ODM EDUCATIONAL GROUP
Changing your Tomorrow

PROBABILITY

INTRODUCTION

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 15
CHAPTER NAME : PROBABILITY

Website: www.odmegroup.org
Email: info@odmps.org
Toll Free: **1800 120 2316**
Sishu Vihar, Infocity Road, Patia, Bhubaneswar- 751024

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.

PREVIOUS KNOWLEDGE TEST

ODM EDUCATIONAL GROUP
Changing your Tomorrow

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

ODM EDUCATIONAL GROUP
Changing your Tomorrow

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, $0 \leq P(E) \leq 1$

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

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 …….

A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is

(i) red?

(ii) not red?

A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is
(i) red?
(ii) not red?

Number of red balls = 3

Number of black balls = 5

Total number of balls = 3 + 5 = 8

$$(i)\ \text{P (red ball)} = \frac{\text{Number of red balls}}{\text{Total number of balls}} = \frac{3}{8}$$

$$(ii)\ \text{P (not red)} = 1 - \frac{3}{8} = \frac{5}{8}$$

A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be

(i) red?

(ii) white?

(iii) not green?

A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be

(i) red?

(ii) white?

(iii) not green?

Number of red marbles = 5

Number of white marbles = 8

Number of green marbles = 4

Total number of marbles = 5 + 8 + 4 = 17

(i) P (red marble) = $\frac{5}{17}$

(ii) P (white marble) = $\frac{8}{17}$

(iii) P (not green) = 1 – P(green) = $1 - \frac{4}{17} = \frac{13}{17}$

A die is thrown once. Find the probability of getting
(i) a prime number
(ii) a number lying between 2 and 6
(ill) an odd number

Total number of outcomes
$= 6$, i.e., 1, 2, 3, 4, 5 and 6

(i) Number of favourable outcomes $= 3(2, 3, 5)$

$\therefore$ P(getting a prime) $= \frac{3}{6} = \mathbf{\frac{1}{2}}$.

(ii) Number of favourable outcomes $= 3(3, 4, 5)$

$\therefore$ P(getting a number between 2 and 6)
$= \frac{3}{6} = \mathbf{\frac{1}{2}}$.

(iii) Number of favourable outcomes
$= 3(1, 3, 5)$

$\therefore$ P(getting an odd number) $= \frac{3}{6} = \mathbf{\frac{1}{2}}$.

A die is thrown once. Find the probability of getting
(i) a prime number
(ii) a number lying between 2 and 6
(ill) an odd number

One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting

(i) a king of red colour

(ii) a face card

(iii) a red face card

(iv) the jack of hearts

(v) a spade

(vi) the queen of diamonds

One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting

(i) a king of red colour

(ii) a face card

(iii) a red face card

(iv) the jack of hearts

(v) a spade

(vi) the queen of diamonds

Number of cards in a well-shuffled deck = 52.

(i) P (a king of red colour) = $\frac{2}{52} = \frac{1}{26}$

(ii) P (a face card) = $\frac{12}{52} = \frac{3}{13}$

(iii) P (a red face card) = $\frac{6}{52} = \frac{3}{26}$

(iv) P (the jack of hearts) = $\frac{1}{52}$

(v) P(a spade) = $\frac{13}{52} = \frac{1}{4}$

(vi) P (the queen of diamonds) = $\frac{1}{52}$

A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears

(i) a two digit number.

(ii) a perfect square number.

(iii) a number divisible by 5.

A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears

(i) a two digit number.

(ii) a perfect square number.

(iii) a number divisible by 5.

Total numbers of discs = 90

(i) P (a two digit number) = $\frac{81}{90} = \frac{9}{10}$

(ii) Here, perfect square numbers are 1, 4, 9, 16, 25, 36, 49, 64, 81

P (getting a perfect square number) = $\frac{9}{90} = \frac{1}{10}$

(iii) Numbers divisible by 5 are 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90

P (getting a number divisible by 5) = $\frac{18}{90} = \frac{1}{5}$

A game consists of tossing a one rupee coin 3 times and noting its outcome each time. Hanif wins if all the tosses give the same result, i.e. three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game.

A game consists of tossing a one rupee coin 3 times and noting its outcome each time. Hanif wins if all the tosses give the same result, i.e. three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game.

ODM EDUCATIONAL GROUP
Changing your Tomorrow

Total outcomes are HHH, TTT, HHT, HTH, THH, TTH, THT, HTT

so, there are 8 outcomes

Hanif will lose the game if outcomes are HHT, HTH, THH, TTH, THT, HTT

So, favourable outcomes = 6

$\therefore$ P(Hanif will lose the game) $= \frac{6}{8} = \frac{3}{4}$.

A die is thrown twice. What is the probability that
(i) 5 will not come up either time?
(ii) 5 will come up at least once?

A die is thrown twice. What is the probability that
(i) 5 will not come up either time?
(ii) 5 will come up at least once?

Total outcomes = 36

Number of outcomes in favour of 5 is (1, 5) (2, 5) (3, 5) (4, 5) (5, 5) (6, 5) (5, 1) (5, 2) (5, 3) (5, 4) (5, 6) = 11

(i) P (5 will not come up either time) = $\frac{25}{36}$

(ii) P (5 will come up at least once) = $\frac{11}{36}$

ODM EDUCATIONAL GROUP
Changing your Tomorrow

HOME ASSIGNMENT Ex. 15.2

ODM EDUCATIONAL GROUP
Changing your Tomorrow

THANKING YOU

ODM EDUCATIONAL GROUP