Work on these with your partner(s) at the board

1. Compute the continued fraction expansion for π through a_5:
   $\pi = [a_0, a_1, a_2, a_3, a_4, a_5, \ldots]$

2. Compute the first six convergents for π

3. Find the decimal values for the first six convergents π

4. Repeat #2 and #3 for $\sqrt{2}$

5. Repeat #2 and #3 for $\varphi = \dfrac{1+\sqrt{5}}{2}$

Work on these with your partner(s) at the board

If the convergents of $x = [a_0, a_1, a_2, a_3, \ldots]$ are $c_k = \frac{p_k}{q_k}$ then

Theorem 1: $p_k = a_k p_{k-1} + p_{k-2}, \qquad q_k = a_k q_{k-1} + q_{k-2} \qquad \forall\ k \geq 2$

Theorem 2: $p_k q_{k-1} - p_{k-1} q_k = (-1)^{k-1} \quad \forall k \geq 1$

6. Verify Theorems 1 & 2 for the first six convergents of π

7. Use Theorem 1 to compute the first 15 convergents of $\sqrt{2}$
   Compare these convergents to $\sqrt{2}$. What do you notice?

8. Use Theorems 1 to compute the first 15 convergents of φ
   Compare these convergents to φ. What do you notice?