Lesson Plan – Fibonacci Numbers and Origami

Have you ever pulled petals off a daisy?

If you look at the yellow center of a daisy, you notice that the center consists of sets spiraling out. These spirals are not unique to daisies! Look, for instance, at the bottom of a pineapple or a pinecone. There is one set of spirals going clockwise and one going counterclockwise.

These and many other patterns in nature are actually mathematical! Over 800 years ago, an Italian mathematician named Leonardo de Pisa (also known as Fibonacci) wrote a book introducing the Hindu-Arabic number system to Europe. This is the number system that we use today with digits 0,1,2,3,4,5,6,7,8,9; his book convinced many 13th century mathematicians in European to use this system.

Consider the following numbers 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144…

Notice 0+1 =1, 1+1=2, 2+3=5, etc

The Fibonacci numbers occur a lot in nature! Count petals and leaves and look at spirals. Fibonacci numbers optimize certain properties and describe branching in trees, arrangement of leaves on a stem, the florets of a sunflower, and many other things!

PASS OUT PINE CONES/PASS OUT PINE CONE WORKSHEET/OBSERVE SPIRALS AND COUNT

PASS OUT SUNFLOWER WORKSHEETS/COLOR SPIRALS/CUT OUT

PASS OUT ORIGAMI PAPER/CRANE WORKSHEETS

MAKE 13 CRANES AND TAPE AROUND A SPIRAL LIKE PETALS
(https://www.etsy.com/listing/28789858/origami-crane-sunflower-trio)
Fibonacci Numbers and Pine Cones

Find a pine cone and look at it from the bottom.

Count the number of spirals going from the center of the cone (where it attached to the tree) to the outside edge.

Count the spirals in both directions. The resulting numbers are usually two consecutive Fibonacci numbers (e.g., 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, . . .).

In the example shown, there are 8 clockwise spirals and 13 counter-clockwise spirals. Can you find a cone that doesn’t follow this pattern?
How to Fold a Crane

1. Fold the paper in half diagonally.
2. Repeat step 1 to create a smaller square.
3. Fold the paper in half vertically.
4. Open the paper and fold the corners to the center.
5. Repeat step 4 to create a smaller square.
6. Fold the paper in half horizontally.
7. Repeat step 6 to create a smaller square.
8. Fold the paper in half vertically.
9. Open the paper and fold the corners to the center.
10. Repeat step 9 to create a smaller square.
11. Fold the paper in half diagonally.
12. Repeat step 11 to create a smaller square.
13. Fold the paper in half vertically.
14. Repeat step 13 to create a smaller square.

The crane is now fully folded.