

Key

# Lesson 12-8 Compound Events

A **compound event** is two or more events connected by the words "and" or "or."

When two events have no outcomes in common, the events are **mutually exclusive events**. If  $A$  and  $B$  are mutually exclusive events, then  $P(A \text{ and } B) = 0$ . When events have at least one outcome in common, they are **overlapping events**.

You need to determine whether two events  $A$  and  $B$  are mutually exclusive before you can find  $P(A \text{ or } B)$ .

Take note

### Key Concept Probability of A or B

#### Probability of Mutually Exclusive Events

If  $A$  and  $B$  are mutually exclusive events,  $P(A \text{ or } B) = P(A) + P(B)$ .

#### Probability of Overlapping Events

If  $A$  and  $B$  are overlapping events,  $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ .

### Problem 1 Mutually Exclusive and Overlapping Events

Suppose you spin a spinner that has 20 equal-sized sections numbered from 1 to 20.

**A** What is the probability that you spin a 2 or a 5?

$$P(2 \text{ or } 5) = \frac{1}{20} + \frac{1}{20} = \frac{2}{20} = \frac{1}{10} \text{ or } .10$$

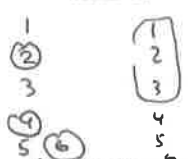
**B** What is the probability that you spin a number that is a multiple of 2 or 5?



$$P(\text{mult } 2 \text{ or } 5) = \frac{10}{20} + \frac{4}{20} - \frac{2}{20} = \frac{14-2}{20} = \frac{12}{20} = \frac{3}{5} \text{ or } .60$$

**Got-It?** 1. Suppose you roll a standard number cube.

a. What is the probability that you roll an even number or a number less than 4?



$$P(\text{even or } < 4) = \frac{3}{6} + \frac{3}{6} - \frac{1}{6} = \frac{5}{6} \text{ or } .833$$

b. What is the probability that you roll a 2 or an odd number?

$$P(2 \text{ or odd}) = \frac{1}{6} + \frac{3}{6} = \frac{4}{6} \text{ or } \frac{2}{3} \text{ or } .667$$

# 12-8 Practice

## Probability of Compound Events

Form G

Suppose you spin a spinner that has 12 equal-sized sections numbered 1 to 12. Find each probability. Remember not to count any numbers twice!

$$1. P(3 \text{ or } 4) = \frac{1}{12} + \frac{1}{12} = \frac{2}{12} = \boxed{\frac{1}{6}}$$

$$2. P(\text{even or } 7) = \frac{6}{12} + \frac{1}{12} = \boxed{\frac{7}{12}}$$

$$3. P(\text{even or odd}) = \frac{6}{12} + \frac{6}{12} = \frac{12}{12} = \boxed{1}$$

$$4. P(\text{multiple of 3 or odd}) = \frac{4}{12} + \frac{6}{12} - \frac{2}{12} = \frac{8}{12} = \boxed{\frac{2}{3}}$$

3  
6  
9  
12

$$5. P(\text{odd or multiple of 5}) = \boxed{\frac{7}{12}}$$

$$6. P(\text{less than 5 or greater than 9}) = \boxed{\frac{7}{12}}$$

$$7. P(\text{even or less than 8}) = \boxed{\frac{5}{6}}$$

$$8. P(\text{multiple of 2 or multiple of 3}) = \boxed{\frac{2}{3}}$$

$$9. P(\text{odd or greater than 4}) = \boxed{\frac{5}{6}}$$

$$10. P(\text{multiple of 5 or multiple of 2}) = \boxed{\frac{7}{12}}$$

11. The probability that Bob will make a free throw is  $\frac{2}{5}$ . What is the probability that Bob will make both of his next two free throws?

$$= \boxed{\frac{4}{25}}$$

You choose a marble at random from a bag containing 3 blue marbles, 5 red marbles, and 2 green marbles. You replace the marble and then choose again. Find each probability.

12.  $P(\text{both blue}) = \boxed{\frac{9}{100}}$

13.  $P(\text{both red}) = \boxed{\frac{1}{4}}$

14.  $P(\text{blue then green}) = \boxed{\frac{3}{50}}$

15.  $P(\text{red then blue}) = \boxed{\frac{3}{20}}$

16.  $P(\text{green then red}) = \boxed{\frac{1}{10}}$

17.  $P(\text{both green}) = \boxed{\frac{1}{25}}$

You choose a tile at random from a bag containing 2 tiles with X, 6 tiles with Y, and 4 tiles with Z. You pick a second tile without replacing the first. Find each probability.

18.  $P(X \text{ then } Y) = \boxed{\frac{1}{11}}$

19.  $P(\text{both } Y) = \boxed{\frac{5}{22}}$

20.  $P(Y \text{ then } X) = \boxed{\frac{1}{20}}$

21.  $P(Z \text{ then } X) = \boxed{\frac{1}{33}}$

22.  $P(\text{both } Z) = \boxed{\frac{1}{11}}$

23.  $P(Y \text{ then } Z) = \boxed{\frac{2}{11}}$

24. There are 12 girls and 14 boys in math class. The teacher puts the names of the students in a hat and randomly picks one name. Then the teacher picks another name without replacing the first. What is the probability that both students picked are boys?

$$= \boxed{\frac{7}{25}}$$

