12.2 Start Thinking

Abbey has applied for admittance to her favorite college. Abbey's softball team is playing for the district championship. If they win, they will play for the state championship. Which of the three events (being accepted at her favorite college, winning the district championship, and winning the state championship) are dependent? Which are independent? Explain.

12.2 Warm Up

A group of 128 students was asked to select their favorite high school sport: basketball, football, lacrosse, or baseball. The table shows the results. Use the results to find the probabilities that a student chosen at random from this group would prefer the following.

Survey Results			
basketball	football	lacrosse	baseball
48	35	20	25

1. lacrosse

2. football

3. baseball or basketball

4. football or lacrosse

5. one of the four sports

6. none of the four sports

12.2 Cumulative Review Warm Up

Factor the polynomial completely.

1. $2x^2 - 8$

2. $18x^2 - 3x - 36$

3. $8 - 27x^3$

4. $x^4 - 7x^2 - 18$

5. $5x^7 + 5x^4$

6. $x^4 - 5x^3 - 9x^2 + 45x$

Name_____ Date _____

12.2 Practice A

In Exercises 1 and 2, tell whether the events are *independent* or *dependent*. Explain your reasoning.

1. A box contains an assortment of tool items on clearance. You randomly choose a sale item, look at it, and then put it back in the box. Then you randomly choose another sale item.

   Event *A*: You choose a hammer first.

   Event *B*: You choose a pair of pliers second.

2. A cooler contains an assortment of juice boxes. You randomly choose a juice box and drink it. Then you randomly choose another juice box.

   Event *A*: You choose an orange juice box first.

   Event *B*: You choose a grape juice box second.

In Exercises 3 and 4, determine whether the events are independent.

3. You are playing a game that requires rolling a die twice. Use a sample space to determine whether rolling a 2 and then a 6 are independent events.

4. A game show host picks contestants for the next game, from an audience of 150. The host randomly chooses a thirty year old, and then randomly chooses a nineteen year old. Use a sample space to determine whether randomly choosing a thirty year old first and randomly selecting a nineteen year old second are independent events.

5. A hat contains 10 pieces of paper numbered from 1 to 10. Find the probability of each pair of events occurring as described.

   a. You randomly choose the number 1, you replace the number, and then you randomly choose the number 10.

   b. You randomly choose the number 5, you do not replace the number, and then you randomly choose the number 6.

6. The probability that a stock increases in value on a Monday is 60%. When the stock increases in value on Monday, the probability that the stock increases in value on Tuesday is 80%. What is the probability that the stock increases in value on both Monday and Tuesday of a given week?

Name _____ Date _____

12.2 Practice B

In Exercises 1 and 2, tell whether the events are *independent* or *dependent*. Explain your reasoning.

1. You and a friend are picking teams for a softball game. You randomly choose a player. Then your friend randomly chooses a player.

   Event *A*: You choose a pitcher.

   Event *B*: Your friend chooses a first baseman.

2. You are making bracelets for party favors. You randomly choose a charm and a piece of leather.

   Event *A*: You choose heart-shaped charm first.

   Event *B*: You choose a brown piece of leather second.

In Exercises 3 and 4, determine whether the events are independent.

3. You are playing a game that requires flipping a coin twice. Use a sample space to determine whether flipping heads and then tails are independent events.

4. A game show host picks contestants for the next game from an audience of 5 females and 4 males. The host randomly chooses a male, and then randomly chooses a male. Use a sample space to determine whether randomly choosing a male first and randomly choosing a male second are independent events.

5. A sack contains the 26 letters of the alphabet, each printed on a separate wooden tile. You randomly draw one letter, and then you randomly draw a second letter. Find the probability of each pair of events.

   a. You replace the first letter before drawing the second letter.

   Event *A*: The first letter drawn is T.

   Event *B*: The second letter drawn is A.

   b. You do not replace the first letter tile before drawing the second letter tile.

   Event *A*: The first letter drawn is P.

   Event *B*: The second letter drawn is S.

6. At a high school football game, 80% of the spectators buy a beverage at the concession stand. Only 20% of the spectators buy both a beverage and a food item. What is the probability that a spectator who buys a beverage also buys a food item?

Name_____ Date _____

12.2 Enrichment and Extension

Independent and Dependent Events

	25 to 34	35 to 54	55 and over	Total
Did not complete high school	5325	9152	16,035	30,512
Completed high school	14,061	24,070	18,320	56,451
1 to 3 years of college	11,659	19,926	9662	41,247
4 or more years of college	10,342	19,878	8005	38,225
Total	41,387	73,026	52,022	166,435

In Exercises 1–4, use your knowledge of probability to analyze the table about years of education completed by age. If a person is chosen at random from this population:

1. What is the probability that the person is in the 25 to 34 age range and in the 55 and over age range?

2. What is the probability that a person is between 25 and 34 years of age and they have completed 1 to 3 years of college?

3. If the person is in the 55 and over age range, what is the probability that they completed 1 to 3 years of college?

4. If the person has completed high school, what is the probability that they are 35 to 54 years old?

5. If a person is vaccinated properly, the probability of his/her getting a certain disease is 0.05. Without a vaccination, the probability of getting the disease is 0.35. Assume that $\frac{1}{3}$ of the population is properly vaccinated.

   a. If a person is selected at random from the population, what is the probability of that person's getting the disease?

   b. If a person gets the disease, what is the probability that he/she was vaccinated?

6. Suppose a test for diagnosing a certain serious disease is successful in detecting the disease in 95% of all persons infected, but that it incorrectly diagnoses 4% of all healthy people as having the serious disease. If it is known that 2% of the population has the serious disease, find the probability that a person selected at random has the serious disease if the test indicates that he or she does.

7. The probability that a football player weighs more than 230 pounds is 0.69, that he is at least 75 inches tall is 0.55, and that he weighs more than 230 pounds and is at least 75 inches tall is 0.43. Find the probability that he is at least 75 inches tall if he weighs more than 230 pounds.

Name _____ Date _____

12.2 Puzzle Time

What Do You Put In A Barrel To Make It Lighter?

Write the letter of each answer in the box containing the exercise number.

Tell whether the events are dependent or independent.

1. You roll number cube and select a card from a standard deck of cards.

Event *A*: You roll a 3.

Event *B*: You select a face card.

2. A bag of marbles contains 3 red marbles, 2 yellow marbles, and 4 blue marbles. You randomly choose a marble, and without replacing it, you randomly choose another marble.

Event *A*: You choose a red marble first.

Event *B*: You choose a blue marble second.

Find the probability.

3. A container contains 13 almonds, 8 walnuts, and 19 peanuts. You randomly choose one nut and eat it. Then you randomly choose another nut. Find the probability that you choose a walnut on your first pick and an almond on your second pick.

4. The letters M, A, R, B, L, and E are each written on a card and placed into a hat. You randomly choose a card, return it, and then choose another card. Find the probability that you choose a vowel on your first pick and a consonant on your second pick.

5. A bag contains 3 red chips, 4 blue chips, 5 yellow chips, and 3 green chips. You randomly choose a chip, and without replacing it, you randomly choose another chip. Find the probability that you choose a yellow chip on your first pick and a blue chip on your second pick.

Answers

L. $\frac{2}{9}$

H. dependent

E. $\frac{2}{21}$

O. $\frac{1}{15}$

A. independent

1		2	3	4	5