Geometry
Big Ideas Chapter 12 Study Guide - Probability

Definitions

Probability experiment: an action, or trial, that has varying results.

Sample space: the set of all possible outcomes for that experiment.

Event: a collection of one or more outcomes.

Probability of an event: a measure of the likelihood, or chance, that the event will occur.

Geometric probability: the probability is found by calculating a ratio of two lengths, areas, or volumes.

Trial: one probability experiment.

Independent events: for two events, the occurrence of one event does not affect the occurrence of the other event.

Dependent events: for two events, the occurrence of one event does affect the occurrence of the other event.

Two-way frequency table: a frequency table that displays data collected from one source that belong to two different categories.

Joint frequency: an entry in a two-way table.

Marginal frequency: the sum of a row or column in the table.

Joint relative frequency: the ratio of a joint frequency over the total outcomes.

Marginal relative frequency: the ratio of a marginal frequency over the total outcomes.

Conditional relative frequency: the ratio of a joint relative frequency over the marginal relative frequency.

Compound event: the union or intersection of two events.

Mutually exclusive events: two events that do not share outcomes.

Overlapping events: two events that have one or more outcomes in common.

Permutation: an arrangement of objects in which order is important.

Combination: an arrangement of objects in which order is not important.

Random variable: a variable whose value is determined by the outcomes of a probability experiment.

Probability distribution: a function that gives the probability of each possible value of a random variable.

Binomial distribution: the probabilities of the outcomes of a *binomial experiment*.

Joint frequency

Attendance			
Class	Attending	Not Attending	Total
Junior	42	64	106
Senior	77	37	114
Total	119	101	220

Marginal frequency

Formulas

Theoretical Probability: $\text{Theoretical probability} = \dfrac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Experimental Probability: $\text{Experimental probability} = \dfrac{\text{Number of successes}}{\text{Number of trials}}$

Joint relative frequency

Attendance			
Class	Attending	Not Attending	Total
Junior	$\frac{42}{220} \approx 0.191$	$\frac{64}{220} \approx 0.291$	0.482
Senior	$\frac{77}{220} = 0.35$	$\frac{37}{220} \approx 0.168$	0.518
Total	0.541	0.459	1

Marginal relative frequency

Probability of the Complement of an Event: $P(\overline{A}) = 1 - P(A)$

Probability of Independent Events: P(A and B) = P(A) * P(B)

Probability of Dependent Events: P(A and B) = P(A) * P(B|A)

Probability of Compound Events: P(A or B) = P(A) + P(B) - P(A and B)

Disjoint Events A and B: P(A and B) = 0

Conditional relative frequency by Class

Attendance		
Class	Attending	Not Attending
Junior	$\frac{0.191}{0.482} \approx 0.396$	$\frac{0.291}{0.482} \approx 0.604$
Senior	$\frac{0.35}{0.518} \approx 0.676$	$\frac{0.168}{0.518} \approx 0.324$

Factorial: $n! = n*(n-1)*(n-2)*...*3*2*1$ for n > 0 and $0! = 1$

Permutations: $_nP_r = \dfrac{n!}{(n-r)!}$ when choosing r objects out of n objects

Combinations: $_nC_r = \dfrac{n!}{r!(n-r)!}$ when choosing r objects out of n objects

Binomial Probability: P(k successes) $= {}_nC_k\, p^k (1-p)^{(n-k)}$

Geometry   Name _____

Big Ideas Chapter 12 Practice Problems   Date _____ Period _____

Show all work!!!

1) When two six-sided dice are rolled, there are 36 possible outcomes.

a. Find the probability that the sum is 5.

b. Find the probability that the sum is not 5.

c. Find the probability that the sum is less than or equal to 5.

d. Find the probability that the sum is less than 5.

2) 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.

3) Use the two-way table to create another two-way table that shows the joint and marginal relative frequencies.

		Surfing Style		
		Regular	Advanced	Total
Gender	Male	86	24	110
	Female	77	18	95
	Total	163	42	205

For problems 4 and 5, a paper bag contains ten slips of paper with the numbers 1 to 10 written on them.

Event A: You randomly choose a first slip with the number 4 written on it.

Event B: You randomly choose a second slip with an even number written on it.

4) You put the first slip back into the bag before choosing the second slip.

a. Independent or dependent events?

b. Calculate P(A and B)

c. Calculate P(A or B)

5) You do not put the first slip back into the bag before choosing the second slip.

a. Independent or dependent events?

b. Calculate P(A and B)

c. Calculate P(A or B)

6) Evaluate the following expressions.

a. $_7P_2$

b. $_7C_3$

7) Find the number of ways that you can arrange the letters in "CHURN".

a. all of the letters

b. 2 of the letters

Problems 8 through 11. The girls Amy, Ann, and Doris and the boys Al, Aaron, Bob, and Roy are in a nursery group. Determine the number of ways the children can be arranged in a line with the following conditions.

8) A girl is always at the head of the line.

9) Roy is always at the head of the line.

10) A child whose name begins with A is always at the head of the line.

11) A child whose name begins with A is always at the head and the rear of the line.