

Nature's Engineering

by Carol Ann Harlos

Why do hexagons show up so often in the world of insects? You may have looked upward at paper wasp nests. The openings are hexagonal. Stingless bees make spiraling hexagonal sheets or spiral honeycomb structures using hexagons. And of course you are familiar with honeybee cells which are hexagonal. Do some creatures know more about mathematics than many humans?

Why hexagons? Hexagons maximize storage space while minimizing the amount of materials need to construct them!

Let's take a look. What shapes work best to cover an area without having spaces between them? Answer: Squares, equilateral triangles, and hexagons. So why choose hexagons? Back to math class. The area of a triangle is $\frac{1}{2}$ base X height. The area of a square is the length of one side squared. The area of a hexagon is 3 times the square root of three divided by 2 times the length of one side. (You knew that right?) So, the area of a square with a side of 1 is 1 square unit. The area of equilateral triangle is $\frac{1}{2}$ (1 X 1) = 1/2 square unit. So, the area of a hexagon is 2.5 square units. WOW!

So... are honeybees clever? Not really. Many honeybees work close together. Each honeybee secretes wax from her abdomen which they chew so it can be shaped. Each honeybee makes a cylinder of wax around herself. Since the wax is soft the multiple cylinders collapse into each other until there are no

spaces between them. Voila! Hexagons. Don't believe people who tell you how perfect the hexagons are because they aren't. The cylinders are adjusted depending on their future use: storage, egg laying, honey, nectar.

If you have ever seen wild honeybee comb it will not be perfect! When you see perfect hexagons in a beehive it is because the beekeeper used prepared comb which has perfectly shaped hexagons. Why is this done? Honeybees can spend more energy on honey production rather than comb production.



Image Canva



Cornell Cooperative Extension is an employer and educator recognized for providing equal program and employment opportunities in accordance with applicable laws.

© Copyright 2026 All Rights Reserved