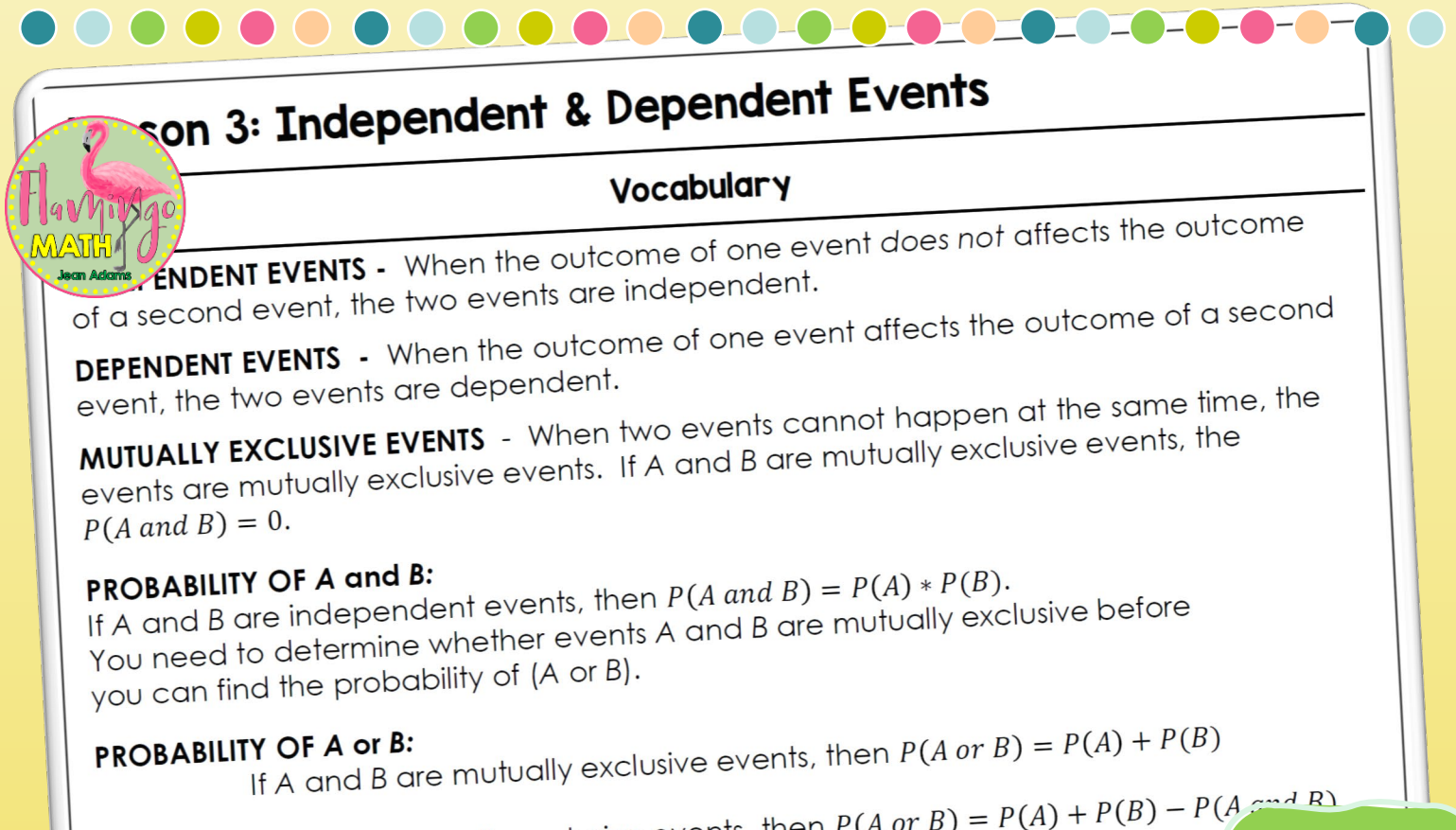


Algebra 2 Honors

Independent & Dependent Events



Completely Editable

12.3

Lesson 12.3: Independent & Dependent Events

Vocabulary

INDEPENDENT EVENTS - When the outcome of one event does not affect the outcome of a second event, the two events are independent.

DEPENDENT EVENTS - When the outcome of one event affects the outcome of a second event, the two events are dependent.

MUTUALLY EXCLUSIVE EVENTS - When two events cannot happen at the same time, the events are mutually exclusive events. If A and B are mutually exclusive events, the $P(A \text{ and } B) = 0$.

PROBABILITY OF A and B:

If A and B are independent events, then $P(A \text{ and } B) = P(A) \cdot P(B)$.

You need to determine whether events A and B are mutually exclusive before you can find the probability of (A or B).

PROBABILITY OF A or B:

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

If A and B are not mutually exclusive events, then $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

Classifying Events

EX #1: Classify each pair of events as **dependent** or **independent**.

A. A letter is selected at random, one of the remaining letters is selected at random.

B. The color of a truck is selected at random; the size of the engine is selected at random.

EX #2: Two number cubes (a pair of dice) are tossed. Are the events that the sum of the numbers is 7 and the sum is 11 mutually exclusive or not? Explain your answer.

A. The sum is a prime number; the sum is less than 5.

B.

C. A King is drawn, is not replaced, and then a Queen is drawn.

Probabilities of

EX #7: A jar contains four blue marbles and two red marbles. A marble is chosen at random, and then another marble is chosen at random, without replacement. Find the probability of each event.

A. You select a blue marble and then a red marble.

B.

Finding Probability of Dependent Events

EX #3: A drawer contains 10 white socks and 6 blue socks. Caleb reaches in the drawer without looking and selects 2 socks.

A. What is the probability that he selects two blue socks?

B. What is the probability that he selects first one blue sock and then one white sock?

C. What is the probability that he selects no blue socks?

EX #4: A basket contains 10 yellow, 8 white, and 2 orange tennis balls. Without looking, Sabrina selects 3 tennis balls.

A. What is the probability that she selects three yellow tennis balls?

B. What is the probability that she selects no white tennis balls?

Using a Table to Find Conditional Probability

EX #5: The table below shows the distribution of votes for Student Government President elections at Surfside High. Find each probability.

CLASS	Keegan	Wolber	Dao
Freshmen	249	285	194
Sophomores	312	257	212
Juniors	205	324	248
Seniors	197	259	318

A. Probability that a junior voted for Dao.

B. Voted for Wolber.

C. Voted for Keegan and was from the sophomore class.

Dependent or Independent?

EX #6: Two cards are drawn from a deck of 52 cards. Are the events independent or dependent? Then find the probability.

A. Selecting two diamonds when the first card is replaced.

Real-World Application

EX #8: About 54% of U.S. college students are under 25-years-old. About 22% of U.S. college students are over 33-years-old.

A. What is the probability that a U.S. college student chosen at random is under 25 or over 33?

B. If a U.S. college student is chosen at random. Find the probability for students in 25-33 range.

C. If a U.S. college student is chosen at random. Find the probability for students in 25-33 range or over 33.

D. If a U.S. college student is chosen at random. Find the probability for students under 33.

NOTES

Independent & Dependent Events Practice

Problems 1 – 4, classify each pair of events as *dependent* or *independent*.

- | | |
|---|---|
| 1. You select a month to go on vacation and then select the day of the month to begin the vacation. | 2. On a spinner, you spin twice. |
| 3. At Pizza Palace, you and your best friends order your favorite pizza. At the table next to you, a family is ordering the same pizza. | 4. In a game, two players are not allowed to land in the same place. Maria goes first and moves to a space on the game board, then Ericka takes a turn. |

Problems 5 – 8, P and Q are independent events. Find $P(Q \text{ and } R)$.

5. $P(Q) = \frac{1}{6}, P(R) = \frac{3}{4}$

6. $P(Q) = \frac{3}{8}, P(R) = \frac{4}{15}$

7. $P(Q) = 0.35, P(R) = 0.25$

8. $P(Q) = \frac{2}{3}, P(R) = \frac{9}{x}$

Problems 9 – 12, R and S are mutually exclusive events. Find $P(R \text{ or } S)$.

9. $P(R) = \frac{3}{8}, P(S) = \frac{5}{16}$

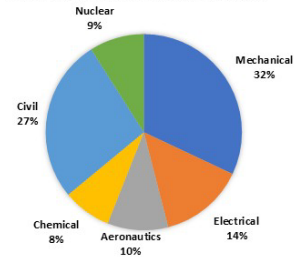
10. $P(R) = \frac{2}{3}, P(S) = \frac{1}{5}$

11. $P(R) = 9\%, P(S) = 17\%$

12. $P(R) = \frac{1}{3}, P(S) = 30\%$

Problems 13 – 16, the graph at the right shows the number of students in the College of Engineering applicants by degree type at a local university this year. Find each probability.

ENGINEERING COLLEGE APPLICANTS



13. An applicant wants to become a mechanical engineer.

14. An applicant wants to become a civil or a mechanical engineer.

15. An applicant is neither in nuclear nor electrical engineering programs.

16. An applicant is neither chemical nor nuclear.

Problems 17 – 20, you randomly select two cards from a standard 52-card deck. Find the following.

17. What is the probability that the first card you select is a face card?

18. What is the probability that the first card you select is not a face card, and the second card you draw is a face card? Assume you do not replace the first card.

19. What is the probability that the first card you select is not a face card, and the second card you draw is a face card? Assume you replace the first card before selecting the second.

20. What is the probability that the first card you select is a face card, and the second card you draw is an ace? Assume you do not replace the first card.

Problems 21 – 25, find each probability.

21. A jar of specialty jelly beans contains 54 banana jelly beans, 42 root beer jelly beans, and 28 watermelon jelly beans. You reach into the jar and randomly select a jelly bean, then select another without putting the first jelly bean back. What is the probability that you draw 2 banana flavored jelly beans?

22. Clara entered the 400-meter individual race at a track meet. She prefers to begin in the outside lane of a six-lane track. What is the probability that she will draw lane 6 in the 3 heats she will run for the event?

23. Jamie and Mark each bought a raffle ticket to win a new laptop or a new cell phone where only 125 tickets were sold. The holder of the first ticket drawn wins the prize of their choice and is removed from the drawing. The holder of the second ticket drawn wins the remaining prize. Find the probability that Jamie and Mark wins the second drawing prize.

24. A bag contains 6 black marbles, 4 clear marbles, and 2 tiger eye marbles. If you draw one marbles and do not replace it, after three draws, what is the probability of drawing a black marble, a clear marble, and a tiger eye marble in that order?

Practice Sets

Name _____

Date _____

Period _____

Lesson Warm-Ups

greater than 20; the product is a multiple of 3.

A bag contains 26 blue marbles, 24 green marbles, 16 red marbles and 12 yellow marbles. Suppose you pick one marble at random. Find the probability.

3. P (green)4. P (not red)

Name _____ Date _____ Period _____

Lesson 12.3: Independent & Dependent Events**Warm-Up #2**

1. Classify the pair of events as *dependent* or *independent*.

Roll a number cube. Then toss a coin.

2. Give an example to show the events are not mutually exclusive.

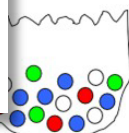
Two number cubes are tossed. The product is greater than 20; the product is a multiple of 3.

A bag contains 24 blue marbles, 22 green marbles, 14 red marbles and 12 yellow marbles. Suppose you pick one marble at random. Find the probability.

3. P (red)4. P (not green)

Form A

Period _____



random and not replaced.

1. What is the probability that one of the marbles you choose is red and the other is blue?

2. A jar contains 20 jelly beans; 3 red, 7 green, 4 yellow, and 6 purple. What is the probability that you select two green or two purple jelly beans?

3. A basket contains 16 bags of snacks. 5 chips, 6 pretzels, 4 granola bars, and 3 crackers. If you replace your first choice, what is the probability that you select two bags of snacks that are not chips?

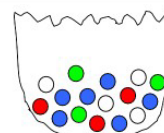
12.3 Independent & Dependent Events

Form B

Name _____

Date _____ Period _____

The bag shown at the right contains 3 red, 6 blue, 4 white, and 3 green marbles. One marble is selected at random and not replaced.



1. What is the probability that one of the marbles you choose is green and the other is white?

2. A jar contains 20 jelly beans; 3 red, 7 green, 4 yellow, and 6 purple. What is the probability that you select two red or two yellow jelly beans?

3. A basket contains 16 bags of snacks. 5 chips, 6 pretzels, 4 granola bars, and 3 crackers. If you replace your first choice, what is the probability that you select two bags of snacks that are not chips?

Daily Lesson Quiz

Grade: _____

Grade: _____