

**CONCEPT** Fractals are graphs with infinitely repeating patterns. An algorithm is used and repeated infinitely to generate the pattern (and this is different for each fractal). Examples include repeatedly dividing lines into two different segments, or repeating a calculation on a number until it diverges.

## BACKGROUND

Fractals get into the idea of infinity, as processes are repeated infinitely often. A big idea of fractals is that no matter how far in the camera may zoom, the image still looks the same. Mandelbrot is famous for advancing the field of fractals, and the most famous one bears his name.

## REAL WORLD CONNECTIONS

What state has the longest coastline? This seemingly simple question gets more complicated when we start to consider the fact that the coast is rarely straight. Regardless of how close we zoom in, we can always count one more little crag. Instead of getting an exact calculation, we normally fix a certain “minimum” distance of a ruler we use to measure the actual coastline, or else we would be trying to measure the distances of individual molecules and atoms.

Fractals also touch upon the idea of imaginary numbers, which are used frequently in electrical engineering. Understanding how complex operations work are vital to a modern society.



## EXAMPLES

Mandelbrot’s set is perhaps the most famous example. This is generated by using the complex number system, and repeating a calculation until the resulting number diverges. The amount of repetitions with which it diverges determines the color portrayed on screen.