

## CHAPTER V

### Ruritanian Dances.

Although Bruce and Alice often wondered when their parents would come and fetch them, they were really beginning to have such a good time that they both thought that they would be very sorry to leave. They always had a good time at school now, and whenever it was not a school day, Mrs. Koto would take them to do something interesting. At one point there was a week's break from school and the Kotos thought they could take the children on a tour of TWOLAND and FOURLAND as well as EIGHTLAND, which was on one of the neighboring islands. EIGHTLAND and NINELAND were the nearest islands, the boat took about an hour to make the crossing.

"What are we going to do today?", said Alice to Mrs. Koto.

"I think we shall go over to TWOLAND. There is a public holiday today in TWOLAND and there will be some music and dancing. We shall show you how the Twolandians enjoy themselves! In TWOLAND they are allowed to dance the FOURLAND dances, so we don't have to cross the mountains to see those! I am sure we shall all have a good time!"

"That'll be lovely!", said Alice.

Bruce was not quite sure about these plans because, being a boy, he was not as keen on dancing as Alice. Soon Alice, Alo, Ata and Unta as well as their friend Karo got themselves ready to go, so Bruce thought he might as well fall in with the others. Perhaps in Ruritania boys and girls were not so different from each other, they did seem to like similar things, not like in the children's own country. So when they were all ready, Mrs. Koto tried to squeeze them into two cars, making sure they were sitting according to TWOLAND rules!

It was not very far to TWOVILLE. It was the largest town in TWOLAND, although when they reached the centre Bruce and Alice did not think it was very large. It only had two main streets, one was called Zero Street and the other, at right angles to it, was called One Street. At the intersection of the two main streets there were one zero zero corners; there was an important building on each corner. One was the local Post Office, but you could only send letters to places within Ruritania. On another corner there was a big store, on the next corner round there was a church, and on the fourth corner there was a Dance Hall. They went into the Dance Hall and bought tickets. There were red tickets and green tickets; Mr. Koto and the boys got green tickets, while Mrs. Koto and the girls got red tickets. They learned later that the tickets were for playing some game.

"I wonder if we shall know how to dance the dances?", said Alice to Alo.

"You'll learn them very quickly", replied Alo, "I can teach them to you, they are quite easy. In any case there is a special tune for each step and once you learn which step goes with which tune, all you have to do is listen to the music and you will know what to do!"

"That sounds quite easy", agreed Alice, but Bruce still was not sure about this dancing. He was certainly not used to it. In their school at home only the girls did country dancing, while the boys did carpentry. He had noticed at the THREELAND school that the girls came to the workshop too and some seemed to be very good at carpentry, so he supposed that the boys could do some of the things that he thought only girls normally did! In fact Alo had tried to reassure him, saying that he himself was pretty good at the TWOLAND dances, so Bruce thought he would just go along with everybody else.

At the entrance to the Dance Hall there were some rules written up in two languages, in Ruritanian and in English. Bruce read the rules with interest.

"Look over there, Alice", said Bruce, "there are some curious rules written up there, have you read them?"

"No, I haven't", replied Alice, "in what way are they curious?"

"Well, look at the first rule!" said Bruce "It says you must dance all the time the band is playing! You are not allowed to sit out!"

"Oh!", said Alice "that's fine, I like dancing!"

"But what do you do when you are tired?" asked Bruce.

"I suppose you go home!", suggested Alice.

"And look at that other rule ", said Bruce "it says children are only allowed to dance with other children, and adults only with adults!"

"That suits me", said Alice "you wouldn't want to dance with the old people, would you?"

"I suppose not", said Bruce uncertainly, "I don't know if I want to dance at all! But I suppose if I am going to dance, I might as well dance with some other children. I suppose it isn't such a bad rule. But look at the next one!"

"What is it?", inquired Alice.

"Read it yourself", said Bruce, "it is written in English as well!"

"I see", said Alice, "everything is written in Ruritanian as well as in English, that's handy, isn't it?"

Alice read the next rule. It said that no person was allowed to dance with a member of the same sex.

"Well, well, well", said Alice "that means I must dance with the boys!"

"Why not?", said Bruce "I must dance with the girls then, according to that rule"

"I suppose one idea of dancing is to get all mixed up and not be shy!", added Alice.

"I suppose you are right", said Bruce "I wouldn't know"

"Look, there is another rule!", said Alice to Bruce "It says that if you cannot find a dancing partner with whom you are allowed to dance, then you must go to the refreshment room and wait until someone turns up that you can dance with"

"That's not a bad rule", said Bruce "If I can't find a girl to dance with, I'll just go and drink one of those gorgeous juices and wait until someone comes with whom I am allowed to dance. You'll have to wait for a boy, and I'll have to wait for a girl. But if we are both there, then wouldn't we have to dance with each other?"

"Yes, of course", replied Alice, "and for all you know, if we didn't, we'd finish up in prison learning to dance!"

"Karo", said Bruce to his friend "How strict are the rules?"

"They are very strictly observed", said Karo "All the rules in Ruritania must be obeyed. They are very strict about them. If you don't obey them, you go to prison!"

"I thought that might be the case", said Bruce "so we'd better remember all the rules!"

"Have you read them?", asked Karo.

"Yes, Alice and I have just been studying them, and we were just wondering how we could remember them all!" replied Bruce.

"It's easy", said Karo, "All you have to remember is that you dance with people of your own age but of different sex, and that you MUST dance if there is someone there with whom you are allowed to dance. If there isn't, then you go to the refreshment room - through that door over there - and wait. It's really quite simple, isn't it?"

"Yes", said Bruce "but the rules don't tell us how to do the dances!"

"That's simple enough", replied Karo, "Alo has already explained to Alice that there are special tunes for each kind of step and a tune to introduce each dance. It's really easy!"

So Bruce, Alice, Karo, Alo, Ata, Unta and Mr. and Mrs. Koto and a lot of other children whom they already knew, tramped into the refreshment room. Before going into the dance hall where people were dancing, you had to go through the refreshment room, in case there were people waiting for dancing partners there.

In fact there were some boys in the refreshment room, sipping fruit juice, who must have been waiting for some girls to turn up. This was a pity, since there were the same number of girls as boys and the same number of men as women in their party, so nobody was without a partner. Mr. Koto went to dance with Mrs. Koto, Alice went in with Alo, Karo took Unta, and Bruce took Ata. So they made three children's couples and one adult couple, which was as the rules prescribed! As they were coming in, the next dance was being announced:

"Take your partners for a FOURLAND Crossover, please! The band will start playing the tunes in a few minutes!"

This dance had to be danced by four people. So Alice, Alo, Bruce and Ata made up the first four, Karo and Unta found another boy and girl to make up the four and Mr. and Mrs. Koto found Mr. and Mrs. Hecla for their foursome.

"What's a FOURLAND Crossover?", said Alice to Alo.

"That's a very easy one", replied Alo, "There are only four different steps, like in all the FOURLAND dances. They are called

ROUND, CROSS, ALONG FIRST and ALONG SECOND

Can you see those squares on the floor with pictures painted on them? There is a red flower on one, a yellow flower on another, then going round there is a yellow tree and then a red tree. Can you see that the yellow flower and the red tree are on opposite corners, and the red flower and the yellow tree are on the other opposite corners?"

"Yes, we can see them", said Bruce and Alice together.

"The ROUND is simple. We all hold hands and make one complete turn. The CROSS, on the other hand is done by people standing on opposite corners changing places. Some dancers like to do this by doing a half turn, also holding each other by the hand. The ALONG FIRST is a color change. If you are standing at a red flower, you must go to a yellow flower. If you are standing on a red tree, you must go to a yellow tree, and so on. And finally for an ALONG SECOND, you have to go to a picture of the same color, but from a tree you go to a flower and from a flower you go to a tree."

"Now you know all the steps", said Alo "all you have to know is how to follow the music. Each step has its music, but the steps are also announced on the loudspeaker, so you can't really make a mistake. So we do five or six steps, dancing to the music. When it stops, we have to return to our original positions in one step, humming the music for that step!"

"That sounds terribly hard!" objected Alice.

"Not at all", said Alo soothingly "Suppose we do an ALONG FIRST, followed by a CROSS. How would you get back to START in one move?"

"Doing an ALONG SECOND?" ventured Alice.

"Absolutely correct", replied several of the children all at once "We can now join in the dancing! Don't forget to hold hands for the ROUND, and possibly also for the CROSS. if we are going to do it by dancing just half way round, instead of crossing over", added Ata.

The music started and Bruce and Alice got to know very quickly how to do this dance. They soon learned which tune meant which step, and they were dancing with complete abandon, as though they were themselves Twolandans or Fourlanders!

They began to wonder if there would be any TWOLAND dances, when there was announcement that there would be an interval of

one zero zero zero minutes.

Bruce and Alice knew that this meant eight minutes, but they were not sure how long a TWOLAND minute was. Anyway, everyone tramped into the refreshment room and had more fruit juices as they were all hot and tired after all the exercise.

"Are we going to have any TWOLAND dances?", said Alice to Mrs. Koto.

"Oh, I expect so", replied Mrs. Koto," but these are not that popular in TWOLAND, as each dance only has two different steps in it, most people prefer the FOURLAND dances as they are more varied, with four different steps in each dance. Sometimes they even do EIGHTLAND dances, which in TWOLAND are called

one-zero-zero-zero-land dances

but they do use the English word eight, or the Ruritanian word okta, as one-zero-zero-zero is a bit of a mouthful!"

"I think an EIGHTLAND dance might be too complicated", said Alice to Mrs. Koto, "but do tell us about the TWOLAND dances now!"

"That's easy", said Mrs. Koto, "All you have to do is to choose two steps out of the FOURLAND Crossover, as long as one of them is the ROUND, and you have a TWOLAND dance!"

"How does that make a TWOLAND dance?", asked Alice.

"Well, you see", Mrs. Koto explained, "If for example you have a ROUND step and a CROSS step in a dance, however many of such steps you do one after the other, you can always get back to START in one step, either with a ROUND or with a CROSS. For example after two CROSS steps one after then other, the way to get back to where you were is by doing a ROUND. Actually, you are already where you were after two CROSS steps, but for the return to START you always have to do something, so you do a ROUND."

"I see", said Bruce, "So a ROUND, with any other step, would make a TWOLAND dance!"

"Not quite", objected Karo "You are forgetting the steps in the CLOCK dance! In that you have a ROUND, a CROSS, and a CLOCKWISE and a COUNTERCLOCKWISE. The CLOCKWISE will take each dancer to the next space in the clockwise sense, whereas the COUNTERCLOCKWISE will take each dancer to the next space in the counterclockwise sense. So if you tried to make up a dance out of the steps

ROUND and CLOCKWISE

then for example after two steps CLOCKWISE, you would need a CROSS to get back to START, but CROSS is not one of the two steps!"

"You are right, of course", replied Bruce, "the second step in the TWOLAND dance which is not the ROUND has to get you back to your starting position when you've done it twice! I can see all this, but I have wondered why there are two kinds of FOURLAND dance and only one kind of TWOLAND dance!"

"There is more than one TWOLAND dance!" objected Alice "You can add any of the three other steps of the FOURLAND Crossover to ROUND, and you get a different dance each time!"

"This is how I see it", Bruce tried to explain to Alice, "It doesn't make any difference whether in a TWOLAND dance the step besides the ROUND is a CROSS or an ALONG or anything else, as long as this second step is the kind which when you've done it twice, it gets you back to where you were. This is the only way you can have two steps in a dance so that the dancers get back to START always in one single step. At least, this is how I think of it."

"What are THREEELAND dances like?", asked Alice, just to change the subject, as she did not feel like arguing with Bruce any more.

"They're not really very different", said Mrs. Koto "there are always three different steps in each dance, but again the steps must be so made up that it is always possible to get back to START in one step"

"Could we learn some THREEELAND dances?", asked Alice.

"Sure thing", said Mrs. Koto, "but you'll have to wait till we get home. They are strictly forbidden here!"

"Naturally", said Bruce and Alice together, "but they are not forbidden in your house, are they? I suppose the TWOLAND and the FOURLAND dances must be forbidden in THREEELAND."

"Yes, of course." agreed Mrs. Koto.

At this point, the loudspeaker announced a TWOLAND ROUND and CROSS. Bruce and Alice danced this one quite easily, Bruce even thought it was too easy, as there was not much to think about, it was so simple. In the next interval Bruce became rather dreamy thinking about all the dances with their rules, and did not notice that another dance had been announced. Everyone had taken partners so Bruce was left in the refreshment room with Mrs. Koto and two other women. He could not dance with any of the women, as that would have been against the rules, so he ordered a juice and sat down, hoping a girl would soon come in so he could go dancing again! He was really getting into it now!

Before he had time to finish his juice, some more people came into the refreshment room from the outside. He remembered that if a girl came in, he would have to ask her to dance, otherwise he would be breaking the rules and would be sent to prison! Sure enough a pleasant looking girl about his own age came in. So Bruce stood up politely, went up to the girl and asked her if she would like to dance. Of course, she agreed, as she had to by the rules! Apart from this girl, two men and one woman came in to the refreshment room, one of the men took the woman who came in to dance and the other asked Mrs. Koto. I wonder if you can work out who was left sipping juices without a partner?

Bruce soon found that his new partner, apart from being a very pleasant looking girl, was also a very good dancer, so he quickly learned to dance the ROUND and CROSS, which was a popular TWOLAND dance. They also danced the ROUND and ALONG, which had the ALONG FIRST as the additional step to ROUND. After a few more FOURLAND Crossovers and FOURLAND Clocks (the one with the CLOCKWISE and the COUNTERCLOCKWISE steps in it!) the Kotos and the children decided that they were quite tired enough to think about calling it a day.

When they had given their tickets up at the counter, Bruce asked what the tickets were for.

"There were no games for the red and green tickets today", Mrs. Koto explained, "You play those games in the refreshment room, they are rather fun to play, while you are waiting for a partner. You will probably play these games during one of your mathematics lessons at school, they form part of the school curriculum!"

"I wonder if these were the interesting things we were going to do, when we had got used to THREEELAND?", wondered Bruce.

"I think you are right", said Ata, "we were just going to go on to the red and green cards on the day you arrived, but then we decided to wait until you both caught up a bit, so you would not be left out, when we played the new games."

"I suppose it isn't much fun playing a game with someone who doesn't know the rules", agreed Alice "Do you learn a lot of games in the Ruritanian schools?"

"Yes we do", replied Ata "they are fun to play, but you learn some mathematics every time you learn a new game. In fact most of the mathematics I know, I learned through playing games, or playing tennis or dancing!"

Bruce and Alice thought it was a very good idea to teach people things that are lots of fun as well as useful in getting to know more things. They made a mental note of this, and wondered if something could be done about it when they got home to their own country. They were not too hopeful about this, as the schools where they lived were usually very dull places, with boring lessons. But perhaps when they were back home, people might ask them about their adventures they had had in Ruritania, and their teacher might even think it would be good to do some of the Ruritanian activities, as they were such fun, and you did learn a lot doing them!

On the way back to THREEELAND Bruce and Alice asked if there would be time to go to THREEVILLE and do more dancing before the end of the day. Even Bruce was getting quite keen on the dancing, especially since he had seen how all the other boys had enjoyed it too. It was good exercise, and you had to think about it too, unless you were gazing at your attractive dancing partner and forgot to think!

Mathematics seemed to come into almost everything in Ruritania, which meant that you had to think hard nearly all the time, but Bruce really enjoyed having to think and began to realize how little thinking he had done in his own school back home!

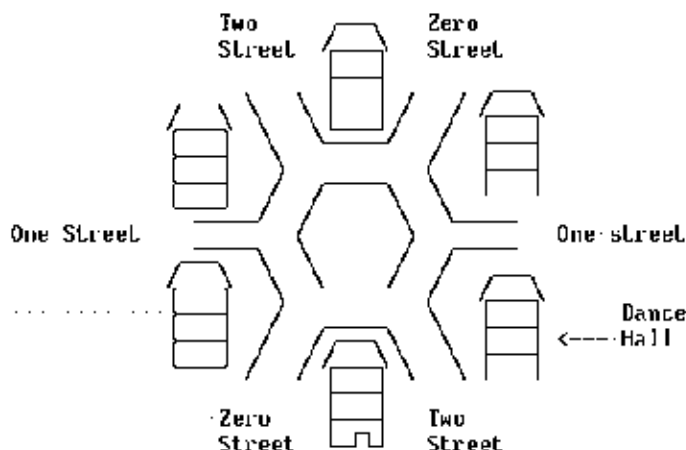
"I think we might run the children down to THREEVILLE", said Mrs. Koto to Mr. Koto "What do you think?"

"We could", replied Mr. Koto "perhaps we can have a bite to eat in the house and then if there is time we'll run them down. It's only two two zero decimas to THREEVILLE from our house, so it wouldn't take very long!"

So it was agreed. They passed across the border, saying hello to Mr. Koto's colleague who was standing in for him at the Customs House, had a bite to eat and something to drink and then set off to finish off their day at the dance hall in THREEVILLE.

It was indeed just over two two zero decimas to THREEVILLE. As Bruce and Alice had expected, there were one zero main streets in THREEVILLE, all intersecting in the centre of the town, where there was a hexagonal roundabout. The three main streets that crossed each other at the roundabout were called Zero Street, One Street and Two Street. There were some suburbs a little way away from the centre, they were called Zeroborough, One borough and Twoborough.

Each suburb was in two parts, one at each end of the street bearing its name. Round the central roundabout there were six buildings, laid out something like this:



Each building was painted on the outside red, yellow and blue, yet they were all painted differently. Bruce noticed that the doors and the windows were one color, the wall was another color and the roof was the third color. He made a mental note of the way the buildings were colored and decided to draw them or paint them as soon as he got home.

They went into the dance hall. Alice noticed that there were no green and red tickets. She kept quiet about this, in case such things might be against the law in THREELAND. Perhaps there was a THREELAND game with tickets, but the tickets were sure to be in three colors! Perhaps a two-color game was only allowed in TWOLAND. Bruce and Alice also noticed that there were no rules posted at the entrance, it was a more relaxed place, people seemed to be coming and going without any tickets and without paying! There was music, but it was coming out of loudspeakers, there was no band, and you could dance with anyone you wanted to. Bruce liked this much better, he could sit down whenever he wanted to, dance when he wanted to, with whom he wanted to. He wondered what the THREELAND dances would be like, but he guessed they would have three kinds of steps. He wondered whether all the music was in three time; when he listened a bit, he realized that the music sounded like a waltz, which is a one two three rhythm!

The children were rather disappointed in the THREELAND dances; they were not as interesting as FOURLAND dances. Mrs. Koto noticed that all the children were getting a little tired and bored, so she suggested heading for home.

"Good idea", said Bruce "THREELAND dancing is very easy, much easier than FOURLAND dancing, isn't it?"

"Yes it is", said Mrs. Koto, "I didn't think you'd be too keen on the THREELAND dances, once you'd done the FOURLAND ones. But wait till we take you to a dance in EIGHTLAND! They have five different dances there, with eight steps in each! But of course we are not allowed those here, we have to keep to our simple ones."

"Are you allowed any SIXLAND dances?", inquired Alice.

"There was a lot of discussion about that a few years ago", said Mrs. Koto, "Some people thought SIXLAND dances were all right, but others objected as six was TWO times THREE, and they thought a SIXLAND dance must be forbidden on account of any two's being forbidden. There was a vote on it, and the people against the sixes won. If you want to dance a SIXLAND Crossover or a SIXLAND Round, you just have to go to SIXLAND!"

"But isn't there a NINELAND Crossover and a NINELAND Round which would be legal?", asked Bruce.

"You want to know too much!", replied Mrs. Koto, who for some reason wanted to change the subject. "Let's get in the cars!"

They left the dance hall and made themselves comfortable in the two cars, using THREELAND rules for doing so. They drove home quite quickly, having dropped Karo at his house. After a quick supper they all went to bed and did not wake up till quite late the next morning, when Mrs. Koto was calling them for breakfast, reminding them that it was the day they had decided to go to Eightsome-on-Sea in EIGHTLAND!

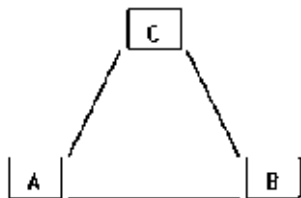
## THINGS TO DO AND THINGS TO THINK ABOUT.

(1) In a THREELAND dance, there are three steps:

(i) CLOCKWISE, (ii) COUNTERCLOCKWISE, and (iii) ROUND.

It is danced by three dancers, and it does not matter if they are boys or girls or whether they are children or adults! Those rules are only for TWOLAND and FOURLAND!

There are three spaces, marked by the letters A, B and C like this:



For CLOCKWISE A goes to C, C goes to B and B goes to A.

For COUNTERCLOCKWISE it is the other way round.

For ROUND, they all hold hands and dance round once.



Work out how you would get back to start after the dancers have done two steps. Fill in the table:

[ C means Clockwise, CC means Counterclockwise, R means Round ]

After R R	<input type="text"/>	After R C	<input type="text"/>	After R CC	<input type="text"/>
After C R	<input type="text"/>	After C C	<input type="text"/>	After C CC	<input type="text"/>
After CC R	<input type="text"/>	After CC C	<input type="text"/>	After CC CC	<input type="text"/>

(2) Now try to write down the rules for the TWOLAND dance. Write in the boxes the step for getting back to START.

After R R	<input type="text"/>	After R C	<input type="text"/>
After C R	<input type="text"/>	After C C	<input type="text"/>

[ R means ROUND and C means CROSS ]

(3) Try the following (in your head) with two light switches:

- (a) This switch turns the light on or off.
- (b) This switch doesn't work, it leaves the light as it is.

START can be either the light in the room being on or being off. Do five or six "operations" (an "operation" is using one of the switches, either a or b). Can you always get back to START by operating just one of the switches?

Do the switches (a) and (b) combine together in just the same way as the steps in a TWOLAND dance?

(4) Write in the boxes on the right, either even or odd, depending on whether you get an even number or an odd number, when you add a number to another, and all you know about each one is whether it is even or odd.

even + even =	<input type="text"/>	even + odd =	<input type="text"/>
odd + even =	<input type="text"/>	odd + odd =	<input type="text"/>

Are these rules like the rules of the TWOLAND dance?

If you know about positive and negative numbers, make a table like the above for multiplying positives by positives, positives by negatives, negatives by positives and negatives by negatives.

Do you get the same kind of table?

(5) What did the announcer mean when he announced an interval of one-zero-zero-zero-zero minutes?

In TWOLAND they divide the day and night into sixteen equal parts or into one-zero-zero-zero-zero parts in Twolandish. One such interval of time is called an AWA. Then they divide the AWA into sixty-four or one-zero-zero-zero-zero-zero-zero equal parts, and this shorter interval of time they call a minute.

So there are 1 0 0 0 0 0 0 0 0 0 minutes in a day and night, which we would call 1 0 2 4 .

Is the Twolandish minute longer or shorter than our minute? Just work out how many minutes there are in a day and night, and then you will know.

The interval lasted one eighth of an AWA. How many of our minutes would that have been?

(6) Try to work out whether a TWOLAND minute or a THREELAND minute is longer.

The Twolandiers divide their day and night into 16 parts and that again into 64 parts to get their minute. The Threelanders divide their day into 27 parts and divide each of these parts into 27 parts to get their minute. So the THREELAND minute is one twenty seventh of a THREELAND hour, but a TWOLAND minute is one sixty fourth of an AWA. Now you can work out which is longer.

(7) In THREELAND they say that in a year there are

1 1 1 1 1 2 days

except in leap years, when there are

1 1 1 1 2 0 days.

Try to work out how the THREELAND Ruritarians would have divided the year into months and weeks, so as to use the numbers 3, 9, and 27 (namely 1 0, 1 0 0 and 1 0 0 0 in their way!). You might have to put some public holidays in somewhere, which are not any part of the months and weeks, so as to make up the 365 days. This was done in the French Revolution, because they wanted every month to have thirty days!

Try to work out how they would have done it in FOURLAND. Would there have been sixteen months in the year?

They would say that in a year there are

1 1 3 1 days, or 1 1 3 2 days in a leap year.

(8) Get some paper and draw the six buildings in the centre of Threeville. Use the colors red, yellow and blue. The door and the windows should be one color, the wall another color and the roof the third color. All the six buildings should be colored differently!

Record the result of your work in a table something like this

Color	of wall	of roof	of door
First building			
Second building			
Third building			
Fourth building			
Fifth building			
Sixth building			

(9) Here is the game that Bruce and Alice learned to play with the red and green tickets.

Some of the tickets were big, some were small, some were red and some were green. These tickets, a whole lot of each kind, were spread out on the table in front of the players. There were two dice, one green one and one red one. One player would be appointed the "dice-thrower", who would also be the one to say whether the players were correct or not in their play.

Both the dice were thrown for the small tickets, and then they were both thrown for the large tickets. On each die, the numbers

0, 1, 2, 10, 11, 12

were written on the six faces (don't forget to read the numbers in Threelandish ways!).

After the second throw, all the players had to quickly collect a pile of small tickets (for the first throw) and a pile of large tickets (for the second throw). Then any pairs of

(small green and small red) or (large green and large red)

would have to be removed from the piles. The first player who was ready with his or her pile shouted READY, and the play stopped. If the player had played correctly, that player gained a point. If incorrectly, the player lost a point. To have played correctly meant that what was thrown by the dice-thrower had been correctly realized in the piles AND the necessary pairs had been removed.

For example    small throw        large throw

2 red, 10 green    12 red, 2 green

would have resulted in a final pile of

1 small green and 10 large red

as two small pairs as well as two large pairs would have been removed.

After Bruce had played this game at school, he realized that the rules of this game were really the same as the rules posted at the entrance of the TWOLAND dance hall where they had been! He was somewhat worried, since he thought such games should be illegal in THREELAND!

Can you work out why Bruce would have thought that the game with the tickets was really the same as the dance hall rules?