Coláiste An Spioraid Naoimh Maths Circle
Lesson 6

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Last Week's Take Home Problem

At 12 o clock, the minute and hour hands on an analog clock are overlapping. What is the next **exact** time that they overlap?

Solution:
The minute hand and the hour hand cross 11 times in the 12 hours it takes the hour hand to make 1 full revolution. Because both hands move at constant speeds, the eleven points at which they cross are evenly spaced- so the next time that they cross will be after $\frac{60}{11}$ minutes. So the exact time that they will cross is $5\frac{5}{11}$ past 1

1. **Mancala**

Mancala is an old game for two players that requires a lot of logical thinking. The rules are quite simple- Each player has a row of 6 pits, and one large pit called the "mancala". The game starts with 4 stones in each of the small pits. On a player's turn, he/she picks up all the stones in any one of the small pits and moving counter-clockwise, put's 1 into each of the pits, including their own mancala and the opponents pits, but **does not** put any in the opponents mancala. There are two special rules- on any move:

- If the last stone falls in your mancala, you get another go
- If the last stone falls in an empty pit on your side of the board, **and** there are stones in the pit opposite to it (on your opponents side), then all the stones in both pits are moved to your mancala.

The game finishes when either player can't move- i.e. has no stones in any of their pits. At this time all the stones (if any) left in your pits are moved to your mancala, and whichever player has the most stones in their mancala wins.

2. **KenKen**

KenKen is a latin square puzzle invented by the Japanese maths teacher Tetsuya Miyamoto in 2004, to help his students learn mental arithmetic. The puzzle works similar to sodoku. You must fill in all the boxes with the numbers 1 to 5 such that each number appears in each row and column exactly once. Kenken grids are also divided by heavy lines into groups of cells, called cages. In each cage there is a number and an operation. The numbers in the cell must produce this target number, under the operation.

Solution:

There are thousands of kenken puzzles, ranging from 3×3 to 9×9 at `www.kenken.com`

Take Home Problem

Mancala Finishing Moves The following represents a position in mancala- each of the boxes is one of pits, with the number in them being the number of stones in that pit, and the last box being the mancala.

0	0	0	0	2	1	

This a "finishing position" in Mancala, meaning that you can finish the game from this position. You do this by moving from the first position, then the second position, then the first position. Each time, you get an extra go, because your last stone falls in the mancala:

0	0	0	0	2	1	
0	0	0	0	2	0	1
0	0	0	0	0	1	2
0	0	0	0	0	0	3

Can you find a "finishing position" that has stones in every pit?
Hint: start by finding one with stones in the first 3 positions, then the first 4, etc.