

Fun With Fibonacci

Table 7

Objective: Students will develop patterns, study ratios, and arrive at an intuitive (non-technical) introduction to limits.

Level: 8th grade with extensions to high school

Instructions:

1. On the first day of the month, your parents give you a penny for washing the dishes. On the second day, they give you another penny. On the third day, they give you the amount they give you on the first and second day combined. On the fourth day, they give you the amount you got on the second and third day combined. Each day, they give you the amount you received on the previous two days combined. How much money would you get on the 20th day?
2. Take the first six numbers of the sequence you generated above and cut out squares with each side being those dimensions. (Make sure you make two 1x1 squares.)
3. Look at your smallest square. What is the ratio of the two dimensions? (Write as both a fraction and a decimal to four decimal places.)

4. Take your first two squares and lay them out to make a rectangle. What is the ratio of the two dimensions? (Write as both a fraction and a decimal to four decimal places.)

5. Take the third square and lay it next to your previous rectangle to make a new rectangle. What is the ratio of the two dimensions? (Write as both a fraction and a decimal to four decimal places.)

6. Add the fourth square to the previous rectangle to make a new rectangle. What is the ratio of the two dimensions? (Write as both a fraction and a decimal to four decimal places.)

7. Repeat this process until you run out of squares, writing the ratios as you go.

8. What do you notice about the fractions you produced? What do you notice about the decimals?

After this, the class will have a discussion about what they discovered and determine that the ratios approach a “common” number. Hopefully some students would have arranged their rectangles in such a way that the Golden Spiral can be drawn through the edges. They can then discuss where the sequence appears in nature and the Golden Ratio can be mentioned.

Extensions:

- Derive the golden ratio using the quadratic formula
- Discuss where Fibonacci occurs in music, finance, etc.

9. Write the next ten ratios as both fractions and decimals. What do you notice about the decimals?