

Week 2 Lecture 2

September 8, 2017

- Stretch 5: Use three 7's and mathematical symbols to construct an expression equal to 20.
 - **Hints:**
 - * List mathematical symbols.
 - * Just try writing down different combinations. Eliminate all symbols and combinations that obviously don't work.
 - * Observe that $\frac{7}{.7} = 10$. How can we get 20 now *using only three 7's*?
 - **Solution:** $\frac{7+7}{.7} = \frac{7+7}{\frac{7}{10}} = \frac{14 \cdot 10}{7} = 20$.
- Stretch 6: Five circles are equivalent to six triangles. One square is equivalent to a circle and triangle together. How many squares are equivalent to eleven triangles?
 - **Hints:**
 - * Make sure you understand the problem.
 - * Draw a picture.
 - * Think of substitutions.
 - **Solution:**
 - * Draw a picture and notice that you can substitute 6 triangles for 5 circles. Then substitute 5 circles and 5 triangles for 5 squares.
 - * Using math: $5C = 6T$ and $S = C + T$. Therefore, $5S = 5C + 5T = 6T + 5T = 11T$.
- Shoreline (Pg. 139): What is the length of the shoreline of Mirror Lake (or some other lake at your university or in your town)?
 - **Solution:** (*Discuss in groups*)
 - * Increasing the resolution increases the length of bends. i.e., as the resolution increases the total length of the shorelines increases.
 - * You can continue to increase the resolution more and more every time. Think of first looking at the shoreline from a distance, then kneeling down, then using a magnifying glass, then using a microscope, and so on. Therefore, the total length of the shoreline goes to infinity.
 - * Shoreline is a fractal - length of the shoreline is infinite.
 - * In reality and in most practical applications this is not the case. The measured length of the shoreline depends on the accuracy of the device we use to measure it with.