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?**

2 4 6 8 10 12 14 16 18 20 5 10 15 20

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

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?

1 2 3 4 5 6 1 2 3 4 5

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

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

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

Name _____ Class _____ Date _____

12-8 Practice

Form G

Probability of Compound Events

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. $P(\text{multiple of 3 or odd})$

3
6
9
12

$= \frac{4}{12} + \frac{6}{12} - \frac{2}{12} = \frac{8}{12} = \boxed{\frac{2}{3}}$

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?

= $\frac{4}{25}$

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*(both blue) = $\frac{9}{100}$

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

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

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

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

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

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 then Y) = $\frac{1}{11}$

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

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

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

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

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

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?

= $\frac{7}{25}$