Algebra 2 Chapter 10 Notes

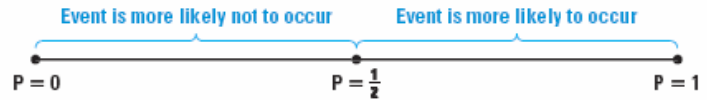
Name: Key

10.3 PROBABLITY

Outcomes The possible results. ex: the outcomes of rolling a die are 1,2,3,4,5,6

Event An outcome or collection of outcomes. ex: rolling an even #: 2,4,6

Probability of an Event a # from 0 to 1 that indicates the likelihood an event will occur.



Theoretical Probability of an Event

When all outcomes are equally likely, the theoretical probability that an event A will occur is:

$$P(A) = \frac{\#\text{ of outcomes in event } A}{\text{Total \# of outcomes}}$$

*The theoretical probability of an event is often simply called the probability of the event.

*The probability of all possible outcomes must add up to 1.

*can be a fraction, decimal, or %

1. You pick a card from a standard deck of 52 playing cards. Find the probability of:

   a. picking an 8

   There are 4 8's

   $P(8) = \frac{4}{52} = \frac{1}{13}$

   b. picking a red king

   There are 2 red kings

   $P(\text{red king}) = \frac{2}{52} = \frac{1}{26}$

2. You have an equally likely chance of choosing any integer from 1 through 20. Find the probability of the given event.

   a. A perfect square is chosen.

   1, 4, 9, 16

   $P(\text{perfect square}) = \frac{4}{20} = \frac{1}{5}$

   b. A factor of 30 is chosen.

   1, 2, 3, 5, 6, 10, 15

   $P(\text{factor of 30}) = \frac{7}{20}$

4. You participate in a lottery where you must correctly select 5 numbers out of the numbers 1-20

   a. What is the probability of correctly selecting the 5 numbers?

   $\frac{1}{{}_{20}C_5} = \frac{1}{15{,}504}$

   b. What is the probability of choosing the correct numbers if the must be picked in a certain order?

   $\frac{1}{{}_{20}P_5} = \frac{1}{1860480}$

Odds

When all outcomes are equally likely, the odds in favor of an event *A* and the odds against an event *A* are defined as follows:

odds in favor of event A: $\frac{\#\text{ of outcomes in A}}{\#\text{ of outcomes not in A}}$

odds against event A: $\frac{\#\text{ of outcomes not in A}}{\#\text{ of outcomes in A}}$

*You can write odds in favor or against an event in the form $\frac{a}{b}$ or $a:b$

5. A standard six-sided die is rolled. Find

   a. the odds in favor of rolling a 6

   $1:5$ or $\frac{1}{5}$

   b. the odds against rolling an odd number

   $1:1$ or $\frac{1}{1}$

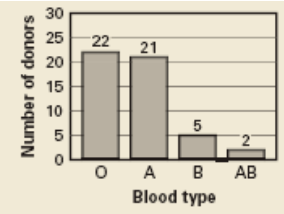
6. If the odds against an event are $\frac{a}{b}$, what are the odds in favor of the event? $\frac{b}{a}$

Experimental Probability of an Event

When an experiment is performed that consists of a certain number of trials, the experimental probability of an event A is given by:

$$P(A) = \frac{\text{The \# of trials where a occurs}}{\text{Total \# of trials}}$$

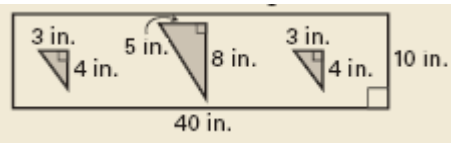
2. The blood types for a sample of donors at a blood drive are displayed in the bar graph. Find the experimental probability that a randomly selected blood donor would have blood type O.



$P(\text{Type O}) = \frac{22}{50} = \frac{11}{25}$

Geometric Probability of an Event

3. Find the probability that a dart thrown at the rectangular board hits one of the triangles. Assume that the dart is equally likely to hit any point inside the board.



Total area of board: 400 in^2

Area of 3 Δs: $6 + 20 + 6 = 32\text{ in}^2$

$P(\text{hitting }\Delta) = \frac{32}{400} = \frac{2}{25}$