

Name: _____

Copper Country Math Circle

Session 1: Numbers as Geometric Shapes

A. Drawing Figurate Numbers

1. Using the circle tiles on the tables, represent the numbers 3, 6, 9 and 10 each in more than one way. Draw your designs for 6 below:



B. Square Numbers: Numbers that can be arranged into a square shape

2. Play with your tiles making different squares.

How many tiles are in a 7-by-7 square? _____ tiles.

How many tiles are in a 20-by-20 square? _____ tiles.

3. Practice forming square numbers and record your answers below:

$1^2 = \underline{\quad}$

$6^2 = \underline{\quad}$

$2^2 = \underline{\quad}$

$7^2 = \underline{\quad}$

$3^2 = \underline{\quad}$

$8^2 = \underline{\quad}$

$4^2 = \underline{\quad}$

$9^2 = \underline{\quad}$

$5^2 = \underline{\quad}$

$10^2 = \underline{\quad}$

4. Look at the differences between square numbers. See if you can explain the pattern using the tiles on your table. Work with your group.

$1^2 - 0^2 = \underline{\quad}$

$2^2 - 1^2 = \underline{\quad}$

$3^2 - 2^2 = \underline{\quad}$

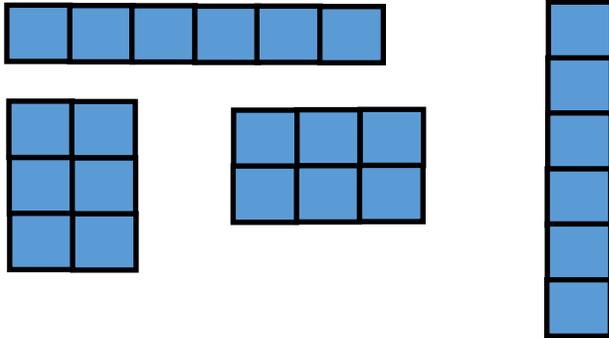
$4^2 - 3^2 = \underline{\quad}$

$5^2 - 4^2 = \underline{\quad}$

$6^2 - 5^2 = \underline{\quad}$

C. Rectangular Arrangements:

There are four ways to represent 6 as a rectangle:

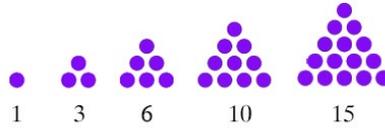


Find the number of all possible rectangular arrangements and fill in the table below.

Tiles	1	2	3	4	5	6	7	8	9	10
Rectangles						4				
Tiles	11	12	13	14	15	16	17	18	19	20
Rectangles										

See if you can find any patterns in the table above.

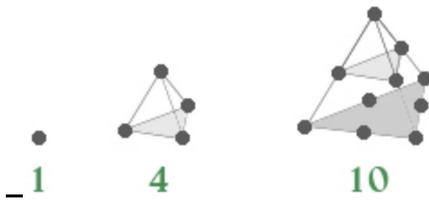
D. Triangular Numbers: Find the total number of discs used in forming triangles with the given sides and fill in the table below.



Side	2	3	4	5	6	7	8	9	10
Coins, total									

E. Three Dimensions: We can make shapes in 3 dimensions as well, for example pyramids. You can make pyramids with square bases or triangle bases. Explore these numbers using the marbles and clay.

Tetrahedral numbers: Triangle base



Square Pyramid Numbers

