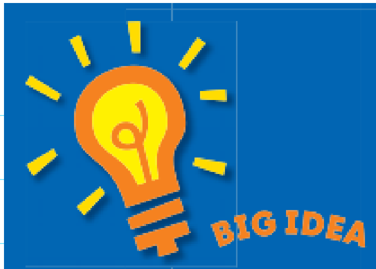
Lesson 11.4 Probability of Compound Events

Objective

TSW understand concept of probability

*understand dependent events

*use the rules of probability to solve problems with dependent events



▶ The probability of simple events can be used to compute the probability of compound events, either dependent or independent.

Common Core State Standards

Extend 7 SP 8b- Represent sample spaces for compound events suing methods such as organized lists, tables and tree diagrams.

Extend 7 SP 8a- Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

Mathematical Practices *MP3 Construct arguments MP 4 Model Mathematics MP8 Express regularity in reasoning*

Example 11 **Solve probability problems involving dependent events with more than one favorable outcome.**

Scott randomly chooses to go to school by either bus or bicycle, but not both. The tree diagram below shows that Scott's choice of transportation depends on the weather. The probability that it rains on a particular day is denoted by *a*. Assume that rainy and sunny days are mutually exclusive events.

Example 11 Solve probability problems involving dependent events with more than one favorable outcome.

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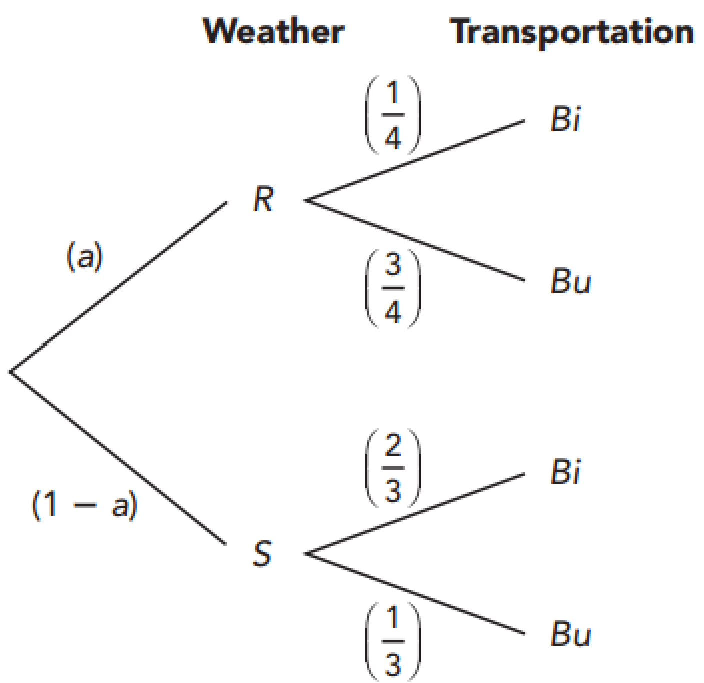

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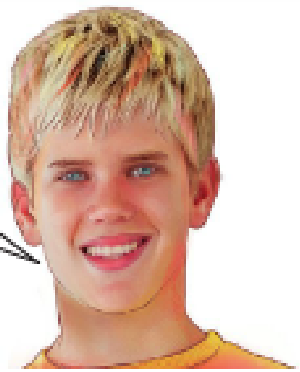
a) If the probability that it rains is $\frac{1}{2}$, find the probability that Scott will take a bus to school on any day.



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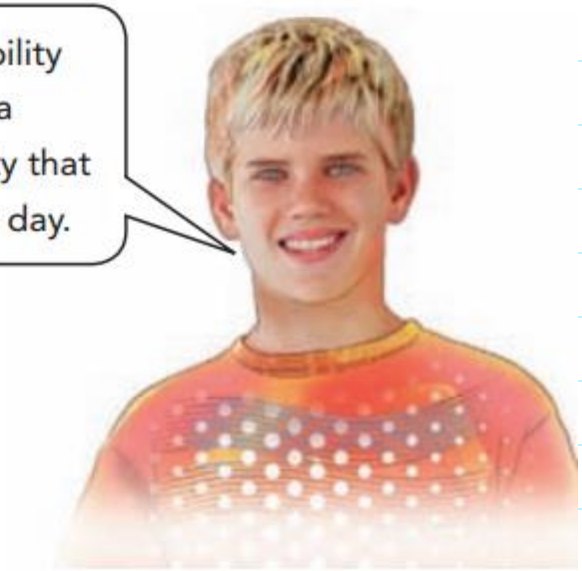

Solution

$P(R) = \frac{1}{2}$

$P(S) = 1 - \frac{1}{2} = \frac{1}{2}$ — Events *R* and *S* are complementary.

$P(Bu) = \frac{1}{2} \cdot \frac{3}{4} + \frac{1}{2} \cdot \frac{1}{3} = \frac{13}{24}$ — Evaluate $P(R, Bu) + P(S, Bu)$.

If the probability that it rains is $\frac{1}{2}$, then the probability that Scott will take a bus to school is $\frac{13}{24}$.

b) If the probability that it rains is $\frac{5}{8}$, find the probability that Scott will ride a bicycle to school.

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Solution

$P(S) = 1 - \frac{5}{8} = \frac{3}{8}$ Events R and S are complementary.

$P(Bi) = \frac{5}{8} \cdot \frac{1}{4} + \frac{3}{8} \cdot \frac{2}{3} = \frac{13}{32}$ Evaluate $P(R, Bi) + P(S, Bi)$.

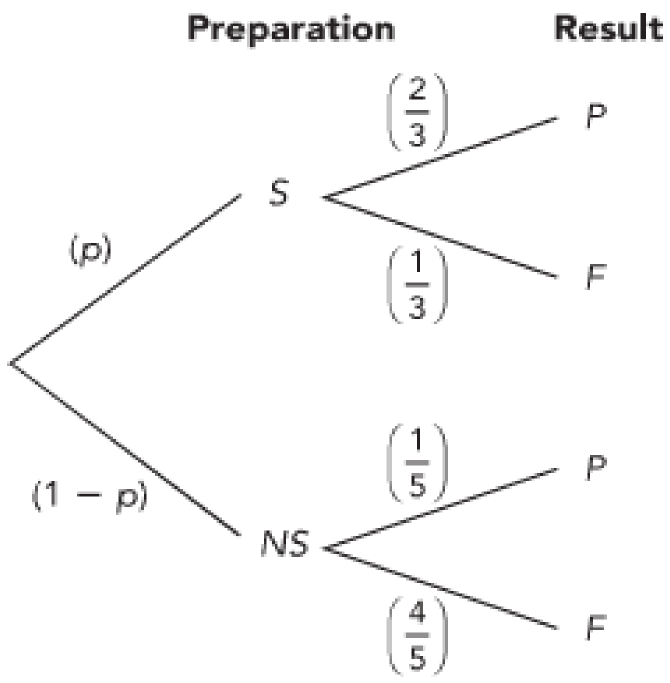
If the probability that it rains is $\frac{5}{8}$, then the probability that Scott will ride a bicycle is $\frac{13}{32}$.

Lesson 11.4 Probability of Dependent Events Day 3

Guided Practice

Solve. Show your work.

3 The tree diagram below shows how passing a test depends on whether a student studies (S) or does not study (NS) for the test. The probability that a student studies is denoted by p. Assume that S and NS are mutually exclusive events.



$P(S) = \frac{?}{?}$ Write the fraction for 0.4.

$P(NS) = 1 - P(S)$ Events S and NS are complementary.

$= 1 - \frac{?}{?}$

$= \frac{?}{?}$

$P(P) = \frac{?}{?} \cdot \frac{?}{?} + \frac{?}{?} \cdot \frac{?}{?}$ Evaluate $P(S, P) + P(NS, P)$.

$= \frac{?}{?}$

If the probability of studying is 0.4, then the probability that a student passes the test is __?__.

a) If the probability of studying is 0.4, find the probability that a student passes the test.

Lesson 11.4 Probability of Dependent Events Day 3

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$= 1 - \frac{?}{?}$

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$P(P) = \frac{?}{?} \cdot \frac{?}{?} + \frac{?}{?} \cdot \frac{?}{?}$ Evaluate $P(S, P) + P(NS, P)$.

$= \frac{?}{?}$

If the probability of studying is 0.4, then the probability that a student passes the test is __?__.

Lesson 11.4 Probability of Dependent Events Day 3

a) If the probability of studying is 0.4, find the probability that a student passes the test.

$P(S) = \frac{?}{?}$ $\frac{2}{5}$ — Write the fraction for 0.4.

$P(NS) = 1 - P(S)$ — Events S and NS are complementary.

$= 1 - \frac{?}{?}$ $\frac{2}{5}$

$= \frac{?}{?}$ $\frac{3}{5}$

$P(P) = \frac{?}{?} \cdot \frac{?}{?} + \frac{?}{?} \cdot \frac{?}{?}$ — Evaluate $P(S, P) + P(NS, P)$. $\frac{2}{5}; \frac{2}{3}; \frac{3}{5}; \frac{1}{5}$

$= \frac{?}{?}$ $\frac{29}{75}$

If the probability of studying is 0.4, then the probability that a student passes the test is __?__. $\frac{29}{75}$

Lesson 11.4 Probability of Dependent Events Day 3

b) If the probability of studying is 0.75, find the probability that a student fails the test.

$P(S) = \frac{?}{?}$ — Write the fraction for 0.75.

$P(NS) = 1 - P(S)$ — Events S and NS are complementary.

$= 1 - \frac{?}{?}$

$= \frac{?}{?}$

$P(F) = \frac{?}{?} \cdot \frac{?}{?} + \frac{?}{?} \cdot \frac{?}{?}$ — Evaluate $P(S, F) + P(NS, F)$.

$= \frac{?}{?}$

If the probability of studying is 0.75, then the probability that a student fails

b) If the probability of studying is 0.75, find the probability that a student fails the test.

$P(S) = \frac{?}{?}$ $\frac{3}{4}$ — Write the fraction for 0.75.

$P(NS) = 1 - P(S)$ — Events S and NS are complementary.

$= 1 - \frac{?}{?}$ $\frac{3}{4}$

$= \frac{?}{?}$ $\frac{1}{4}$

$P(F) = \frac{?}{?} \cdot \frac{?}{?} + \frac{?}{?} \cdot \frac{?}{?}$ — Evaluate $P(S, F) + P(NS, F)$. $\frac{3}{4}, \frac{1}{3}, \frac{1}{4}, \frac{4}{5}$

$= \frac{?}{?}$ $\frac{9}{20}$

If the probability of studying is 0.75, then the probability that a student fails the test is __?__. $\frac{9}{20}$

Lesson 11.4 Probability of Dependent Events

Practice 11.4 #10-12

Name:____________

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.

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?

Challenge- #13 & 14

*Solve created equations

"Challenge your brain"

*BuzzMath

*MangaHigh

Lesson Check #10-can use the multiplication rule of probability for dependent events

Probability of Compound Events

Ticket Out the Door- Connect, Extend, Challenge

1. How are the ideas and information presented CONNECTED to what you already knew?

2. What new ideas did you get that EXTENDED or pushed your thinking in new directions?

3. What is still CHALLENGING or confusing for you to get your mind around? What questions, wonderings or puzzles do you now have?