29 Possibility of an Event

By studying this chapter you will be able to acquire the competencies of,

- ★ explaining the possibility of occurring an event.
- ★ identifying types of experiments.
- ★ identifying biased objects and unbiased objects.
- ★ deciding the possibility of an event.

29.1 Nature of an event

Example 1

Look at the given figures. A few statements having some relation to them are given in the table on the next page. In the cage in front of the statement "happens" has been written if each of the events will definitely happen, " not happen" if it will never happen, and "cannot say" if the occurrence is uncertain.

Event	Result
• The fish swims in water. • Man can go to heaven by hanging in the tail of an elephant. • Throws the ball so that it will fall through the ring.	Happens Will not happen Cannot say

If you understand this well then you will be able to do activity 1 easily.

Activity 29.1

Copy the following table in your exercise book and complete it by applying suitable words as in the example.

Event	Happen/ will not hapen/ cannot say	Reason
(i) A triangle with three side.	Happens	All triangles have exactly three sides.
(ii) If $x = 4$ then $x + 3 = 7$.	.....	.....
(iii) If today is Monday yesterday was Wednesday.	.....	.....
(iv) When a coin is tossed twice, obtaining a "head" in both tosses.	.....	.....
(v) Taking a red bead from a bag having red beads.	.....	.....
(vi) The sum of two angle of a scalene triangle is 100^0.	.....	.....
(vii) ..... (viii) ..... (ix)	Will not happen Happens Cannot say	....

Activity 29.2

Read the following quotation of a newspaper report and answer the given questions.

"The earthquake in the sea bed near the island Sumatra, noted as 9.2 units, was the cause for the Tsunami tide that happened on 2004. 12. 26.

The tide of water which came into the land at a height of more than 10 m killed 30920 people in Sri Lanka alone."
Accordingly,

(1) Can a Tsunami happen again?
(2) Can the height of the Tsunami tide be 10 km?
(3) If safety measures are not put into practice can such a loss of lives happen again?

Events can be of three types as,

- definitely happening
- definitely not happening
- cannot be predicted

Exercise 29.1

(1) Copy the two tables and complete them with suitable examples.

Events definitely happening	Events definitely not happening
1. 2. 3. 4. 5.	1. 2. 3. 4. 5.

Events happening rarely	Events happening frequently
1. 2. 3. 4. 5.	1. 2. 3. 4. 5.

29.2 The Results of an Event and the Possibility of Happening

We come across events which happen definitely, which definitely do not happen and may happen rarely or frequently. We can apply a method to decide numerically, how much the possibility of any such event happening is. As an example, let us consider the tossing of a coin. This has two results and they are the "head" or the "tail". Out of the two, only one result can happen at a time. Accordingly, let us understand through the following activity what the results of an experiment are which help to decide the possibility happening of any event.

Activity 29.3

Fill in the blanks in the following table.

Experiment	Possible results	Total number of results
(i) Tossing a coin.	head, tail	2
(ii) Tossing a die with numbers written from 1 - 6.	.....	.....
(iii) Taking a card from the set of cards. A B C D E	.....	.....
(iv) Getting the number on the side touching the floor when a tetrahedron having 1, 2, 3, 4 written on the four faces is thrown up.	.....	.....
(v) Taking a ball from a bag having red, blue, yellow, green, and black balls of equal size and one from each colour.	.....	.....

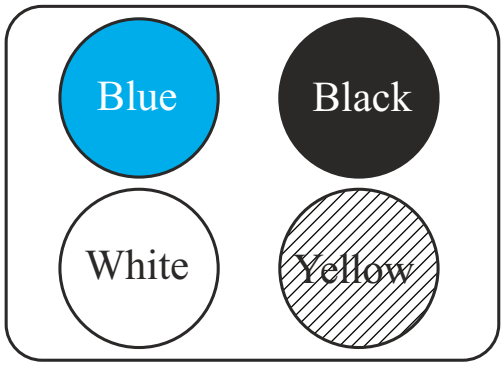
In the activity on page 157, it is possible to reach a decision about the outcome according to the object used in each experiment.

Exercise 29.2

(1) Copy the table given below and fill in the blanks.

Experiment	Possible results
(i) Sitting an examination.	Pass/ Unsuccessful
(ii) Throwing a die with the digit 3 written on all the faces.	.....
(iii) Throwing a die having numbers 1 - 6 written on the six faces.	.....
(iv) Taking a card randomly from a set of cards having an odd number less than 20 written on each card.	.....
(v) Taking part in a competition.	.....

(2)



A container having 4 beads, coloured blue, black, white and yellow of the same size is shown in the figure. Shani took out a bead from the container while closing her eyes.

(i) What are the results she can get according to the colour of the beads?

(ii) What is the number of possible results she can get?

29.3 Experiments

1. Tossing an unbiased coin.
2. Throwing up an unbiased die.
3. Taking a bead from a bag of beads of equal size and weight but of different colours.
4. Throwing up cowries ("cawadi") as a game.

Given above are a few experiments. These experiments are two kinds as, experiments in which there is an equal possibility of getting the results and there is no equal possibility of getting the results.

For the experiments in which the possibility of each result is the same, the objects used are fair or unbiassed. For the experiments in which the possibility of getting the results is not the same, the objects used are biased .

Since in experiment 1 above a fair coin is used, the object used is unbiased and hence all the results have an equal possibility of happening.

In experiment (2) since a fair die is used, that is also unbiased and the results of it also have an equal possibility of happening.

In experiment (3) too, since the bag has beads of equal size and weight, it is unbiased. Hence the results in that also have an of equal possibility of happening.

In experiment (4) the cowries used are not of the same size or weight and hence the objects used are biased and the results do not have an equal possibility of happening .

Exercise 29.3

(1) Write five experiments using unbiased objects and five others using biased objects and write reasons for defining them so.

29.4 Scale 0 - 1

The sun rising from the West will never happen. The possibility of happening it is 0. The sun rising from the East will definitely happen. The possibility of happening it is 1. Accordingly, the possibility of an event which will never happen is 0 and that of an event which will definitely happen is 1.

For some events, values between 0 and 1 can be taken as the possibility. When the occurrence or non-occurrence of an event is the same, the possibility is taken as $\frac{1}{2}$. When the possibility of an event happening is less, it has a value between 0 and $\frac{1}{2}$ and when it is more; a value between $\frac{1}{2}$ and 1 is given. The scale used in the above situations to decide the possibility of an event happening is known as scale 0 - 1 . See the following example.

Example 2

Event	Possibility
(i) Water in a river flowing down.	1
(ii) A fruit falling down from a tree.	1
(iii) Seeing the moon on a new moon day.	0
(iv) Water floating on kerosine oil.	0
(v) Getting a triangular number when a dice having faces written 1 - 6 is thrown.	$\frac{1}{2}$ = (0.5)
(vi) Taking a ripe mango from a bag having equal amount of ripe mango and an unripe mango.	$\frac{1}{2}$ = (0.5)

We assume that you have gained knowledge on the possibility of an event happening from the above example.

Activity 29. 4

Prepare a table as shown below.

Turns	Obtaining a head (H)	Obtaining a tail (T)
1 2 3 . . . 10		
Total		
11 12 . . . 20		
Total		

- Toss a coin. Write 'H' if head falls and 'T' if tail falls, in the table you prepared.
- Do the experiment 10 times. Obtain the number of times of getting 'H' and getting 'T' separately.
- Write as a fraction the number of times tail falls out of the total number of tosses.
- Write as a fraction the number of times head falls out of the total number of tosses.
- Extend the experiment as before up to 20 tosses.
- At the end of the 20 tosses, write the number of times 'H' falls as a fraction of 20 and 'T' falls as a fraction of 20.
- Compare the two fractions you have obtained.

What is the conclusion you can arrive at through this experiment?

Exercise 29.4

(1) Copy the following table. According to the possibility of the relevant events happening, write "1" for each definite occurrence and "0" for those events that will definitely not occur.

Event	Mark	Reason
(i) An athlete jumping a height of 10 m.	.....	will not happen
(ii) Sugar not remaining when packets of 5 kg are prepared from 50 kg of sugar.	.....	.....
(iii) A train travelling on a tarred road.	.....	.....
(iv)	0	.....
(v)	1	.....
(vi) A lion eating grass.	.....	.....

29.5 Events of possibility greater than 0 and less than 1

Activity 29.5

- Copy the table given in page 163 .
- Investigate the events given in it.
- Think about the nature of each event and select the relevant one from the following five statements.

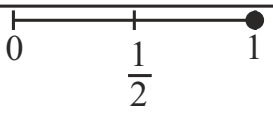
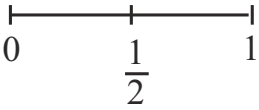
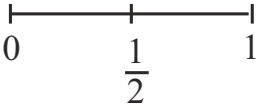
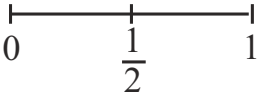
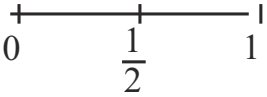
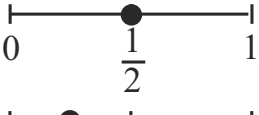
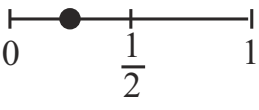
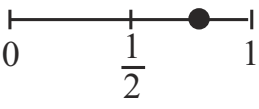
(a) Will not happen
(b) Happens rarely
(c) Having equal possibility of happening or not happening
(d) Happens frequently
(e) Will definitely happen

- Write the English letter relevant to the most suitable statement, in the blank cage under "possibility" as in the example.

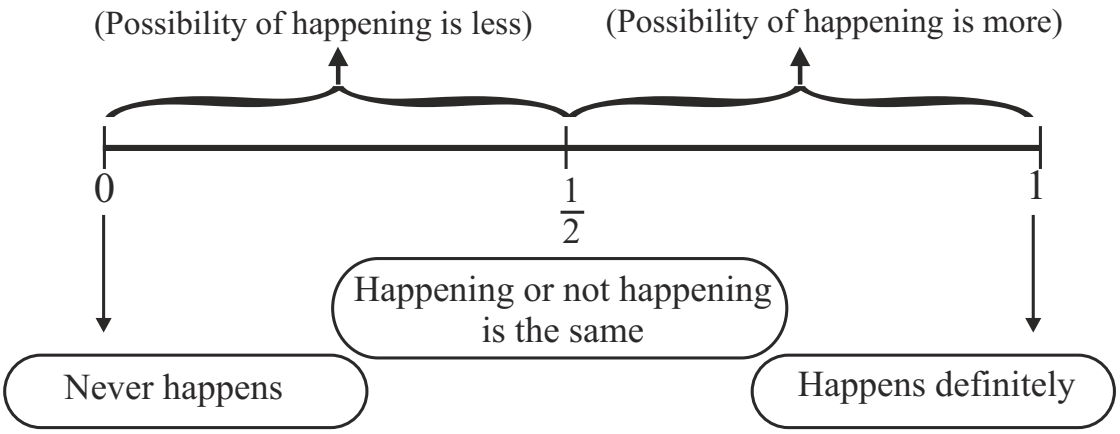
- According to the symbol written in the second column mark the possibility that is shown there to happen on the line in the third column as in the example.

- Write a suitable event for (vi), (vii), (viii) on the dotted line.

- Discuss about how the possibility of the occurrence of events takes values between 0 and 1 according to each representation.

Event	Possibility of happening	Level of the possibility
(i) Coconut oil floating on water	*(e)*	
(ii) Drawing a triangle with 4 straight lines	.....	
(iii) Getting a tail when a coin is tossed	.....	
(iv) A child selected from your class is a left hander	.....	
(v) Getting a prime number on a falling die with the faces numbered from 1 - 6	.....	
(vi)	.....	
(vii)	(b)	
(viii)	(d)	

Let us represent all these conclusions on a line.



Exercise 29.5

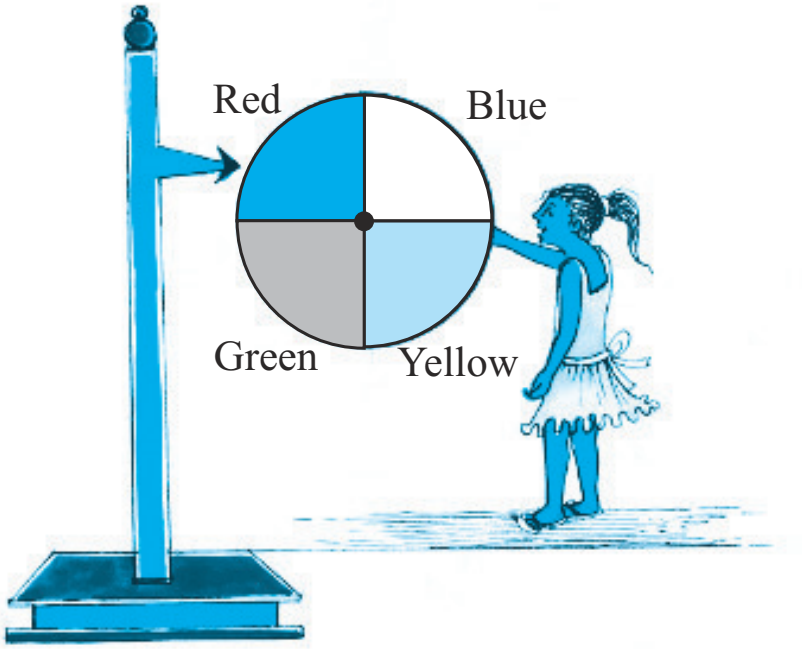
(1) Copy the following table. Complete the table by giving a mark less than $\frac{1}{2}$ if the possibility of the event happening is rare and a mark more than $\frac{1}{2}$ if it happens frequently.

Event	Mark	Reason
(i) An earthquake	Less than $\frac{1}{2}$	Does not happen frequently.
(ii) Getting rain in the wet zone	.....	.....
(iii) Getting a number more than 2 when a die numbered from 1 - 6 is thrown up	.....	.....
(iv) A man living 110 years	.....	.....
(v) Ending a cricket match of 50 overs in 10 overs	.....	.....

(2) Complete the following table by awarding marks from the scale 0-1.

Event	Reason	Marks 0-1
(i) The first child born on the 1st of January 2015 in Sri lanka is a boy	.....	.....
(ii) Opposite sides of a rectangle are equal	.....	.....
(iii) Sri Lanka winning the toss of the coin in a cricket match	.....	.....
(iv) If yesterday was Monday the day after tomorrow will be Thursday	.....	.....
(v) The sum of two odd number is an even number	.....	.....

(3)



An instrument used to select a competitor to a television programme is given in the figure (when the wheel of colours is turned the competitor who asks for the colour shown by the pointer gets the opportunity to enter the contest.)

The competitor asks for the colour yellow and turns the wheel.

(i) What are the possible results she can get?

(ii) Express the above as a number.

(iii) Assume that she was successful in getting the colour yellow and express her success as a fraction.

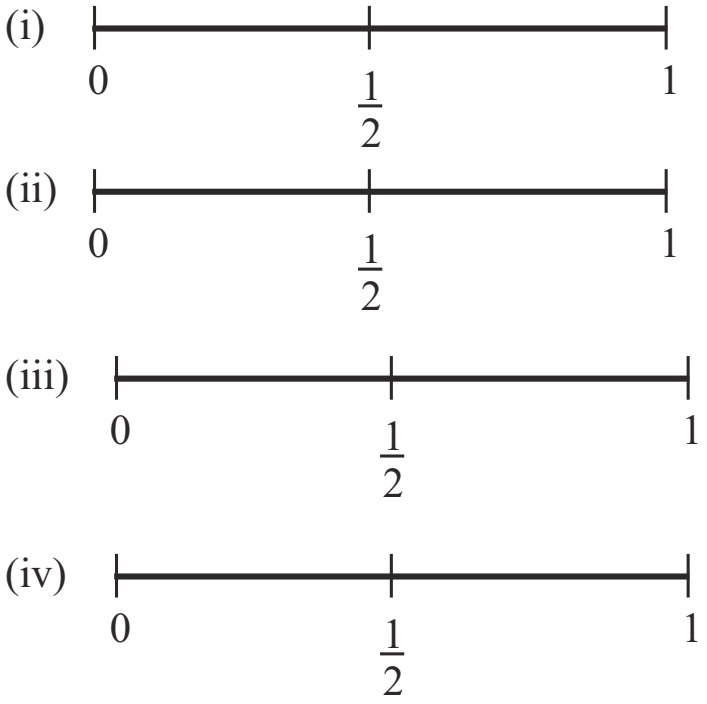
(4) Mark on the given number lines by using 'X' the relevant possibilities of the following events.

(i) A tortoise flying in the sky.

(ii) The moon rising on a fullmoon Poya day.

(iii) From the whole numbers from 1 - 10, five numbers to be odd numbers.

(iv) Obtaining a triangular number out of the numbers from 1 - 10.



Summary

- The results of some events can be influenced. Investigation of such types of events is called **“biased” experiments.**
- The results of some other events cannot be influenced. Investigantion of those types of events are called **"unbiased experiments".**
- Some events will definitely not happen. The possibility of those events happening is "0".
- Some other events will definitely happen. The possibility of those events happening is "1".
- The possibility of the events other than those that will definitely happen and those that will definitely not happen is between 0 - 1.