Lesson 11 November 17, 2009 BMC Elementary

Overview.

1. Today we attacked a difficult topic: the least common multiplier of several numbers in the problem about Lucy and apples (see below). It can be very confusing and unclear, how to approach these problems (especially, because not all of us are very good in multiplication yet ☺), so we took our time and went step-by-step in each case. Probably, this was one of those days when I did a better job at 7 pm group, since I already knew the most difficult places from my experience at 6 pm group.
The discussion went as follows.

a) We started with 3 guests. We observed that she must buy a number of apples that is divisible by 3, and found that among those 6 isthe first one that is good for 2 guests, i.e. is divisible by 2. We agreed that for one guest any number would work.

b) With 4 guests we wrote the first few numbers that are divisible by 4, (numbers (4, 8, 12, 16, 20, …) and marked those that are good for 3 guest (12) and for two guests (all of them). So 12 is the answer.

c) With 5 guests this does not work well: we wrote the first few numbers that are good for 5 guests (5,10,15,20,25,30…), but that sequence was not long enough to find the one that is divisible both by 4 and 3.
Somehow kids guessed that the number should be 60, but nobody could really explain to me, how they did it.
I tried to suggest them a different way to find a number (may be, not the smallest one) that is divisible by 5,4,3,2 and 1. Namely, to *build* such number. For example, if I want something divisible by 5 and 4, I multiply those two numbers, and I get what I want. I can not say that my suggestions were greeted with deep understanding, but it seems that they were satisfied that my way also gives 60 (of course, I did not multiply 5X4X3 by 2 and I even made an attempt to explain, why).

d) We also discussed 6 people, since I wanted to draw our attention to the fact that the answer is the same as for 5 guests (so the pattern is not as simple as one could expect), and to show again how to build common multipliers by multiplying out numbers.

e) We briefly worked out the problem about friends and agreed that it is very similar to Lucy's problem.

2. The "Treasure Island" was our next step towards the method of coordinates. As it was expected, we did not have any troubles with that task and all of us solved the problem.

3. Our next problem was about frogs. Everyone got 3 green marbles and 3 blue marbles as models for frogs. I like this problem, because it always brings satisfaction to kids: there is no way to fail, sooner or later you will interchange the frogs. After several people solved the problem, we called out six kids to the blackboard to play the frogs and one more to guide them. It was fun, I hope, that for those who did not get a chance to be at the board it was fun too.

I tried to explain to some kids who finished the frogs problem earlier the problem about the rabbits and the foxes, and they worked on it for a while. This problem is harder. Some kids claimed that they solved it, but I doubt that it was right and we did not have chance to check their solutions. You can find one of possible solutions in Wikipedia:
http://en.wikipedia.org/wiki/Missionaries_and_cannibals_problem

Problem 1.

Lucy invited some guests today, but she is not sure that all of them can come. She went to buy some apples for her guests and she wants to be sure that all the apples can be divided among the guests equally, no matter how many of her friends will show up. Apples can not be cut. What is the smallest number of apples that Lucy can buy, if she expects

a) at most 3 guests?

b) at most 4 guests?

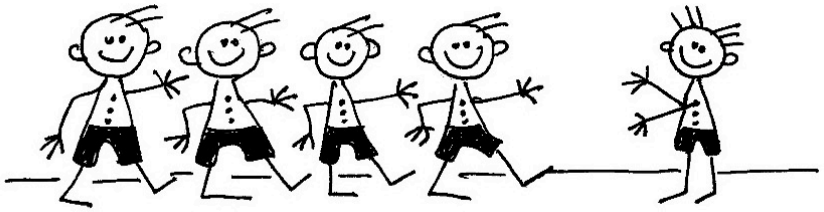
c) at most 5 guests?

d) at most 6 guests?

e) at most 7 guests?

Problem 2.

I have **four** friends.
One visits me **every** day,
another one visits me every **2nd** day,
the third one visits me every **3rd** day,
and the fourth visits me every **5th** day.
Yesterday all my friends came to me. In how many days all of them will meet again at my house?

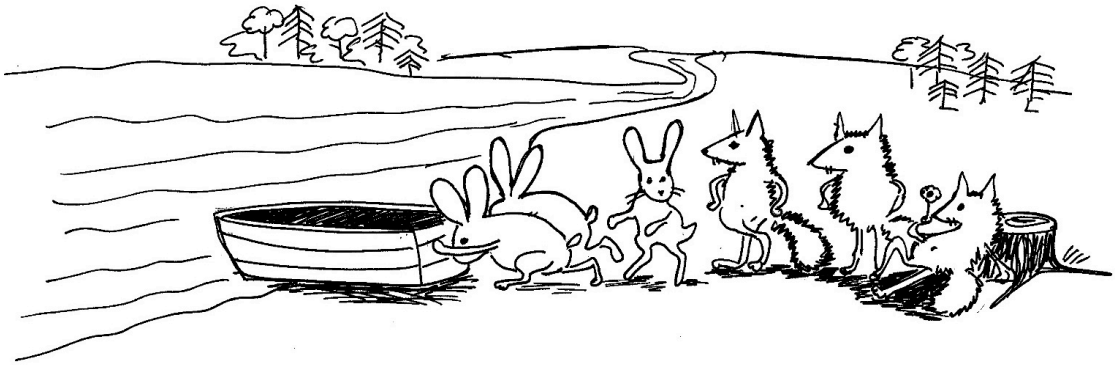


Answers:
1. a) 6 b)12 c) 60 d) 60 e) 420
2. 30

Rabbits and Foxes

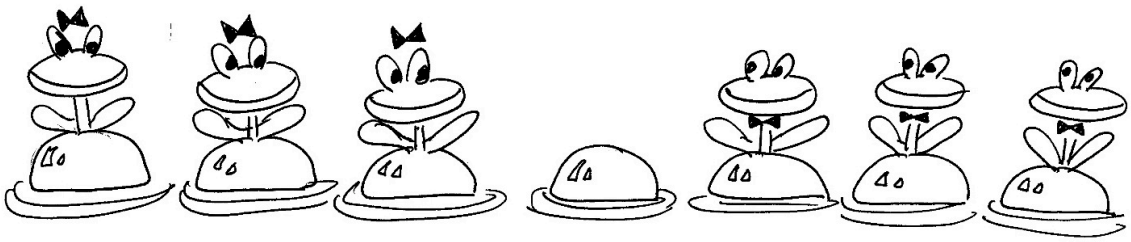
Three rabbits and three foxes must cross a river using a boat which can carry at most two animals. If there are rabbits present on any of the banks, they cannot be outnumbered by foxes (the foxes can eat the rabbits in this case)
Help the rabbits and the foxes to cross the river.

Remark: this is "the missionaries and cannibals problem"



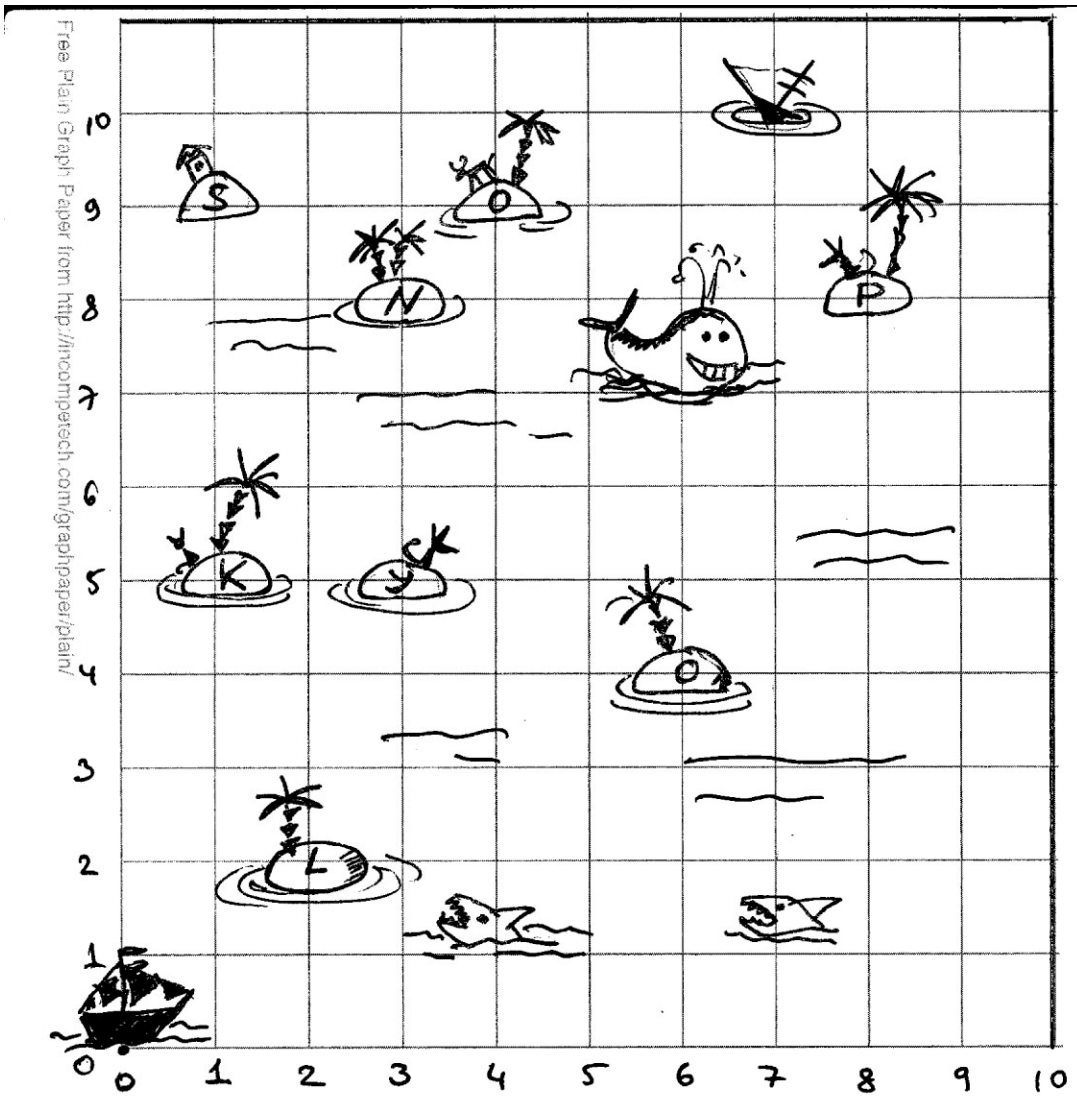
Family

Parents with two children - a son and a daughter - came to a wide river. The only way to get to the other side was to ask a fisherman if he could lend them his boat. However, the boat could carry only one adult or two children. How does the family get to the other side and return the boat to the fisherman?



Frogs

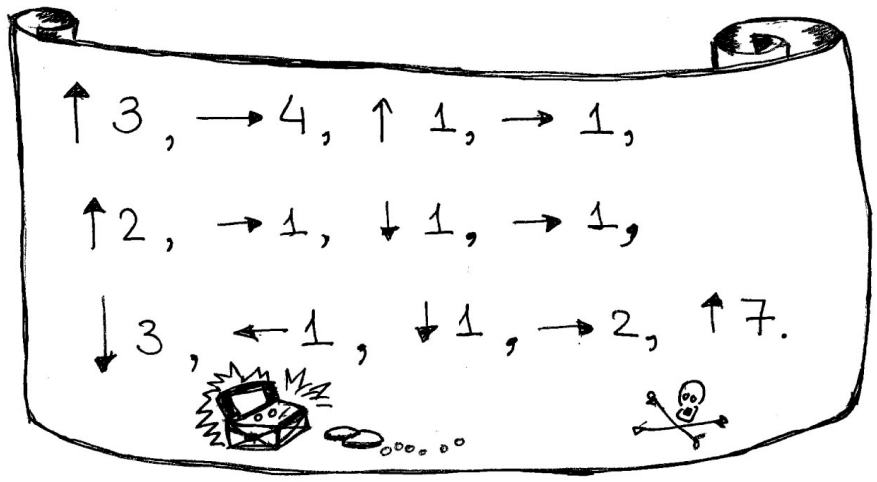
Three frogs on the left of the picture have to jump on the 3 stones on the right of the picture and vice versa. Each frog can jump just on the adjacent stone or jump over another frog if there is an empty stone behind it. How can they do this ?



TREASURE ISLAND

1. One of the islands hides the treasures left by the pirates many years ago. To find the island we

have to use the code, starting from the point (0,0).



2. We found the island, but the treasures are guarded by a big angry dog. The dog will listen to us only if we call him by his name. We can find out the name if we write the letters of the islands with the following coordinates:

(1, 9) (3,8) (6,4) (4,9) (8,8) (3,5).

3. We need to write in the journal about our adventures and to describe the location of the island.

What are coordinates of the treasure island?

What are the coordinates of the island with the hut?

What are the coordinates of the wrecked ship?

Clipart: clipartguide.com

Answers

1. Island P
2. Snoopy
3. (8,8), (1,9), (7,10)