HINT Assignment 1 #2

Try to factor the numbers:

$$1 \equiv 31 \equiv 61 \equiv 91 \equiv 121 \equiv \cdots \pmod{30}$$

OR

In the following list search for a number congruent to 1 in mod 30:

$$\begin{array}{c} 1 \cdot 13 \\ 2 \cdot 13 \\ 3 \cdot 13 \\ 4 \cdot 13 \\ 5 \cdot 13 \\ 6 \cdot 13 \\ \vdots \end{array}$$

HINT Assignment 1 #8

Hint: Pick any number from the list and call it:

$$111 \cdots 11$$

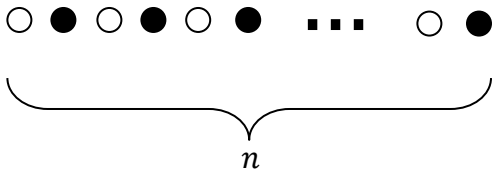
Now note that:

$$111 \cdots 11 \equiv 111 \cdots 100 + 11 \equiv 0 + 3 \equiv 3 \pmod{4}$$

But for any integer x what are the possible values of x^2 in mod 4?

HINT Assignment 1 #10

Checker the coins white and black so that white coins are adjacent to only black coins (and vice versa):



HINT Assignment 1 #5 and the Bonus Question

When solving question 5 and the bonus question:

-Let R represent the scale tipping to the right.
-Let L represent the scale tipping to the left.
-Let B represent when the scale is balanced.

For the bonus question:

-Let G be the coin that is always perfect.
-Let H be the coin that cannot be too light.

Now, for solving question 5 and the bonus question use the following assignments for the different ways the scale can react:

LLL or RRR $\Rightarrow$ coin 1 is counterfeit
LLR or RRL $\Rightarrow$ coin 2 is counterfeit
RLL or LRR $\Rightarrow$ coin 3 is counterfeit
LRL or RLR $\Rightarrow$ coin 4 is counterfeit
BRR or BLL $\Rightarrow$ coin 5 is counterfeit
RBR or LBL $\Rightarrow$ coin 6 is counterfeit
RRB or LLB $\Rightarrow$ coin 7 is counterfeit
BRL or BLR $\Rightarrow$ coin 8 is counterfeit
LBR or RBL $\Rightarrow$ coin 9 is counterfeit
RLB or LRB $\Rightarrow$ coin 10 is counterfeit
BBL or BBR $\Rightarrow$ coin 11 is counterfeit
BLB or BRB $\Rightarrow$ coin 12 is counterfeit
LBB or RBB $\Rightarrow$ coin 13 is counterfeit
BBB $\Rightarrow$ coin H is counterfeit

(Note: in problem 5 you do not have to call the coins :1,2,3,4,5,6,7,8,9,10)