PROBABILITY

INTRODUCTION

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 15
CHAPTER NAME : PROBABILITY

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LEARNING OUTCOMES

1. Students will be able to know the concept of Probability.
2. Students will be able to use the concept of Probability in daily life situations.

Probability – An Experimental (Empirical) Approach

Let n be the total number of trails. The empirical probability of an event E happening, is given by

$$P(E) = \frac{\text{Number of trials in which the event happened}}{\text{The total number of trials.}}$$

(i) Experiment : An operation which can produce some well defined outcomes is known as experiment.

(ii) Trail : Performing of an experiment is called trial.

(iii) Equally likely outcomes : Outcomes of trial are equally likely if there is no reason to accept one in preference to the others.

(iv) Sample space : The set of all possible outcomes of an experiment is called sample space.

(v) Elementary event : An event having only one outcome

Note that the sum of probabilities of all the elementary events of an experiment is 1

Probability of Impossible and Sure Events

The probability of an event which is impossible to occur is 0 and such an event is called impossible event, i.e; for impossible event T, P(I) = 0

The probability of an event which is sure or certain to occur is 1 and such an event is called sure event or certain event.

i.e; for sure event or certain event 's', P(s) = 1

From the definition of the probability P(E), we see that the numerator (number of outcomes favourable to the event E) is always equal or greater than 0 but less than or equal to the denominator (the number of all possible outcomes). Therefore,

$0 \le P(E) \le 1$

$$P(E) + P(\bar{E}) = 1$$

OR

$$P(E) = 1 - P(\bar{E})$$

Complete the following statements:

(i) Probability of an event E + Probability of the event ‘not E’ = ………

(ii) The probability of an event that cannot happen is ……… Such an event is called ………

(iii) The probability of an event that is certain to happen is ………. Such an event is called ………

(iv) The sum of the probabilities of all the elementary events of an experiment is ……….

(v) The probability of an event is greater than or equal to …………. and less than or equal to ……….

(i) Probability of an event E + Probability of the event 'not E' = **1**.

(ii) The probability of an event that cannot happen is **0**. Such an event is called **impossible event**.

(iii) The probability of an event that is certain to happen is **1**. Such an event is called **sure event**.

(iv) The sum of the probabilities of all the elementary events of an experiment is **1**.

(v) The probability of an event is greater than or equal to **0** and less than or equal to **1**.

Which of the following experiments have equally likely outcomes? Explain.

(i) A driver attempts to start a car. The car starts or does not start.

(ii) A player attempts to shoot a basketball. She/he shoots or misses the shot.

(iii) A trial is made to answer a true-false question. The answer is right or wrong.

(iv) A baby is born. It is a boy or a girl.

(i) It is **not an equally likely** outcome because car will not start only when it is out of order.

(ii) It is **not an equally likely** outcome because this game depends on many factors.

(iii) It is an **equally likely** outcome because both have equal chances to happen.

(iv) It is an **equally likely** outcome because both have equal chances to happen.

Why is tossing a coin considered to be a fair way of deciding which team should get the bail at the beginning of a football game?

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When we toss a coin, the outcomes head and tail are equally likely. So, the result of an individual coin toss is completely unpredictable.

If P (E) = 0.05, what is the probability of ‘not E’?

We have, P (E) + P (not E) = 1

Given: P(E) = 0.05

P (not E) = 1 – 0.05 = 0.95

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(i) an orange flavoured candy?

(ii) a lemon flavoured candy?

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(i) There is no orange flavoured candy. So the probability of an orange flavoured candy P(E) = 0 (impossible event).

(ii) All candies are lemon flavoured in the bag. So the probability of a lemon flavoured candy P(E) = 1 (sure event).

It is given that in a group of 3 students, the probability of 2 students not having the same birthday is 0.992. What is the probability that the 2 students have the same birthday?

We have, P (E) + P (not E) = 1

$\Rightarrow$ P (E) + 0.992 = 1

$\Rightarrow$ P (E) = 1 − 0.992 = 0.008

HOME ASSIGNMENT Ex. 15.1

THANKING YOU

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