1. Put 6 X’s on a tic-tac-toe grid without 3 X’s in any direction, including the diagonals.



Answer(s): 





2. If you list the first 20 numbers of the fibonacci sequence starting with two ones, then multiply the numbers, what is the hundreds digit of the resulting product? (0)

3. How many rotationally distinct ways are there to color the 6 sides of a regular hexagon either black or white? (14)

4. Suppose two people are playing a game. The game consists of an *n* number of sticks divided into 3 piles. Each turn, a player can take any number of sticks from a single pile. The players alternate turns, and the player who takes the last stick wins. If the size of heap A, B, and C consist of 3, 4, and 5 sticks respectively, then does the first player or the second player win or is it indeterminate? Prove your answer.

One solution:

Player 1 wins: take two sticks from smallest pile:

Win conditions: Be the second player with 2 equal piles

Casework!

Case 1: Player 2 takes all of any pile, always possible for Player 1 to reduce to win condition.

Case 2: Player 2 takes all but one of the two large piles, Player 1 reduces to win condition by taking all of the other pile.

Case 3: Player 2 takes part of either of the large piles (3,2 from the pile with 5 or 2,1 from the pile with 4)

It is always possible for Player 1 to reduce piles to (3, 2, 1) in any order (it is now Player 2’s turn).

Then, no matter what Player 2 plays, Player 1 can reduce to win condition.

There is probably more than one solution.

5. Sudoku with a twist! (Ken-Ken) Your goal is to fill in the whole grid with numbers, making sure no number is repeated in any row or column. In this particular grid down below, use the numbers 1 - 5. The outlined areas are called “cages”. This puzzle has 10 cages. The top left corner of each cage has a “target number” and math operation (plus, minus, multiply, and divide). The numbers you enter into a cage must combine in any order to produce the target number using only the math operation at the top left. There cannot be more than one of each number in a cage. Make sure to fill in the “freebies” first! (The cages with only one number) (There could be more than 1 answer!)



