



# Getting It Together

The collective motion of many groups of animals can be stunning. Flocks of birds and schools of fish are able to remain cohesive, find food, and avoid predators without leaders and without awareness of all but a few other members in their groups. Research using vector analysis and statistics has led to the discovery of simple principles, such as members maintaining a minimum distance between neighbors while still aligning with them, which help explain shapes such as the one below.



Photo by Jose Luis Gomez de Francisco.



*The Mathematical Moments program promotes appreciation and understanding of the role mathematics plays in science, nature, technology, and human culture.*