

**9-1****Study Guide and Intervention****Simple Events**

The **probability** of an event is a ratio that compares the number of favorable outcomes to the number of possible outcomes. Outcomes occur at **random** if each outcome occurs by chance.

Two events that are the only ones that can possibly happen are **complementary events**. The sum of the probabilities of complementary events is 1.

**EXAMPLE 1** What is the probability of rolling a multiple of 3 on a number cube marked with 1, 2, 3, 4, 5, and 6 on its faces?

$$\begin{aligned} P(\text{multiple of } 3) &= \frac{\text{multiples of } 3 \text{ possible}}{\text{total numbers possible}} \\ &= \frac{2}{6} && \text{Two numbers are multiples of } 3: 3 \text{ and } 6. \\ &= \frac{1}{3} && \text{Simplify.} \end{aligned}$$

The probability of rolling a multiple of 3 is  $\frac{1}{3}$  or about 33.3%.

**EXAMPLE 2** What is the probability of *not* rolling a multiple of 3 on a number cube marked with 1, 2, 3, 4, 5, and 6 on its faces?

$$\begin{aligned} P(A) + P(\text{not } A) &= 1 \\ \frac{1}{3} + P(\text{not } A) &= 1 && \text{Substitute } \frac{1}{3} \text{ for } P(A). \\ -\frac{1}{3} & \quad -\frac{1}{3} && \text{Subtract } \frac{1}{3} \text{ from each side} \\ \hline P(\text{not } A) &= \frac{2}{3} && \text{Simplify.} \end{aligned}$$

The probability of *not* rolling a multiple of 3 is  $\frac{2}{3}$  or about 66.7%.

**EXERCISES**

A set of 30 cards is numbered 1, 2, 3, ..., 30. Suppose you pick a card at random without looking. Find the probability of each event. Write as a fraction in simplest form.

- $P(12)$
- $P(2 \text{ or } 3)$
- $P(\text{odd number})$
- $P(\text{a multiple of } 5)$
- $P(\text{not a multiple of } 5)$
- $P(\text{less than or equal to } 10)$

**9-1****Practice: Skills****Simple Events**

A set of 12 cards is numbered 1, 2, 3, ...12. Suppose you pick a card at random without looking. Find the probability of each event. Write as a fraction in simplest form.

1.  $P(5)$
2.  $P(6 \text{ or } 8)$
3.  $P(\text{a multiple of } 3)$
4.  $P(\text{an even number})$
5.  $P(\text{a multiple of } 4)$
6.  $P(\text{less than or equal to } 8)$
7.  $P(\text{a factor of } 12)$
8.  $P(\text{not a multiple of } 4)$
9.  $P(1, 3, \text{ or } 11)$
10.  $P(\text{a multiple a } 5)$

The students at Job's high school were surveyed to determine their favorite foods. The results are shown in the table at the right. Suppose students were randomly selected and asked what their favorite food is. Find the probability of each event. Write as a fraction in simplest form.

<b>Favorite Food</b>	<b>Responses</b>
pizza	19
steak	8
chow mein	5
seafood	4
spaghetti	3
cereal	1

11.  $P(\text{steak})$
12.  $P(\text{spaghetti})$
13.  $P(\text{cereal or seafood})$
14.  $P(\text{not chow mein})$
15.  $P(\text{pizza})$
16.  $P(\text{cereal or steak})$
17.  $P(\text{not steak})$
18.  $P(\text{not cereal or seafood})$
19.  $P(\text{chicken})$
20.  $P(\text{chow mein or spaghetti})$

**9-1****Practice: Word Problems****Simple Events**

**COINS** Susan opened her piggy bank and counted the number of each coin. The table at the right shows the results. For Exercises 1–3, assume that the coins are put in a bag and one is chosen at random.

Coin	Number
quarters	15
dimes	21
nickels	22
pennies	32

1. What is the probability that a quarter is chosen?	2. What is the probability that a nickel or a dime is chosen?
3. What is the probability that the chosen coin is worth more than 5 cents?	4. <b>NUMBER CUBES</b> Juan has two number cubes, each with faces numbered 1, 2, ...6. What is the probability that he can roll the cubes so that the sum of the faces showing equals 11?
5. <b>SKATEBOARDS</b> Carlotta bought a new skateboard for which the probability of having a defective wheel is 0.015. What is the probability of not having a defective wheel?	6. <b>CALCULATORS</b> Jake's teacher had 6 calculators for 28 students to use. If the first students to use the calculators are chosen at random, what is the probability that Jake will get one?
7. <b>VEHICLES</b> The rental car company had 14 sedans and 8 minivans available to rent. If the next customer picks a vehicle at random, what is the probability that a minivan is chosen?	8. <b>MUSIC</b> Tina has 16 pop CDs, 6 classical, and 2 rock. Tina chooses a CD at random. What is the probability she does not choose a classical CD?

**9-1****Reading to Learn Mathematics****Simple Events**

**Pre-Activity** *Read the introduction at the top of page 370 in your textbook. Write your answers below.*

1. What fraction of the taffy is vanilla? Write in simplest form.
2. Suppose you take one piece of taffy from the box without looking. Are your chances of picking vanilla the same as picking root beer? Explain.

**Reading the Lesson**

Use the information from the introduction to answer Exercises 3–5.

3. How do you read  $P(\text{cherry})$ ?
4.  $P(\text{cherry}) = \frac{6}{48}$ ; where does the 6 come from? Where does the 48 come from?
5. Probability can be written as a fraction, a decimal, or a percent. Write  $P(\text{cherry})$  as a decimal.
6. If there is a 25% chance that something will happen, what is the chance that it will *not* happen? What are these two events called?

**Helping You Remember**

7. Write the equation  $P(A) + P(\text{not } A) = 1$  in words. What does it mean with respect to event  $A$ ?

**9-1****Enrichment****Coin-Tossing Experiments**

If a coin is tossed 3 times, there are 8 possible outcomes. They are listed in the table below.

Number of Heads	0	1	2	3
Outcomes	TTT	HTT	HHT	HHH
		THT	THH	
		TTH	HTH	

Once all the outcomes are known, the probability of any event can be found. For example, the probability of getting 2 heads is  $\frac{3}{8}$ . Notice that this is the same as getting 1 tail.

1. A coin is tossed 4 times. Complete this chart to show the possible outcomes.

Number of Heads	0	1	2	3	4
Outcomes	TTTT				

2. What is the probability of getting all tails?
3. Now complete this table. Make charts like the one in Exercise 1 to help find the answers. Look for patterns in the numbers.

Number of Coin Tosses	2	3	4	5	6	7	8
Total Outcomes							
Probability of Getting All Tails							

4. What happens to the number of outcomes? the probability of all tails?