

Chp 11 Notes – Probability and Odds

GOAL Find sample spaces and probabilities.

Vocabulary

A possible result of an experiment is an **outcome**.

An **event** is an outcome or a collection of outcomes, such as rolling an odd number.

The set of all possible outcomes is called a **sample space**.

The **probability of an event** is a measure of the likelihood, or chance, that the event will occur.

The **odds** of an event compare the number of favorable and unfavorable outcomes when all outcomes are equally likely.

Common Student Errors

- Obtaining a probability that is greater than 1

Tip Remind students that the probability of an event can only be between 0 and 1, inclusive. If they obtain a probability greater than 1, then they know an error has occurred and they should go back and check their work.

- Confusing odds and probabilities

Tip Reinforce that “odds” is an alternative way of expressing the likelihood of an event occurring. Be sure to note the difference in the formulas.

Example: A student may make the following incorrect statement.

“The probability of the event is $\frac{25}{12}$.”

Probability:

$$\frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$$

Odds in favor:

$$\frac{\text{Number of favorable outcomes}}{\text{Number of unfavorable outcomes}}$$

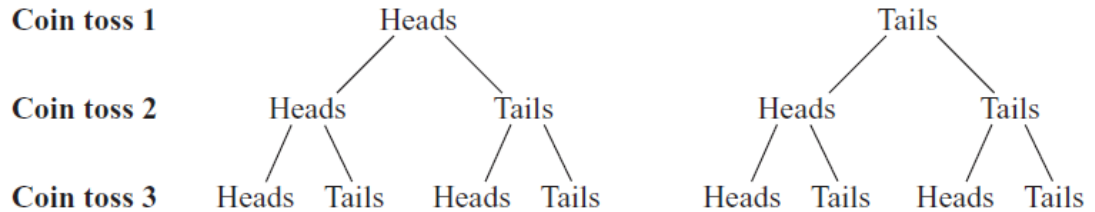
Different denominators

EXAMPLE 1 Find a sample space

You toss 3 coins. How many possible outcomes are in the sample space? List the possible outcomes.

Solution

Use a tree diagram to find the outcomes in the sample space.



The sample space has 8 possible outcomes. They are listed below. (Heads, H; Tails, T)
HHH, HHT, HTH, HTT, THH, THT, TTH, TTT

EXAMPLE 2 Find a theoretical probability

A bag contains numbered balls in red, blue, and yellow. The table below shows the numbers of each type of ball. A ball is selected at random. What is the probability that the ball selected is an odd numbered yellow ball?

	Red	Blue	Yellow
Even numbered	6	8	10
Odd numbered	11	7	8

Solution

There is a total of $6 + 8 + 10 + 11 + 7 + 8 = 50$ balls. So, there are 50 possible outcomes. Of all the balls, 8 are odd numbered and yellow. There are 8 possible favorable outcomes.

$$\begin{aligned} P(\text{odd and yellow}) &= \frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}} \\ &= \frac{\text{Number of odd, yellow balls}}{\text{Total number of balls}} \\ &= \frac{8}{50} \\ &= \frac{4}{25} \end{aligned}$$

