Grouping Numbers

Group the counting numbers as follows: (1), (2, 3), (4, 5, 6), (7, 8, 9, 10), ... Notice that each group has one more number in it than the previous group. For each group we can add the numbers in that group. For example, the sum of the numbers in the third group will be 15 because 4 + 5 + 6 = 15.

1) What is the sum of the numbers in the fifth group?

2) What is the sum of the numbers in the sixth group? Check your answers with a friend or family member.

3) What is the sum of the numbers in the tenth group?

4) What is the sum of the numbers in the 100th group?!

5) What is the sum of the numbers in the 199th group?!

6) Write up your work neatly and explain how you got your answer or answers. Did you find any shortcuts? Did you collaborate?

7) Can you make up a related problem?

8) Have fun!

Source: Columbus State University

Penrose Tiles

They were created in 1974 by Roger Penrose, a British scientist. The shapes were named "kites" and "darts" by John Conway, a mathematician who is now at Princeton University.

These tiles have many amazing properties. For one thing, they are non-periodic. You can tile forever with them, but if you trace your tiling on tracing paper, you can't slide the tracing paper and make it match up.

The best way to begin to understand them is to play with them! Make a bunch of tiles on card stock, using the pattern given. Color the arcs blue and red so you can work with other students. Put your name on the back of each tile. As you tile, your pieces must touch edge to edge, and the colors must match up. If you reach a place where no tile fits, take a few tiles off and try again.

1) Create a beautiful Penrose tiling!

2) Write a paragraph describing what you made and what you've learned about Penrose tiles.

3) How many different ways can you tile around one point? (For example, five kites will do it.)

4) What are the angles in each shape?

5) Use a ruler, compass and protractor to draw a neat kite and dart "from scratch." Make the smaller sides 3 inches. How long will the longer sides need to be?

6) Draw a regular pentagon with all its diagonals, to make a five pointed star. How can you find the kite and dart shapes in this drawing?

7) How could you tell someone, using only words, how to draw the two shapes?

8) No Penrose tiling has translational (sliding) symmetry. But can you make tilings with rotational or reflectional symmetry?

9) What is the ratio of the longer side to the shorter side in each shape?

10) Can you learn more about Roger Penrose and the Penrose tiles?

11) Have fun!