Name ________________ Class ________ Date ________

Section 14-6 Notes

Conditional Probability Formulas: $\boxed{P(B|A) = \dfrac{P(A \text{ and } B)}{P(A)}}$

1. A Midwestern airport reported that of all thunderstorms affecting the airport, 45% were categorized as severe. The probability of a thunderstorm being severe *and* producing a tornado was 18%.

$P(\text{severe}) = 45\%$
$P(\text{severe} \,\&\, \text{tornado}) = 18\%$

What is the probability of a storm producing a tornado given that it is severe?

To start, set up a fraction with the decimal form of the percent of storms that were severe as the denominator: $\frac{}{0.45} =$ __ %

$P(\text{Tornado} \mid \text{severe}) = \dfrac{P(\text{severe} \,\&\, \text{torn})}{P(\text{severe})} = \dfrac{.18}{.45} = \boxed{.4 \text{ or } 40\%}$

2. Half of your friends went to the pool, and half of them went to the lake. Of the friends who went to the pool, 13% got sunburned. What is the conditional probability that a randomly chosen friend who went to the pool got sunburned?

$P(\text{pool}) = .5$
$P(\text{lake}) = .5$
$P(\text{pool} \,\&\, \text{burned}) = .13$

To start, write a fraction with the percent that went to the pool as the denominator: $\frac{\quad}{\quad} =$ ____

$P(\text{burned} \mid \text{pool}) = \dfrac{P(\text{burned} \,\&\, \text{pool})}{P(\text{pool})} = \dfrac{.13}{.50} = \boxed{.26 \text{ or } 26\%}$

3. In the junior class, 80% of the students own a bike, 40% of the students own a scooter, and 20% own both. What are the probabilities that a bike owner also owns a scooter, and a scooter owner also owns a bike?

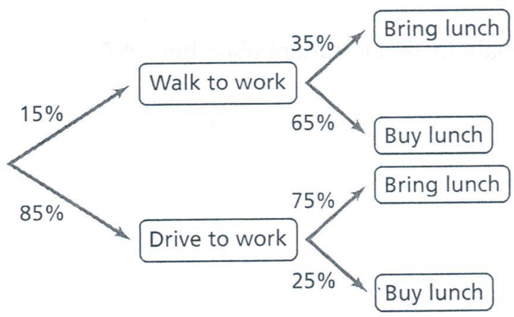
$P(\text{bike}) = .8$
$P(\text{scooter}) = .4$
$P(\text{bike} \,\&\, \text{scooter}) = .2$

$P(\text{scooter} \mid \text{bike}) = \dfrac{.2}{.8} = \boxed{.25 \text{ or } 25\%}$

$P(\text{bike} \mid \text{scooter}) = \dfrac{.2}{.4} = \boxed{.5 \text{ or } 50\%}$

4. The tree diagram at the right shows the percentages of people who walk or drive to work and whether they bring lunch to work or buy lunch. What is the combined probability that a person brings their lunch to work?

$\boxed{P(A \text{ and } B) = P(A) \cdot P(B|A)}$



$P(\text{Brings lunch}) = P(\text{Walks and Brings Lunch}) + P(\text{Drives and Brings Lunch})$

$= P(\text{Walks}) \cdot P(\text{Bring} \mid \text{Walks}) + P(\text{Drives}) \cdot P(\text{Bring} \mid \text{Drives})$

$= (.15)(.35) + (.85)(.75)$

$= .0525 + .6375$

$\boxed{= .69 \text{ or } 69\%}$

Name ______________________ Class ____________ Date ____________

Practice (continued) *Form K*

Conditional Probability Formulas

Of the people who went to a museum last month, 45% purchased tickets for the planetarium show, 38% purchased tickets for the 3-D movie, and 8% bought tickets for both shows.

$P(\text{planet}) = .45$
$P(\text{3-D}) = .38$
$P(\text{both}) = .08$

5. What is the conditional probability that a person who bought a planetarium ticket also bought a 3-D movie ticket?

$P(3D \mid \text{Planet}) = P(\text{both}) / P(\text{Planet}) = \frac{.08}{.45} = \boxed{.17 \text{ or } 18\%}$

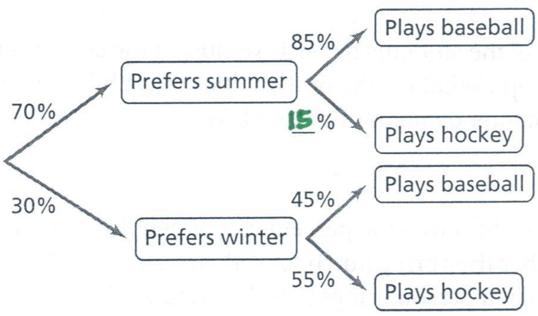
6. **Writing** Explain the meaning of P(bought a planetarium ticket | bought a 3-D ticket). Then calculate the probability.

Those that bought a 3-D ticket also bought a planetarium ticket.

$P(\text{Planet} \mid \text{3-D}) = P(\text{both}) / P(\text{3-D}) = \frac{.08}{.38} = \boxed{.21 \text{ or } 21\%}$

The diagram below shows the percent of students who preferred either summer or winter, and whether they played baseball or hockey. Use the diagram for Exercises 7 and 8.

7. Complete the diagram.



8. What is the combined probability that a student plays hockey?

$P(\text{Hockey}) = P(\text{summer} \ \& \ \text{hockey}) + P(\text{winter} \ \& \ \text{hockey})$

$= P(\text{summer}) \cdot P(\text{hockey} \mid \text{summer}) + P(\text{winter}) \cdot P(\text{hockey} \mid \text{winter})$

$= (.7)(.15) + (.3)(.55)$

$\boxed{= .27 \text{ or } 27\%}$