6.7 Probability and Odds

Goal: Find probabilities.

Vocabulary	
Outcomes:	The possible results of an experiment are outcomes.
Event:	event is an outcome or a collection of outcomes.
Favorable outcomes:	The outcomes for a specified event are called favorable outcomes
Probability:	The probability that an event occurs is a measure of the likelihood that the event will occur
Theoretical probability:	A theoretical probability is based on knowing all of the equally likely outcomes of an experiment
Experiment probability:	al
Odds in favor:	be ratio of the number of favorable outcomes to the unber of unfavorable outcomes is called the odds in por of an event.
Odds against:	he ratio of the number of unfavorable outcomes to te number of favorable outcomes is called the odds painst an event.

Probability of an Event

The probability of an event when all outcomes are equally likely is:

 $P(\text{event}) = \frac{\text{Number of favorable outcomes}}{\text{Number of possible outcomes}}$

Example 1 Finding a Probability

Suppose you roll a number cube. What is the probability that you roll an odd number?

Solution

Rolls of 13.5 are odd, so there are 3 favorable outcomes.

There are possible outcomes.

Checkpoint

1. Suppose you roll a number cube. What is the probability that you roll a number less than 5?

roll a number less than 5?
$$P(\# \angle 5) = \frac{4}{6} \div 2 = \boxed{\frac{2}{3}}$$

2. Suppose you roll a number cube. What is the probability that you roll a number that is a multiple of 3?

P(multide of 3) =
$$\frac{2}{6} = \frac{1}{3}$$

Experimental Probability

The experimental probability of an event is:

$$P(\text{event}) = \frac{\text{Number of successes}}{\text{Number of trials}}$$

Example 2 Finding Experimental Probability

You plant 32 seeds of a certain flower and 18 of them sprout. Find the experimental probability that the next flower seed planted will sprout.

Solution

$$P(\text{flower seed will sprout}) = \frac{18}{32} = \frac{2}{\text{Number of successes}}$$

$$= \frac{9}{110}$$
Simplify.

Answer: The experimental probability that a flower seed will

Example 3 Finding the Odds

Suppose you randomly choose a number between 1 and 16.

- a. What are the odds in favor of choosing a prime number?
- b. What are the odds against choosing a prime number?

Solution

a. There are
$$(2,3,5,7,1,13)$$
 and $16 - (6) = 10$ unfavorable outcomes.

Odds in favor =
$$\frac{\text{Number of favorable outcomes}}{\text{Number of unfavorable outcomes}} = \frac{100}{100} = \frac{3}{100}$$

The odds are , or 5, that you choose a prime number.

b. The odds against choose a prime number are 3, or 5 to 3.