

Leap Frog

May 30, 2014

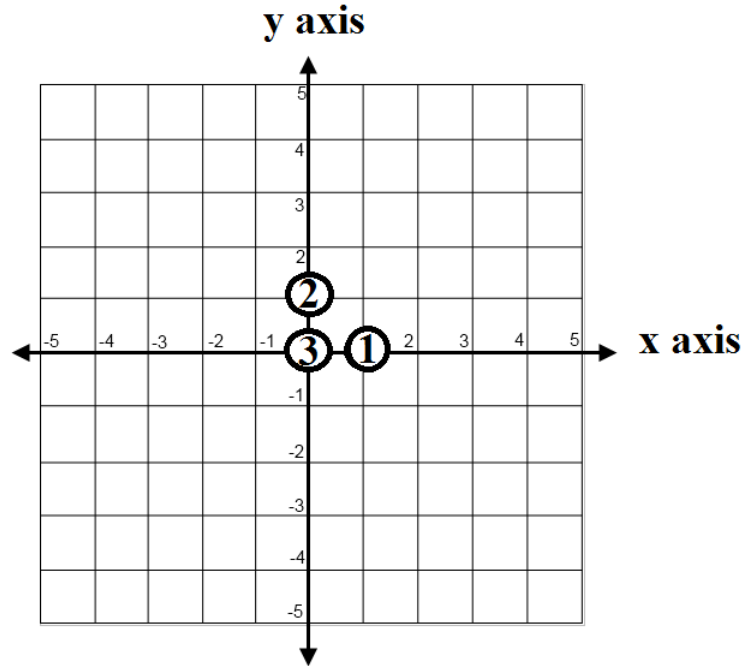
Leap frog is a game that is played between three players on a grid.

Start: Pick a square on the grid. Each player puts his counter on a different corner of this square. On the one corner that remains free, draw an X.

How to Move your “Frog”: On every move, a player must “leap frog” over any other player, by taking his frog and *reflecting* it over his opponent’s counter. In other words, if it is Player 1’s turn, he must move his frog so that some other player’s frog sits in the middle between Player 1’s old and new positions.

Goal of the Game: Be the first player to reach the X drawn on the grid in the beginning of the game.

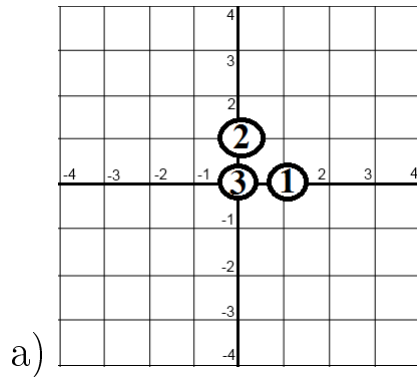
Below is how one Leap Frog game was started:



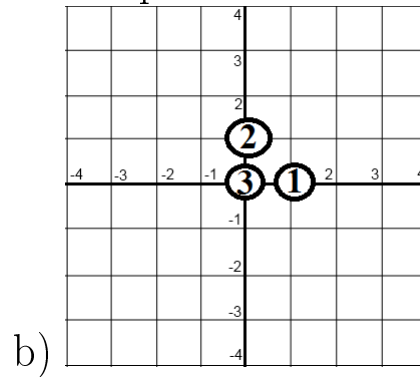
1. Fill in the position of the three players at the start of the game:

Player	X Coordinate	Y Coordinate	Position
1. ①	1	0	(1,0)
2. ②			
3. ③			

2. Draw in all the spots that Player 1 can move to. Then write down what those positions are.

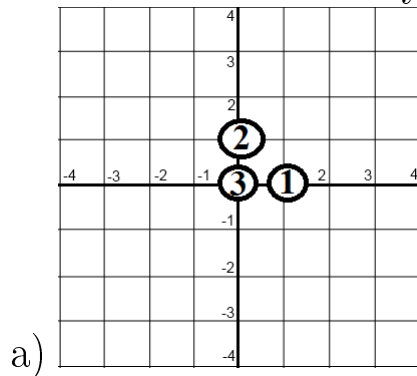


①	Position
Old	(1,0)
New	

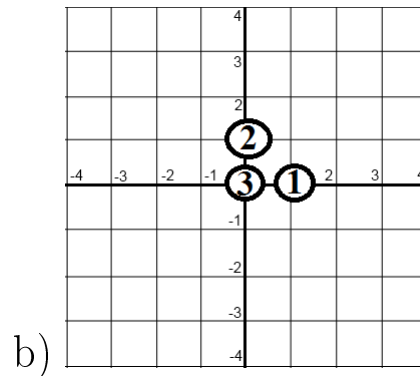


①	Position
Old	
New	

3. Do the same for Player 2.

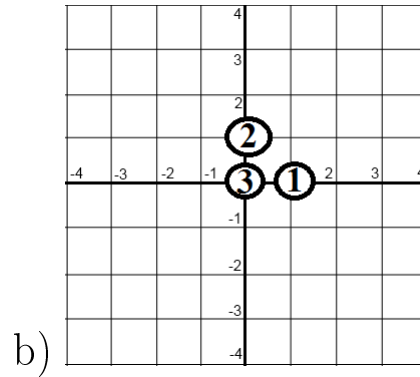
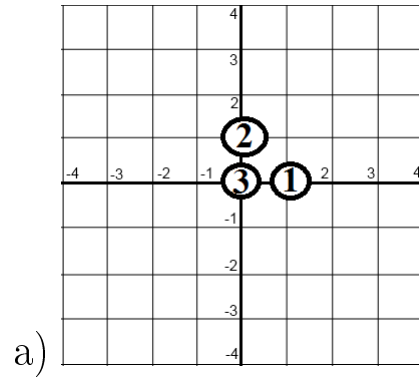


②	Position
Old	(0,1)
New	



②	Position
Old	
New	

4. Do the same for Player 3.



③	Position
Old	(0,0)
New	

③	Position
Old	
New	

5. What do you notice about the x coordinates of both the old and new positions for Player 3?

6. What do you notice about the y coordinates of both the old and new positions for Player 3?

7. Play Leapfrog with two classmates at your table. Use the table below to record where each player lands on every turn.

	Player 1	Player 2	Player 3
START	(1,0)	(0,1)	(0,0)
Turn 1			
Turn 2			
Turn 3			
Turn 4			
Turn 5			
Turn 6			
Turn 7			
Turn 8			

8a. What do you notice about the x coordinates of all of Player 1's moves?

8b. What do you notice about the y coordinates of all of Player 1's moves?

8c. Is it possible for Player 1 to land on the position (1,1)? Why or why not?

9a. What do you notice about the x coordinates of all of Player 2's moves?

9b. What do you notice about the y coordinates of all of Player 2's moves?

9c. Is it possible for Player 2 to land on the position (1,1)? Why or why not?

10a. What do you notice about the x coordinates of all of Player 3's moves?

10b. What do you notice about the y coordinates of all of Player 3's moves?

10c. Is it possible for Player 3 to land on the position (1,1)? Why or why not?

10d. Is it possible for any of the three players to win the game? Why or why not?