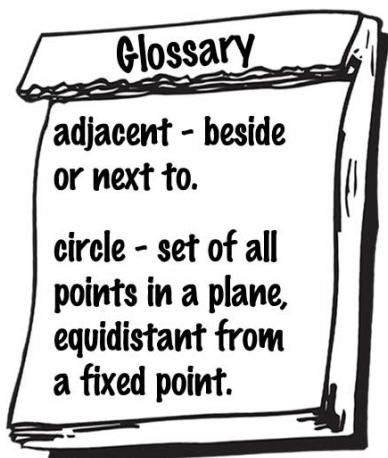
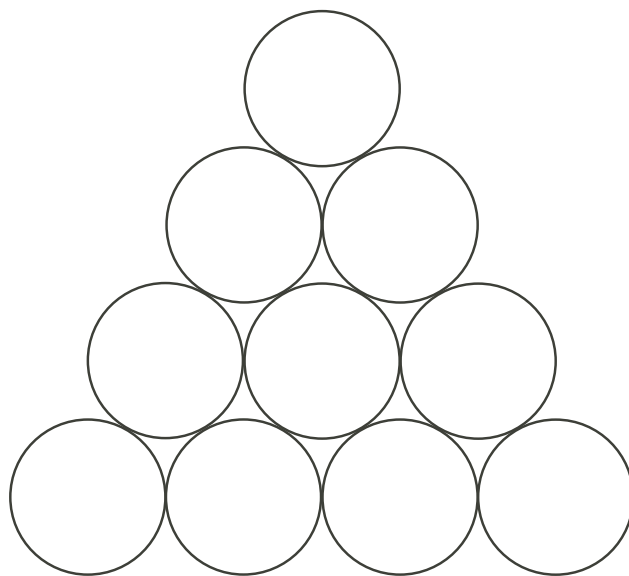


Problem

What? Chips, but no Dip?

- a) Colour the circles in the triangular stack at right below using three different colours, with no two adjacent circles of the same colour.
- b) How many circles are there of each of the three colours in the stack a)?
- c) Suppose the stack had only 3 rows of circles instead of 4. How many circle would there be of each colour? What if the stack had 5 rows?
- d) Fill in the table below, and hence decide when there will be the same number of circles of each colour. Predict the first number of rows greater than 7 for which there is NOT the same number of circles of each colour.

No. of rows	No. of Circles	No. of Colour 1	No. of Colour 2	No. of Colour 3
2				
3				
4				
5				
6				
7				



Hints**Part 1 a)**

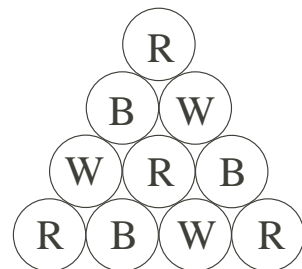
Hint 1 - If you use the colours red, black, and white, and you colour the top circle red, what colours must be used for the circles in the row below?

Hint 2 - Does choosing the colours for the top three circles determine exactly the colours for the three circles in the third row down?

Suggestion: The teacher may wish to make copies of the problem page (with the diagram) for students to use in trying this problem. Pencil (with eraser) is best!

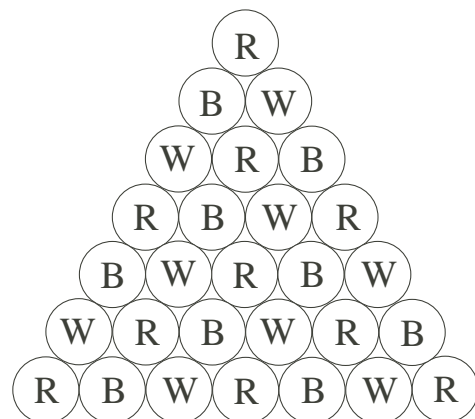
Solution

a) Using R = red, B = black, W = white as the choice of colours, one solution is shown at the right. Others can be found by interchanging the colours (e.g., one way would be to replace R with B, B with W, and W with R).



b), c), d) Using the diagram at the right, the completed table is:

No. of rows	No. of Circles	No. of Colour R	No. of Colour B	No. of Colour W
2	3	1	1	1
3	6	2	2	2
4	10	4	3	3
5	15	5	5	5
6	21	7	7	7
7	28	10	9	9



Thus we see that there will be the same number of circles of each colour provided that the total number of circles is divisible by 3. The next time this will NOT occur is when there are 10 rows, with a total of $28+8+9+10=55$ circles.