Name: _____

Finding Fibonacci Numbers in Nature

Below are examples from nature in which Fibonacci numbers can be found. Using the illustrations or samples your teacher provides, work with your group to answer the questions. Make sure that you complete your own sheet.

1. Flower petals: Count the number of petals on each of these flowers. What numbers do you get? Are these Fibonacci numbers?

2. Seed heads: Each circle on the enlarged illustration represents a seed head. Look closely at the illustration. Do you see how the circles form spirals? Start from the center, which is marked in black. Find a spiral going toward the right. How many seed heads can you count in that spiral? Now find a spiral going toward the left. How many seed heads can you count there? Are they Fibonacci numbers?

3. Cauliflower florets: Locate the center of the head of cauliflower. Count the number of florets that make up a spiral going toward the right. Then count the number of florets that make up a spiral going toward the left. Are the numbers of florets that make up each spiral Fibonacci numbers?

4. Pinecone: Look carefully at the picture of a pinecone. Do you see how the seed cases make spiral shapes? Find as many spirals as you can going in each direction. How many seed cases make up each spiral? Are they all Fibonacci numbers?

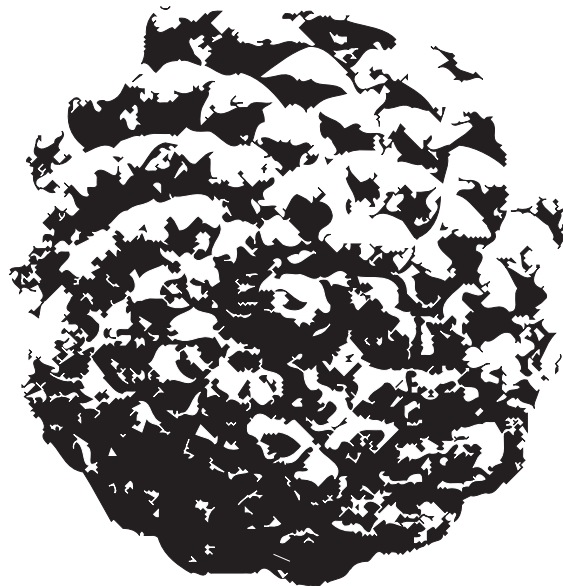**5. Apple:** How many points do you see on the "star"? Is this a Fibonacci number?

What shape emerges most often from the Fibonacci numbers? What function do you think this shape serves?

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Finding Fibonacci Numbers in Nature

Seed head
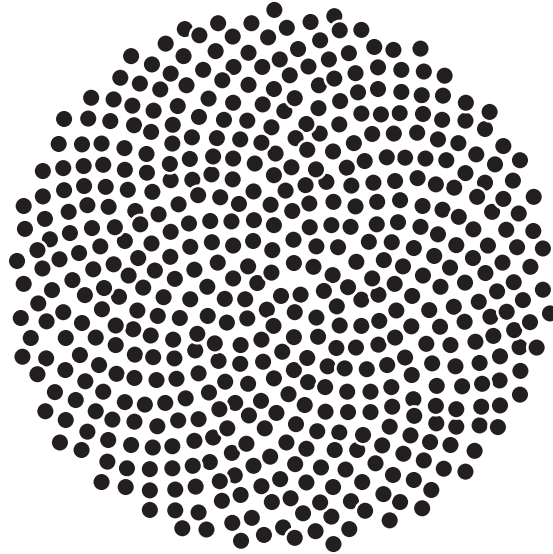
Pinecone

Finding Fibonacci Numbers in Nature

Buttercup

Lily
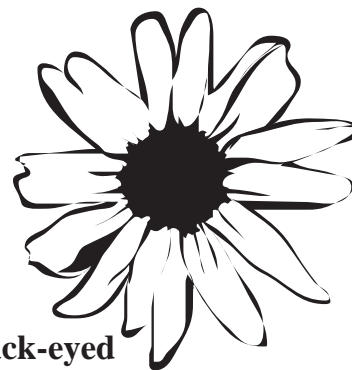
Black-eyed Susan

Iris

Aster

Cauliflower florets

Apple

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Name: _____
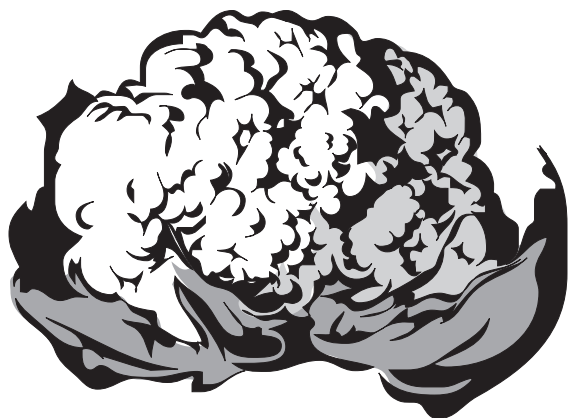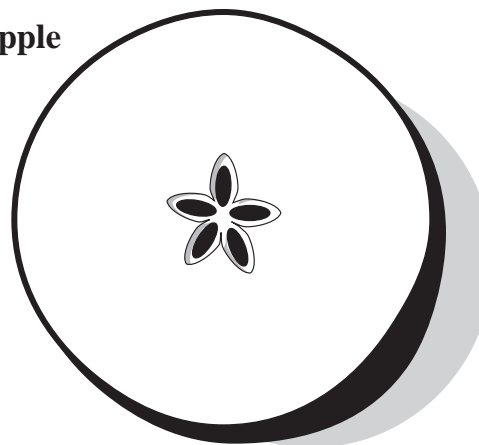
Creating the Fibonacci Spiral

You will need a large piece of draft paper, a ruler, and a compass to create the Fibonacci spiral. Follow the directions below and watch the spiral emerge.

1. Draw a small square that is 1 inch on each side. Draw a second square of the same size directly to the left of the first square so that the sides of the two squares are touching.

2. Draw a 2-inch square just above the two 1-inch squares.

3. Draw a 3-inch square to the right of the three smaller squares so that it borders the two 1-inch squares and the 2-inch square. All the squares should be connected.

4. Draw a 5-inch square that borders the 1-, 2-, and 3-inch squares (below the smaller squares). Each successive square will have an edge whose length is the sum of those of the two squares immediately preceding it.

5. Draw an 8-inch square to the left of the previous five squares.

6. Draw a 13-inch square above the previous six squares.

7. You will need your compass to complete your drawing. Within each square of your drawing, you are going to draw an arc, or a quarter circle, from one corner to the opposite corner. (You will be drawing an arc of a circle with a radius equal to the length of one side of that square.) Each arc will be connected to the next.

To begin, place your pencil in the upper-right-hand corner of the FIRST 1-inch square you drew and draw an arc downward to its lower-left-hand corner. Next, draw an arc from that same point on the SECOND 1-inch square (the lower-right-hand corner) to the upper-left-hand corner of the second square. Continue drawing arcs in each square you created, starting each arc at the point where the last one ended.

8. What shape did you get? What forms in nature reflect this shape?

Creating the Fibonacci Spiral

ANSWER SHEET (for the teacher only)

The drawings your students make should look like this:

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