



Sunflowers embody beauty and math

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Sunflowers, whose colorful beauty is celebrated in Van Gogh's famous paintings, are also of note botanically and (surprisingly) mathematically.

The common sunflower, *Helianthus annuus*, is one of more than 50 species in the sunflower genus *Helianthus*, mainly native to North America. Common sunflower is a good name for this species, as it is our familiar ornamental sunflower, and also the source of edible sunflower seeds and sunflower oil. Fittingly, the name "*Helianthus*" comes from "*Helios*," the Greek sun god, plus "*anthos*" flower.

The flower structure is typical of the sunflower/aster family (*Asteraceae*, *compositae*), so what appears to be a single flower is actually a "head" of many tiny flowers! The "petals" (ray flowers) are sterile, and the central disc flowers are fertile, with each flower producing one dry fruit with a seed inside. You may have noticed that the flower buds open from the outside to the inside of the sunflower. The petal color is typically yellow, but sunflowers are also cultivated in colors like red or brown.

Garden Tales

So what do sunflowers have to do with math? If you look at the center of a sunflower, you'll notice that the disc flowers form spirals going both left and right. Count the number of these spirals in one sunflower, and you'll often find 34 left spirals and 55 right spirals, or 21 and 34; a large sunflower may have 89 and 144. Surprisingly, these numbers are part of a mathematical series known as Fibonacci numbers (0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144 ...), in which each number is the sum of the two preceding numbers. This arrangement appears to help maximize seed density.

A field of sunflowers with all the flowers facing the same direction makes a dramatic image. Sunflowers exhibit heliotropism, or turning with the sun, facing east at sunrise and turning to face west by sunset (and returning to face east again during the night!). This heliotropism stops when the bud stage ends.

Delaware has five native sunflower species, but none of them are common now. An additional three species, including the common sunflower, are introduced in Delaware.

Modern cultivated common sunflowers have reached a record height of 25 feet, and a flower has measured a record of almost 3 feet wide. The wild sunflower is much smaller, just 3-4 inches wide, and was originally domesticated several thousand years ago by Native Americans who se-



Submitted illustration/Susan Yost
The common sunflower (*Helianthus annuus*) is a symbol of light and hope.

lected for bigger heads and seeds for food. Native Americans also used all parts of the plants medicinally; for example, the stem juice for cuts, roots for inflammation, seeds for constipation and warts, and stem tea for fever. The hulls were used for dyes. After the sunflower was introduced to Europe, more varieties were bred, especially in Russia.

You wouldn't have wanted someone to send you sunflowers during the Victorian era, for at that time they were used to symbolize false riches and haughtiness! Today, however, sunflowers often symbolize light and hope. They are cheerful flowers to plant and watch growing and following the sun, and as an added bonus, you and the birds can eat the seeds at the end of the summer.

Editor's note: On the campus of Delaware State University, the Claude E. Phillips Herbarium is Delaware's center for research, education, and outreach about plant identifications, locations, and uses. Call 857-6452 to arrange a tour of the herbarium, or for more information about