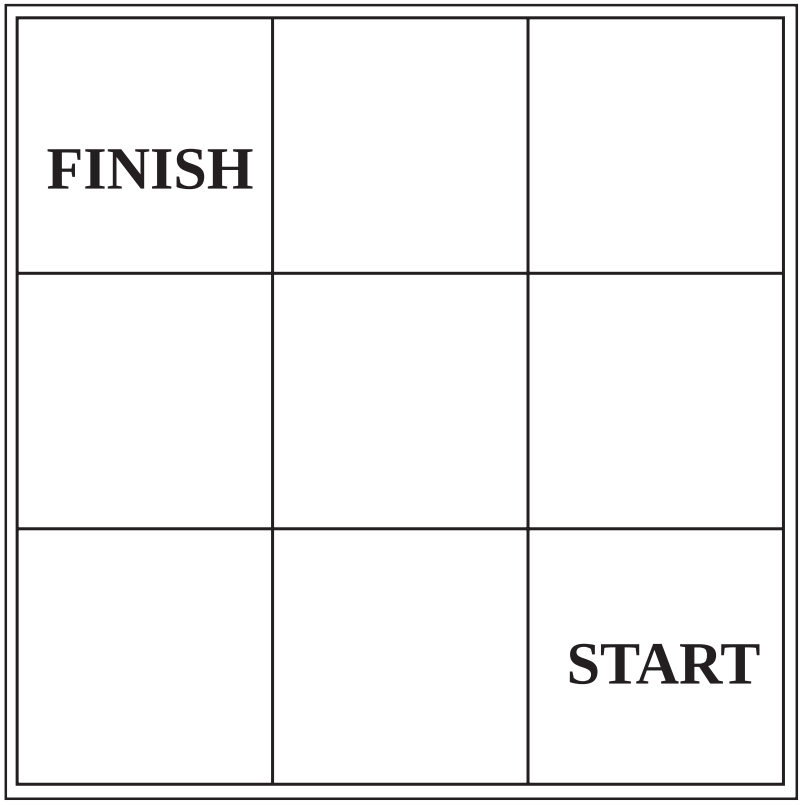
UNIT 6 *Probability* Activities

Activities

ACTIVITY 6.1 *Evens and Odds*

This is a simple game, where you throw a dice which controls the position of your counter on a 3×3 board.



Place your counter at the START square. Throw a dice.

If you get an EVEN number, you move your counter one square *upwards*.

If you get an ODD number, you move your counter one square *left*.

If your counter moves off any side of the board, you lose!

If your counter reaches the FINISH square, you have won.

Play the game a few times and see if you win.

1. How many 'odds' and how many 'evens' do you need to get to win?

2. What is the probability of winning?

Extensions

1. Play the game 20 or 30 times to find the experimental probability. Check your answers with that of question 2, above.

2. Analyse the same game on a 4×4, 5×5, . . ., board.

ACTIVITY 6.2 *A Russian Fable*

This is the method traditionally used in some Russian villages to see which of the girls in the village are to be married next year! You take three blades of grass, folded in two, and hold them in your hand so that the six ends are hanging down. A young girl ties the ends together in pairs. If, on release, a large loop is formed, the girl will be married next year.

1. What are the possible outcomes for this experiment in terms of small, medium and large loops?

2. By labelling the six ends (say *a* and A for the two ends of one blade of grass), consider all the possible outcomes and hence find the probability of getting the large loop.

3. Test your predicted probabilities by using short lengths of string and getting the class to work in pairs, recording their answers. Collect all the data together and use it to work out the experimental probabilities. Compare these to the theoretical values found in question 2.

4. If a Russian village has 30 young girls and they all go through this ritual, how many do you estimate will be predicted to marry next year?

Extension

What happens if either 4 or 5 blades of grass (string) are used? What is the probability of now obtaining one large loop?

ACTIVITY 6.3 *Birthdays*

First try this experiment. Find out the birthdays of as many of your family as possible. Do any of them have birthdays on the same date?

Now try the same experiment with all the members of your class. We will see how likely it is that two members of a group have the same birthday.

Consider each member of a group, one by one. The first person will have his/her birthday on a particular day.

1. What is the probability of the second person having a different birthday from the first?

2. What is the probability of the third person having a birthday different from both the first and second person?

3. What is the probability that at least two of the first three people have the same birthday?

This solves the problem of a group of three people. As expected, it is not likely that any 2 out of 3 people will have the same birthday.

4. Repeat the problem above for 4 people. What is the probability that at least 2 of them have the same birthday?

5. Using either a computer programme or a calculator, solve the problem for a group of n people, where $n = 10, 20, 30$, etc.

6. What is the probability that 2 members of your class have the same birthday?

Extension

How many people are needed in the group to be 95% sure that there will be at least two with the same birthday?