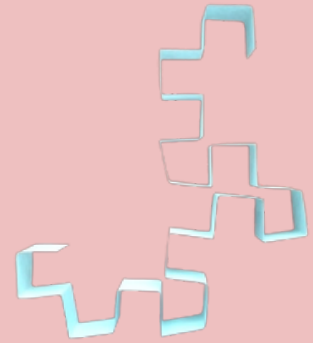
- Cut a letter size sheet along the long side into 1-inch thick strips of paper.
- Tape two of the resulting strips together on the short side, to make a strip that is twice as long. When taping, be careful not to overlap the paper. The two ends should barely touch each other.
- Fold the long strip in half along the long side to the left. If everything went well, this first fold should fall right on the tape.
- Repeat the process four more times, always folding to the left.
- Unfold and arrange the strip forming right angles on the bends. Behold your dragon!

There is nothing special about folding five times as we did. If we continued folding, we would still get a dragon. The more folds, the more refined picture of a dragon we get (similar to how more pixels give a better resolution).

Further folding the strip of paper is hard because of the thickness of paper. If we had a special paper that we could fold infinitely, the dragon we would get after an infinite number of folds is called *dragon fractal*.

We can think of these dragons as a sequence of shapes. The first dragon in the sequence is what we get if we only fold one time. The next one would result from folding two times, and so on. **Draw the sequence of dragons below.** To do that, take another one of the strips you cut and fold it in half. Unfold, form a right angle, and record your dragon. Fold back and add one more fold. Again, unfold and record. Repeat two more times.

Solution:



1 fold          2 folds          3 folds          4 folds