A fractal is a complex geometric shape that can be split into parts, each of which is a reduced-scale copy of the whole. Fractals often exhibit self-similarity across different scales, meaning that as you zoom into smaller parts of the fractal, you'll find similar patterns repeating at different levels of magnification. This property makes fractals fascinating objects of study in mathematics, art, science, and computer graphics.

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Fractals can be found abundantly in nature, such as in coastlines, clouds, mountains, and trees. They are also prevalent in various mathematical functions and equations, where they represent structures with irregular or fragmented shapes.

Some common examples of fractals include:

Mandelbrot Set: One of the most famous fractals, named after mathematician Benoît Mandelbrot, the Mandelbrot Set is generated by iterating a simple mathematical formula in the complex plane. The resulting image reveals intricate patterns and shapes that repeat at different scales.

Julia Set: Another fractal set closely related to the Mandelbrot Set, the Julia Set is defined by iterating a different mathematical formula in the complex plane.

Koch Snowflake: A fractal curve created by repeatedly dividing equilateral triangles into smaller equilateral triangles and removing the middle third of each side.

Sierpinski Triangle: A fractal formed by repeatedly removing the central triangle from an equilateral triangle and then repeating the process with the remaining triangles.

Dragon Curve: A fractal curve generated by repeatedly folding a strip of paper in half and then unfolding it at right angles, forming a dragon-like shape.

Fractals have practical applications in various fields, including computer graphics, where they are used to create realistic natural landscapes and textures, as well as in modeling complex systems in physics, biology, and finance. They also inspire artistic creations, as their visually captivating patterns and structures have been incorporated into paintings, sculptures, music, and other forms of expression.

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