

12-3 Study Guide and Intervention

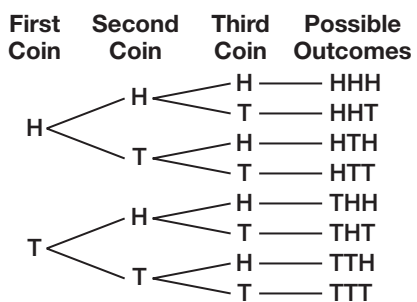
Probability

Probability and Odds In probability, a desired outcome is called a **success**; any other outcome is called a **failure**.

Probability of Success and Failure	If an event can succeed in s ways and fail in f ways, then the probabilities of success, $P(S)$, and of failure, $P(F)$, are as follows. $P(S) = \frac{s}{s+f}$ and $P(F) = \frac{f}{s+f}$.
Definition of Odds	If an event can succeed in s ways and fail in f ways, then the odds of success and of failure are as follows. Odds of success = $s:f$ Odds of failure = $f:s$

Example 1 When 3 coins are tossed, what is the probability that at least 2 are heads?

You can use a tree diagram to find the sample space.



Of the 8 possible outcomes, 4 have at least 2 heads. So the probability of tossing at least 2 heads is $\frac{4}{8}$ or $\frac{1}{2}$.

Example 2 What is the probability of picking 4 fiction books and 2 biographies from a best-seller list that consists of 12 fiction books and 6 biographies?

By the Fundamental Counting Principle, the number of successes is $C(12, 4) \cdot C(6, 2)$. The total number of selections, $s + f$, of 6 books is $C(18, 6)$.

$$P(4 \text{ fiction, } 2 \text{ biography}) = \frac{C(12, 4) \cdot C(6, 2)}{C(18, 6)} \text{ or about } 0.40$$

The probability of selecting 4 fiction books and 2 biographies is about 40%.

Exercises

Find the odds of an event occurring, given the probability of the event.

1. $\frac{3}{7}$ 2. $\frac{4}{5}$ 3. $\frac{2}{13}$ 4. $\frac{1}{15}$

Find the probability of an event occurring, given the odds of the event.

5. 10:1 6. 2:5 7. 4:9 8. 8:3

One bag of candy contains 15 red candies, 10 yellow candies, and 6 green candies. Find the probability of each selection.

9. picking a red candy 10. not picking a yellow candy
11. picking a green candy 12. not picking a red candy

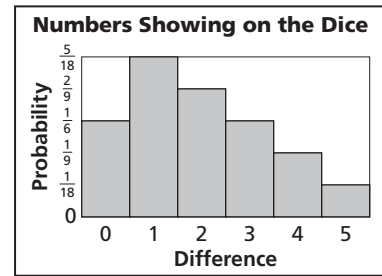
12-3 Study Guide and Intervention *(continued)*

Probability

Probability Distributions A **random variable** is a variable whose value is the numerical outcome of a random event. A **probability distribution** for a particular random variable is a function that maps the sample space to the probabilities of the outcomes in the sample space.

Example Suppose two dice are rolled. The table and the relative-frequency histogram show the distribution of the absolute value of the difference of the numbers rolled. Use the graph to determine which outcome is the most likely. What is its probability?

Difference	0	1	2	3	4	5
Probability	$\frac{1}{6}$	$\frac{5}{18}$	$\frac{2}{9}$	$\frac{1}{6}$	$\frac{1}{9}$	$\frac{1}{18}$



The greatest probability in the graph is $\frac{5}{18}$.
 The most likely outcome is a difference of 1 and its probability is $\frac{5}{18}$.

Exercises

Four coins are tossed.

- Complete the table below to show the probability distribution of the number of heads.

Number of Heads	0	1	2	3	4
Probability					

- Make relative-frequency distribution of the data.

