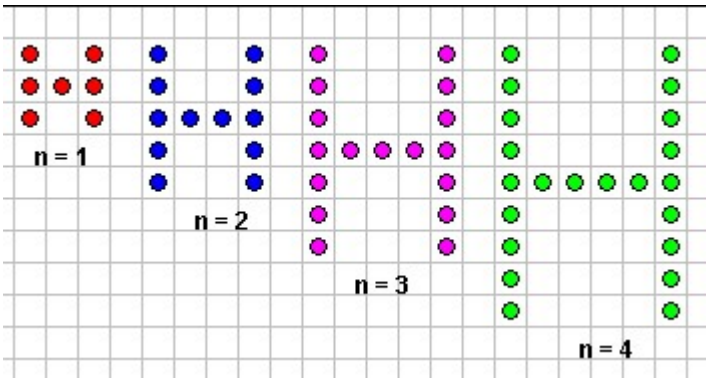
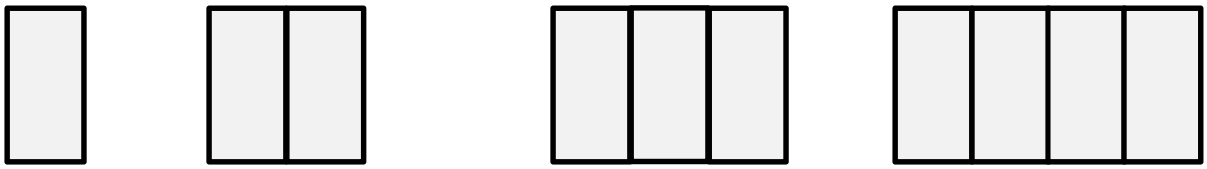
Pattern Practice Problems

1. a. Find and circle some helpful sets/groupings in the pattern below/
b. Write an explanation of how to draw the 10^{th} shape in the pattern.
c. Find a formula that tells how many dots will be in the n-th shape of the pattern. Explain how your formula matches the visual pattern.

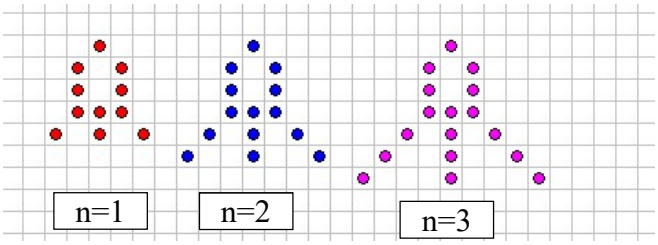


2. This pattern is made out of dominos: rectangles **1 unit wide and 2 units long**.
Find a formula to tell what the perimeter of the n-th pattern is, and explain your formula.



n=1 n=2 n=3 n=4

3. In the rocket pattern (below)



a. Find a formula that tells how many dots it takes to make the n-th rocket. Explain how your formula fits the pictures.

b. What is the biggest rocket you can make using only 80 dots?

c. Explain how to find the biggest rocket you can make using D dots.

d. What is the smallest rocket that has at least 100 dots?

e. Explain how to find the smallest rocket that has at least N dots.

4. Amy has **round beads** in 7 rainbow colors (ROYGBIV) and she has **magnet beads** that she puts on the ends as fastners **(all the same length)**. She is using them to make necklaces. She made a necklace with one rainbow with magnet ends for a Barbie doll, and she made a necklace with 2 rainbows and magnet ends for another doll.

1 rainbow (9 beads) 

2 rainbows (16 beads) 

a. If Amy made a necklace with 3 rainbows, how many beads would it have?

b. Amy cut a length of bead wire long enough for 57 beads. ***Show*** how to figure out how many complete rainbows can she make on a necklace with this bead wire.

c. ***Explain*** how to figure out how many complete rainbows can be made on a necklace like this on a bead wire that is long enough for N beads.

5. a. Draw a visual (number of squares) pattern for the function: $5n+4$
b. Make a table and a graph showing how many squares are in the nth pattern.
c. Show on your table how much the pattern grows by each time. Is the pattern linear or slower than linear or faster than linear in how it grows?

6. a. Draw a visual (number of squares) pattern for the function: $2n^2+3n+5$
b. Make a table and a graph showing how many squares are in the nth pattern.
c. Show on your table how much the pattern grows by each time. Is the pattern linear or slower than linear or faster than linear in how it grows?

7. Use the order of operations correctly to calculate:

a. $12-7+3$ b. $24\div 2\div 2\times 3$ c. $80-5\cdot 2^3+20\div 5\times 2$ d. $2\cdot 6^2\div 3$