22.1 Conditional Probability

Name_____

Date_____Period_____

1. The table shows data for 25 students chosen at random. Let *A* be the event that a student has a job and *B* be the event that a student has a driver's license. What is the probability that a student with a job has a license?

B
Has a Driver's License

A Has a Job	**Yes**	**No**	**Total**
Yes		3	12
No	8		13
Total	17		25

$P(A \cap B) =$ _____

$P(A) =$ _____

$P(B \mid A) = \frac{P(A \cap B)}{P(A)} =$ _____

Now find the probability that a student does not have a job given that they have a driver's license? _____

2. The table shows data for 30 students chosen at random. Let *A* be the event that a student owns a dog and *B* be the event that a student owns a cat. What is the probability that a student with a cat also owns a dog?

B
Owns a Cat

A Owns a Dog	**Yes**	**No**	**Total**
Yes			21
No	8		9
Total		10	

$P(A \cap B) =$ _____

$P(B) =$ _____

$P(A|B) = \frac{P(A \cap B)}{P(B)} =$ _____

Now find the probability that a student has a cat given that they don't own a dog. _____

3. A researcher collected data from 140 students to study the relationship between working a part-time job and owning a car.

	Owns a car	**Does not own a car**	**Total**
Works a part-time job	20	40	60
Does not work a part-time job	10	70	80
Total	30	110	140

a. What is the probability that a student works part-time given that they own a car? _____

b. Is the probability that a student owns a car given that they work part-time the same as the probability found in Problem 3a? Explain.

_____

_____

The **two-way frequency table** shows the genders and grade levels of students who attended a school district meeting.

	Boys	Girls	TOTAL
Middle School	20	25	45
High School	35	20	55
TOTAL	55	45	100

Use the table above to identify the totals, and then calculate the conditional probabilities.

4. Let *A* be that a student is a high-schooler. Let *B* be that a student is a boy. Find $P(A|B)$, the probability that a student who is a boy is also a high-schooler.
   a. What is the total in the *B* column? $n(B) =$ _____
   b. What is the total in the cell for *A* and *B*? $n(A \cap B) =$ _____ c. $P(A|B) = \frac{n(A \cap B)}{n(B)} =$ _____
5. Let *A* be that a student is a girl. Let *B* be that a student is a middle-schooler. Find $P(A|B)$, the probability that a student who is a middle-schooler is also a girl.
   a. What is the total in the *B* row? $n(B) =$ _____
   b. What is the total in the cell for *A* and *B*? $n(A \cap B) =$ _____ c. $P(A|B) = \frac{n(A \cap B)}{n(B)} =$ _____

22.2-22.3 Independent/Dependent Events

The table show the gender and music preference in a group of people. Let A be that a person prefers rock and B be that a person if male.

	Prefers Rock	Prefers Classical	Total
Male	**12**	**3**	**15**
Female	**24**	**6**	**30**
Total	**36**	**9**	**45**

Are events A and B independent?

1. Method 1. Test whether $P(A \cap B) = P(A) \cdot P(B)$.
   a. $P(A) =$ _____ b. $P(B) =$ _____ c. $P(A \cap B) =$ _____ d. Is A independent of B?_____
2. Method 2. Test whether $P(A) = P(A|B)$
   a. $P(A) =$ _____ b. $P(A|B) =$ _____ c. Is A independent of B?_____

The table shows the results of a survey of students intended career and their like of solving puzzles.

	Plans a career in a math/science field	Plans a career in a non math/science field	Total
Likes solving puzzles	**35**	**15**	**50**
Dislikes solving puzzles	**9**	**21**	**30**
Total	**44**	**36**	**80**

3. Determine whether planning for a career in a math/science field and a like for solving puzzles are dependent or independent events. Use either method.