Math Warm Up

In a family, there are three children. Assume that the probability that a child is a boy is $\frac{3}{5}$ and the probability that a child is a girl is $\frac{2}{5}$.

a) Draw a tree diagram to represent this compound event.

b) Use the multiplication rule of probability to find the probability that the eldest child is a girl, the middle child is a boy, and the youngest child is a girl.

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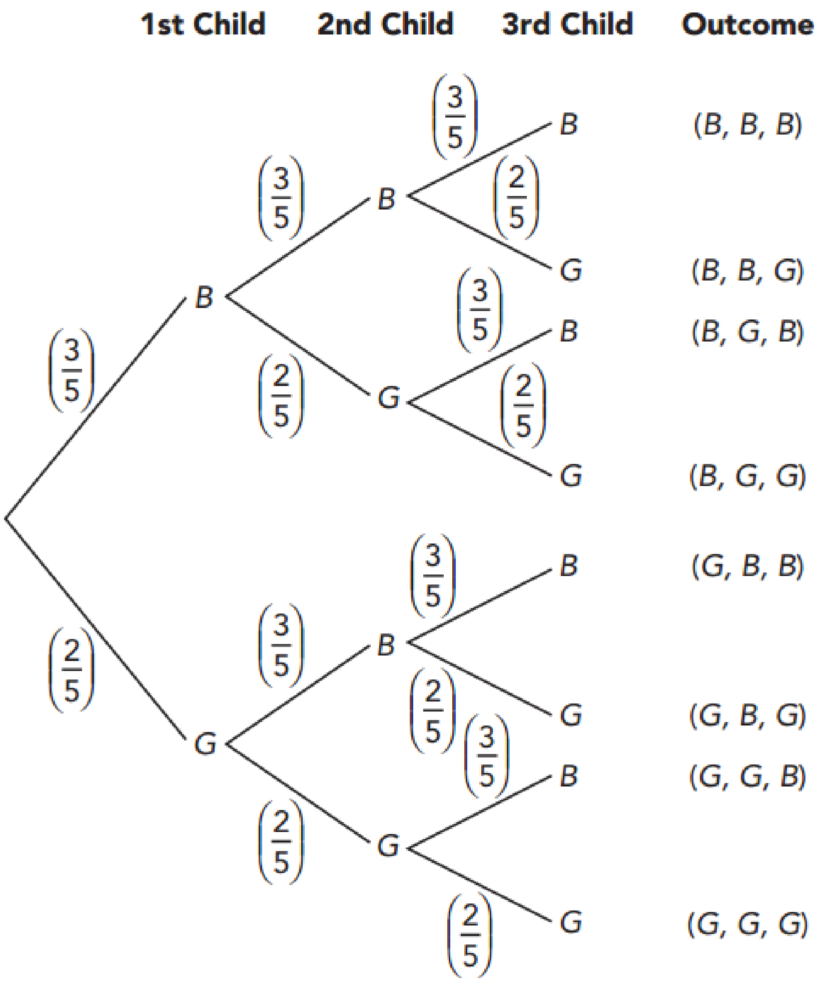


B represents boy
G represents girl

$$P(G, B, G) = P(G) \cdot P(B) \cdot P(G)$$

$$= \frac{2}{5} \cdot \frac{3}{5} \cdot \frac{2}{5}$$

$$= \frac{12}{125}$$

The probability that the eldest child is a girl, the middle child is a boy, and the youngest child is a girl is $\underline{\frac{12}{125}}$.

Lesson 11.4 Dependent Events

Objective

TSW understand concepts of probability

- Understand independent events
- Use rules of probability to solve problems with dependent events.

▶ A line of best fit can be used to model the linear association of bivariate quantitative data. A two-way table displays the relative frequencies of categorical data.

Common Core State Standards

8SP.4– Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table.

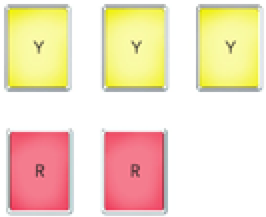
Mathematical Practices 1. Solve problems/persevere. 2. Reason. 4. Model mathematics

Lesson 11.4 Dependent Events

Lesson Objectives

- Understand dependent events.
- Use the rules of probability to solve problems with dependent events.

Suppose there are 3 yellow cards and 2 red cards. They are shuffled and placed in a stack. You are asked to draw two cards randomly, one at a time, from the stack without looking at the cards.



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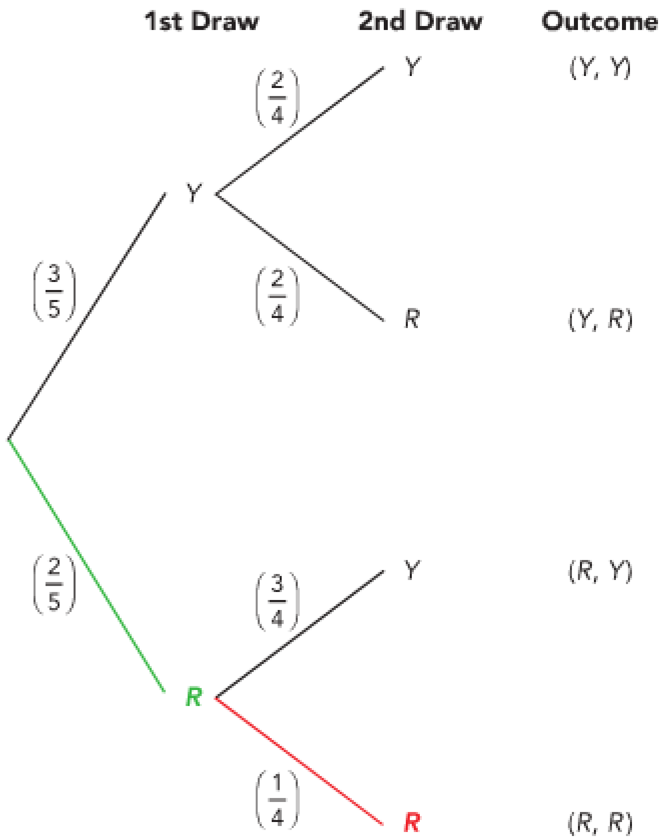

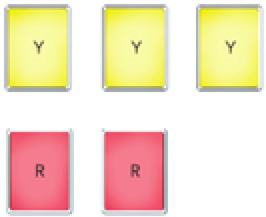

Consider the 5-card scenario again. To find the probability of drawing 2 red cards one after another without replacement, first you locate the branches that will give the favorable outcome (*R*, *R*). Then you multiply the probabilities along the branches. In other words, you multiply the probability of drawing a red card in the first draw with the probability of drawing a red card in the second draw.

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$$P(R, R) = P(R) \cdot P(R \text{ after } R)$$

$$= \frac{2}{5} \cdot \frac{1}{4}$$

$$= \frac{1}{10}$$

Example 9 Understand dependent events.

Inside a jar, there are 3 blue marbles and 7 green marbles. Rena randomly draws two marbles, one after another without replacement. Draw a tree diagram to represent the possible outcomes of this compound event.

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1st draw

$P(B) = \frac{3}{10}$

$P(G) = \frac{7}{10}$

2nd draw

$P(B \text{ after } B) = \frac{2}{9}$ There are 2 blue marbles left after 1 blue marble is drawn.

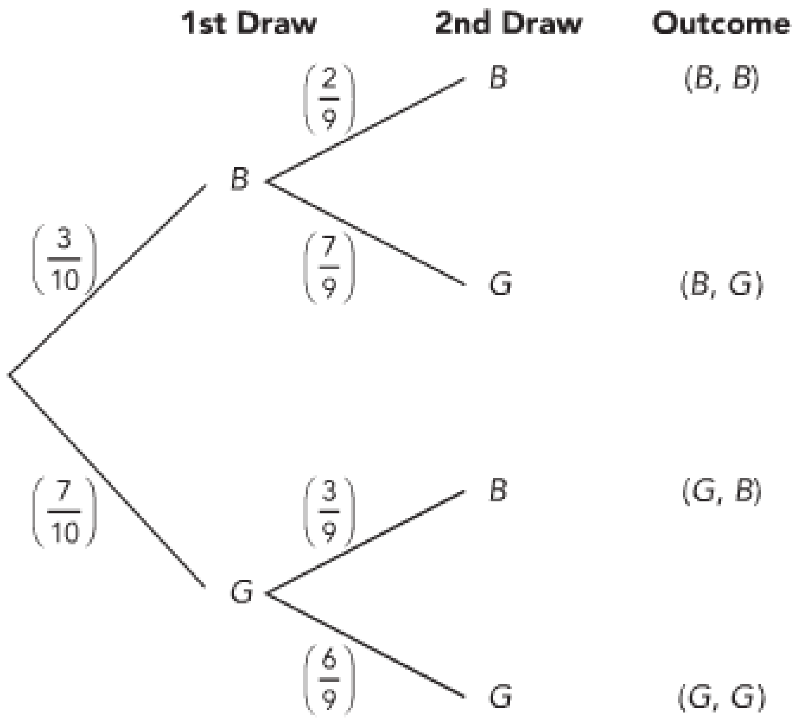
$P(G \text{ after } B) = \frac{7}{9}$ There are 7 green marbles left after 1 blue marble is drawn.

$P(B \text{ after } G) = \frac{3}{9}$ There are 3 blue marbles left after 1 green marble is drawn.

$P(G \text{ after } G) = \frac{6}{9}$ There are 6 green marbles left after 1 green marble is drawn.

Example 9 Understand dependent events.

Inside a jar, there are 3 blue marbles and 7 green marbles. Rena randomly draws two marbles, one after another without replacement. Draw a tree diagram to represent the possible outcomes of this compound event.

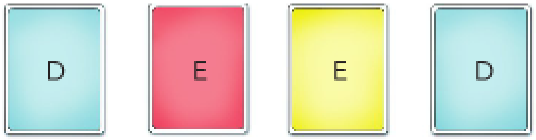


Lesson 11.4 Dependent Events

Guided Practice

Solve. Show your work.

1 A deck of four cards with the letters D, E, E, D are placed facing down on a table. Two cards are turned over at random to show the letters. Draw a tree diagram to represent the possible outcomes for this compound event.



Let *D* represent the letter D and *E* represent the letter E.

Lesson 11.4 Dependent Events

Guided Practice

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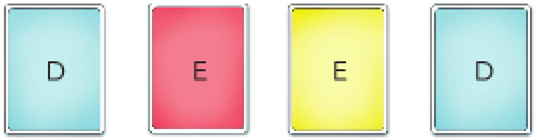

Let *D* represent the letter D and *E* represent the letter E.

1st draw

$P(D) = \frac{2}{4}$

$P(E) = \frac{2}{4}$

2nd draw

$P(D \text{ after } D) = \frac{?}{?}$ There is ? *D* left after 1 *D* is drawn.

$P(E \text{ after } D) = \frac{?}{?}$ There are ? *E*'s left after 1 *D* is drawn.

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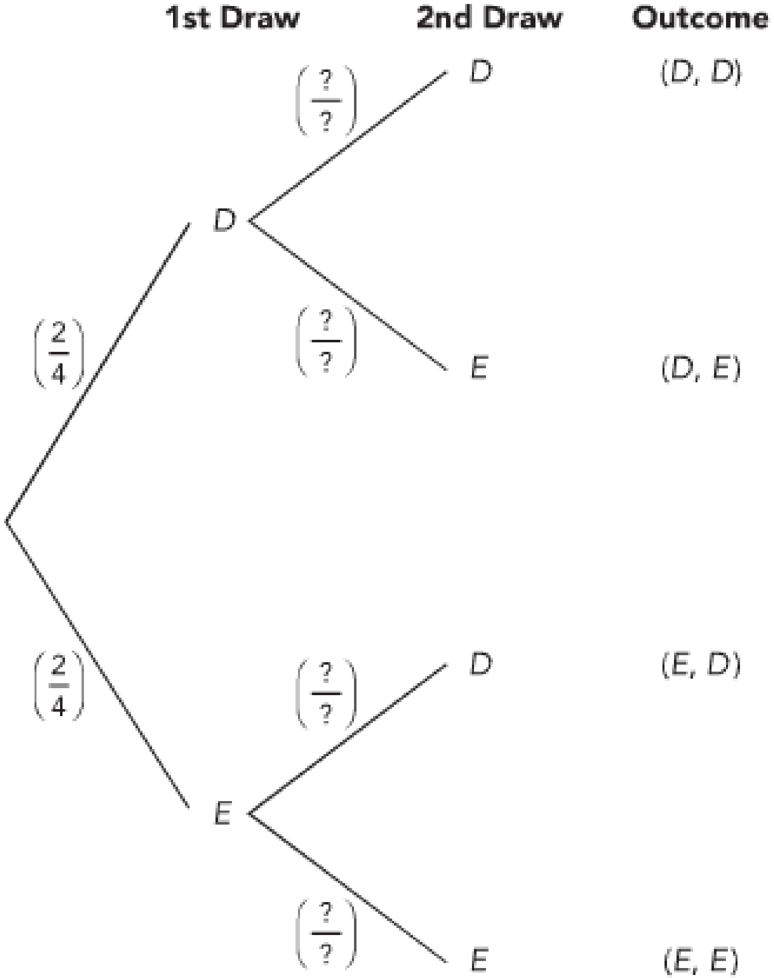
Lesson 11.4 Dependent Events



Lesson 11.4 Dependent Events

1st draw

$P(D) = \frac{2}{4}$

$P(E) = \frac{2}{4}$

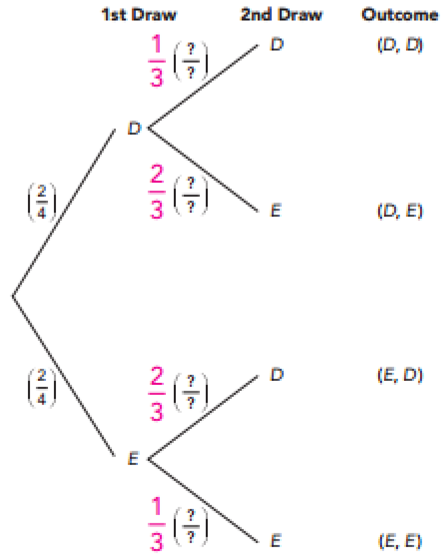
2nd draw

$P(D \text{ after } D) = \frac{?}{?}$ There is __?__ *D* left after 1 *D* is drawn. $\frac{1}{3}$; 1

$P(E \text{ after } D) = \frac{?}{?}$ There are __?__ *E*'s left after 1 *D* is drawn. $\frac{2}{3}$; 2

$P(D \text{ after } E) = \frac{?}{?}$ There are __?__ *D*'s left after 1 *E* is drawn. $\frac{2}{3}$; 2

$P(E \text{ after } E) = \frac{?}{?}$ There is __?__ *E* left after 1 *E* is drawn. $\frac{1}{3}$; 1



Lesson 11.1=4 Dependent Events

Practice 11.4 #1-6

Practice 11.4

State whether each pair of events is dependent or independent.

1. Drawing 2 red balls randomly, one at a time without replacement, from a bag of 6 balls
2. Tossing a coin twice
3. Reaching school late or on time for two consecutive days
4. Flooding of roads during rainy or sunny days

Draw a tree diagram for each situation.

5. 2 balls are drawn at random, one at a time without replacement, from a bag of 3 green balls and 18 red balls.
6. The probability of rain on a particular day is 0.3. If it rains, then the probability that Renee goes shopping is 0.75. If it does not rain, then the probability that she goes jogging is 0.72. Assume that shopping and jogging are mutually exclusive and complementary, and that rain and no rain are complementary.

Challenge-

*MangaHigh provides additional challenge

*Pick a Problem

*BuzzMath

Lesson Check #5,6,8-can read and interpret a two-way table

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Lesson 11.4 Dependent Events

State whether each pair of events is dependent or independent.

1. Drawing 2 red balls randomly, one at a time without replacement, from a bag of 6 balls Dependent

2. Tossing a coin twice Independent

3. Reaching school late or on time for two consecutive days Independent

4. Flooding of roads during rainy or sunny days Dependent

Draw a tree diagram for each situation. 5 – 6 See margin.

5. 2 balls are drawn at random, one at a time without replacement, from a bag of 3 green balls and 18 red balls.

6. The probability of rain on a particular day is 0.3. If it rains, then the probability that Renee goes shopping is 0.75. If it does not rain, then the probability that she goes jogging is 0.72. Assume that shopping and jogging are mutually exclusive and complementary, and that rain and no rain are complementary.

Solve. Show your work.

7. Geraldine has a box of 13 colored pens: 3 blue, 4 red, and the rest black. What is the probability of drawing two blue pens randomly, one at a time without replacement? $\frac{1}{26}$

8. A box contains 8 dimes, 15 quarters, and 27 nickels. A student randomly draws two items, one at a time without replacement, from the bag. Find the probability that 2 quarters are drawn. $\frac{3}{35}$

Ticket Out the Door-

What is the difference between solving problems with and without replacement?