Elementary Math Focus Day January 26, 2018 – "Visual Patterns & Patterns Visualized"
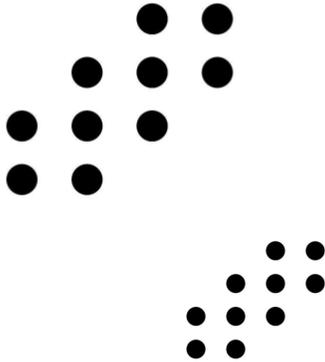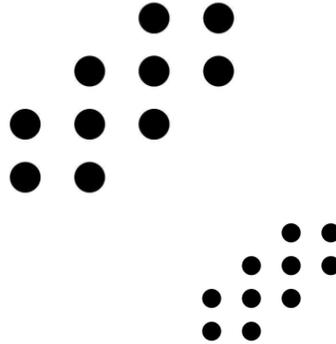Session: Math Mentor Teacher: Fred Harwood   fharwood@sd38.bc.ca   @HarMath

Our goal today is to 'see' mathematics and to see it talk to us. You will need to imagine how other students are thinking and 'show' what they might have done to count how many dots are in an array:
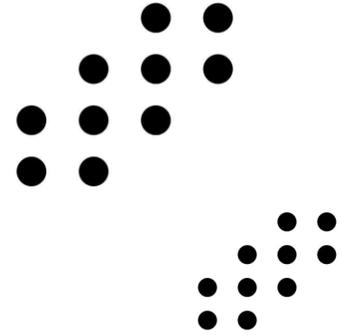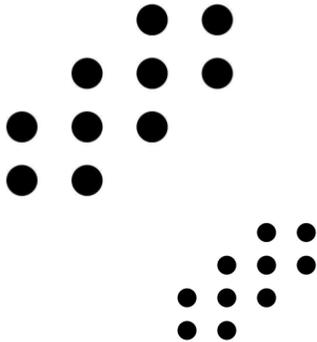
1.) 5 + 5   2.) 2(5)   3.) 3(4) – 2
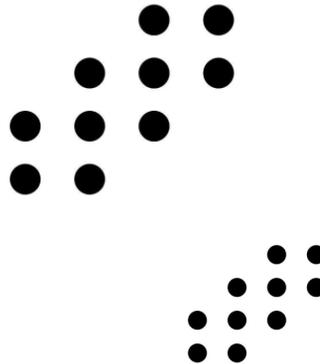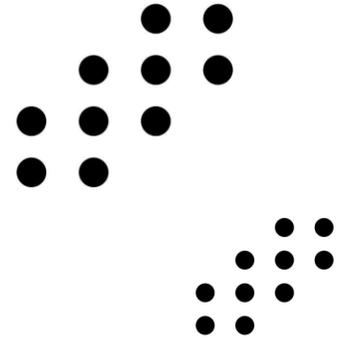
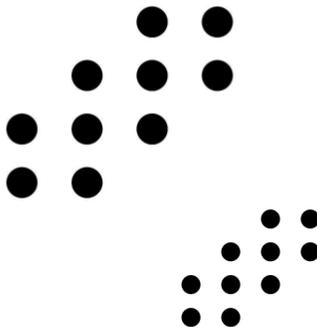4.) 2x3+ 2x2   5.) 2(6) – 2   6.) 4(4) – 2(3)
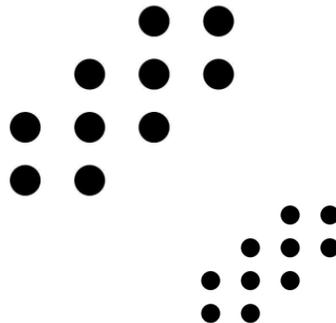
7.) 6 + 4   8.) 4 + 4 + 2   9.) 3(3) + 1
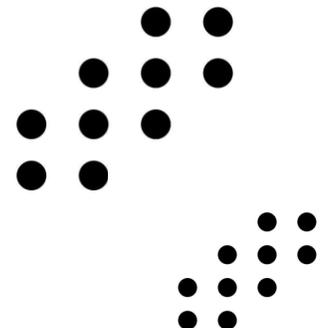
Now defend your diagrams with others to see if there were multiple ways to do it or if you feel someone else did it better and why.

10.) Solve the following questions about this growing pattern on your whiteboard with your partners. Remember you are trying to 'show' how you thought through the problem clearly enough for others to understand your method and the process you did to solve the problems.

Figure 1   **Figure 2**   **Figure 3**
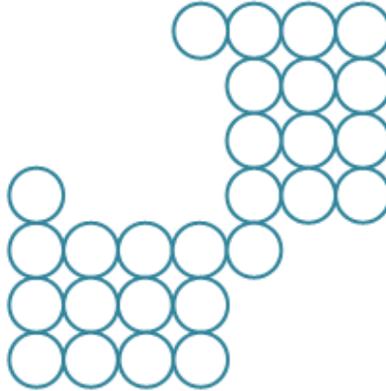
a) What would Figure 4 look like?

b) How many little circles in Figure 6?

c) How many circles in Figure 12?

d) Generalize a formula to predict the number of circles in any Figure? Hint: Figure 'n'

e) If there was a Figure 0, what would it look like and why?

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11.) Solve the following questions about these growing patterns on your whiteboard with your partner. Remember you are trying to 'show' how you thought through the problem clearly enough for others to understand your method and the process you did to solve the problems.

Figure 1   **Figure 2**   **Figure 3**   **Figure 4**

a) **What would Figure 4 look like?**

b) **How many suns in Figure 8?**

c) **How many suns in Figure 12?**

d) **Can you generalize a formula to predict the number of suns in any Figure?**

e) **If there was a Figure 0, what would it look like and why?**

12.) Solve the following questions about these growing patterns on your whiteboard with your partner. Remember you are trying to 'show' how you thought through the problem clearly enough for others to understand your method and the process you did to solve the problems.

Figure 1   **Figure 2**   **Figure 3**   **Figure 4**
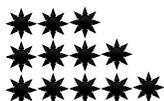

f)   What would Figure 5 look like?

g)   How many stars in Figure 8?

h)   How many stars in Figure 12?

i)   Can you generalize a formula to predict the number of stars in any Figure?

j)   If there was a Figure 0, what would it look like and why?

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Given this growing pattern, **predict and draw what Figure 4 and 5** should look like.
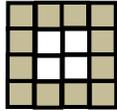
| Fig. 1 | Fig. 2 | Fig. 3 | Fig. 4 | Fig. 5 |

Do the following tasks and questions:

#1) Complete the table for each Figure # comparing the number of Shaded Squares and the number of White Squares.

Figure #	# of shaded squares	# of white squares
1	4	0
2		1
3		
4		
5		
6		

#2) How many shaded squares would be in Fig. 8?

#3) Describe the pattern that you used to find the number of shaded squares in each figure using words in a full sentence.

#4) How many white squares would be in Fig. 13? Show how you figured this out.

#5) What is the relationship between the Figure number and its number of white squares?

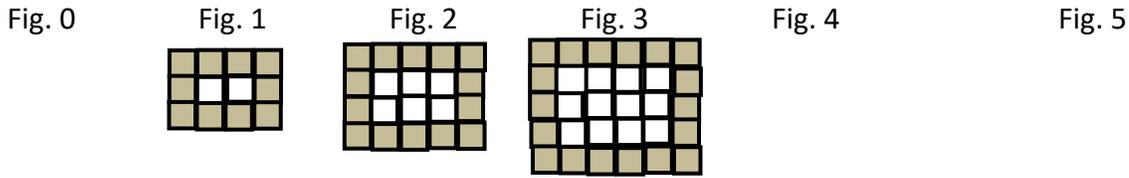#6) How many shaded squares would be in Fig. 50? Show how you figured this out.

#7) How does the figure number determine the number of shaded squares.

#8) What figure has 84 shaded squares? Describe how you figured this out.

Patterning Problem 2 for Algebra Growth: Name: _____

Given this new growing pattern, predict and draw what figures 4 and 5 look like:

Fig. 0   Fig. 1   Fig. 2   Fig. 3   Fig. 4   Fig. 5

Do the following tasks and questions:

#1) Draw what you think the figure before figure 1 would look like. We will call it Fig. 0.

#2) Complete the table for each of the figures comparing the number of shaded squares and the number of white squares to the Figure #.

#3) How many shaded squares in Fig. 8?

#4) Describe the pattern that you used to find the number of shaded squares in each figure. Use words in a full sentence.

Figure #	# of shaded squares	# of white squares
1		2
2		
3		
4		
5		
6		

#5) How many white squares would be in Fig. 11?

#6) What pattern did you use to find the number of white squares in each figure? Use words in a full sentence.

#7) How many shaded squares would be in Fig. 60?

#8) How can the figure number be used to determine the number of shaded squares?

#9) What figure has 90 shaded squares? Describe how you figured this out.

Some Patterning Problem Samples From visualpatterns.org.

Case 1   Case 2   Case 3
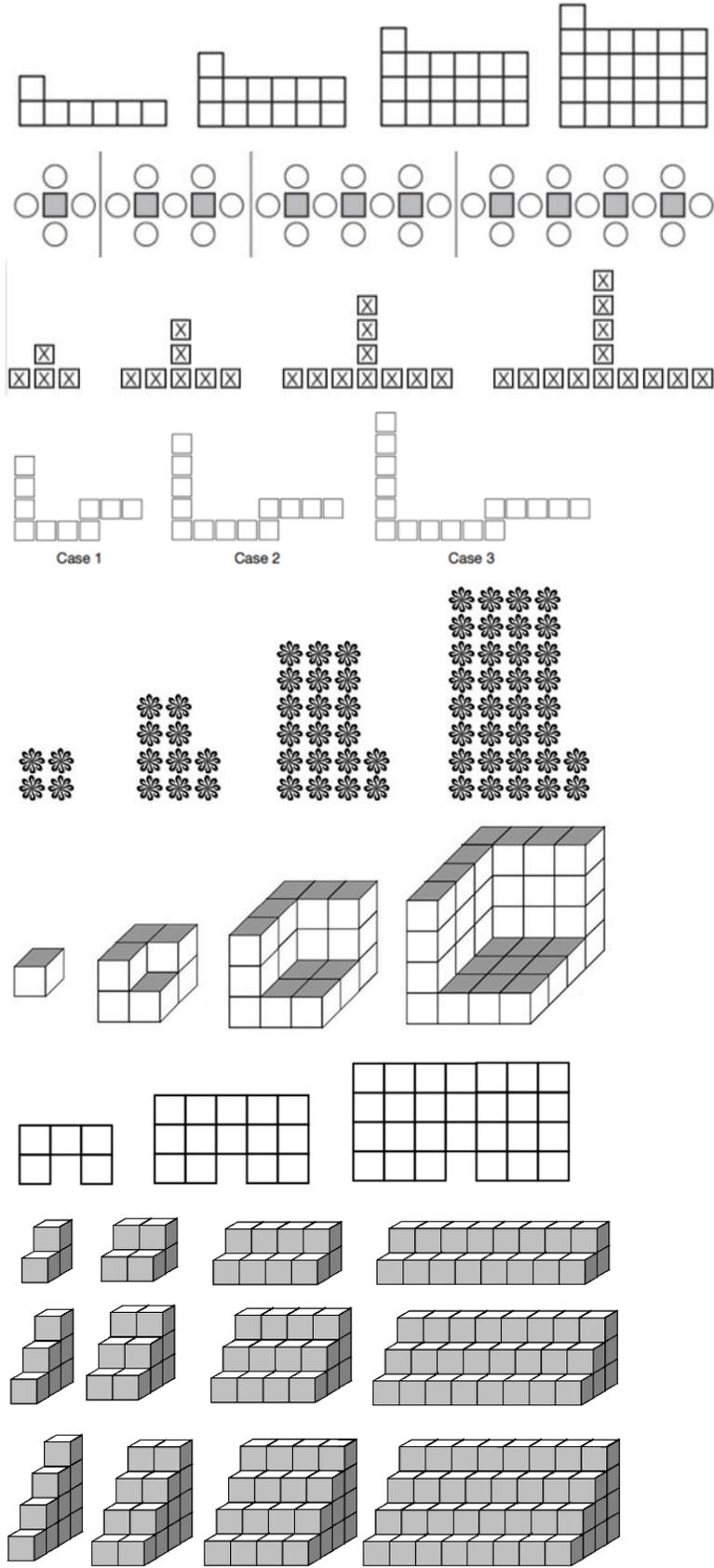
And have students create their own patterns to test one another and yourself!

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Use the manipulatives provided to attempt to understand the pattern by visualizing the changes as you build the growing pattern. Use your visualizations to produce an algebraic formula to predict any sum from a given number of terms in each pattern.

1. The sum of consecutive positive ODD numbers: 1 + 3 + 5 + 7 + . . . + 97 + 99

2. The sum of consecutive positive EVEN numbers: 2 + 4 + 6 + 8 + . . . + 98 + 100

3. The sum of consecutive positive integers: 1 + 2 + 3 + 4 + 5 + . . . + 38 + 40