Continued Fractions Investigation

Process	Example 1	Example 2	Example 3
1. Write a fraction. *Any positive integer over any other positive integer.*	$\dfrac{32}{5}$	$\dfrac{64}{49}$	$\dfrac{5}{17}$
2. Split into a whole number part and a proper fraction part (like a mixed number, but with a $+$ sign written in.) *If it's already a proper fraction, write a $0+$ in front of it.*	$6+\dfrac{2}{5}$	$1+\dfrac{15}{49}$	$0+\dfrac{5}{17}$
3. Divide the top and bottom of the proper fraction by the numerator to give an improper fraction on the bottom. *This is the same as 1 over the reciprocal of the proper fraction.*	$6+\dfrac{1}{\frac{5}{2}}$	$1+\dfrac{1}{\frac{49}{15}}$	$0+\dfrac{1}{\frac{17}{5}}$
4. Repeat the process (steps 2 and 3) for the improper fraction at the bottom. *Continue until all numerators are equal to 1.*	$6+\cfrac{1}{2+\frac{1}{2}}$	$1+\cfrac{1}{3+\frac{4}{15}}$	$0+\cfrac{1}{3+\frac{2}{5}}$
		$1+\cfrac{1}{3+\cfrac{1}{\frac{15}{4}}}$	$0+\cfrac{1}{3+\cfrac{1}{\frac{5}{2}}}$
		$1+\cfrac{1}{3+\cfrac{1}{3+\frac{3}{4}}}$	$0+\cfrac{1}{3+\cfrac{1}{2+\frac{1}{2}}}$
		$1+\cfrac{1}{3+\cfrac{1}{3+\cfrac{1}{\frac{4}{3}}}}$	
		$1+\cfrac{1}{3+\cfrac{1}{3+\cfrac{1}{1+\frac{1}{3}}}}$	
5. Write your continued fraction in list notation, including just the whole number parts from each denominator. The very first number is followed by a semi-colon, the rest by commas. *This is just the integers on the left of each line.*	$[6; 2,2]$	$[1; 3,3,1,3]$	$[0; 3,2,2]$

Investigate continued fractions. What patterns can you find? Can you explain why any of them work?

What will proper fractions look like as continued fractions? What about unit fractions? What about how a fraction and its reciprocal would look?

What happens if we continue our continued fraction until the last denominator is a 1?

What do you notice about the continued fractions for $\dfrac{1}{8}, \dfrac{2}{8}, \dfrac{3}{8}$, etc?