12-3 Word Problem Practice

Conditional Probability

Conditional Probability

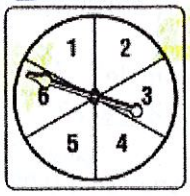
KEY

						Sum
1,1	1,2	1,3	1,4	1,5	1,6	
2,1	2,2	2,3	2,4	2,5	2,6	
3,1	3,2	3,3	3,4	3,5	3,6	
4,1	4,2	4,3	4,4	4,5	4,6	11
5,1	5,2	5,3	5,4	5,5	5,6	
6,1	6,2	6,3	6,4	6,5	6,6	

Prob. dist. 2/36

1. SPINNERS Majorie is playing a game that uses the spinner shown. What is the probability that Majorie spins the number 6, given that she spins a number greater than 2?

greater than 2: 3, 4, 5, 6



$\frac{P(\text{and})}{P(\text{given})} = \frac{1}{4}$

2. CARDS Monique is playing a card game. To win the game, she needs to draw a card that is a club. What is the probability that Monique wins the card game if the card she draws is black?

$\frac{1}{2}$

3. PET GROOMING At the CleanPaws pet grooming salon, owners can bring their cats or dogs in to get bathed only, or bathed and groomed. The table shows how many animals the salon serviced this week.

Animal	Bathed Only	Bathed and Groomed
Dog	48	51
Cat	3	12

Find the probability that an animal was bathed and groomed, given that the animal was a cat.

$\frac{P(\text{and})}{P(\text{given})} = \frac{12}{15}$

$= \frac{8 \text{ or } 4}{5}$

4. DICE Stan rolls a pair of dice. What is the probability that the total of the two dice is 11, given that one of the dice rolls is a 5?

11 of 36 contains a "5"

$\frac{P(\text{and})}{P(\text{given})} = \frac{2}{11}$

$\frac{2}{36} \div \frac{11}{36}$ or $\frac{2}{36} \cdot \frac{36}{11} = \frac{2}{11}$

5. WOMEN IN POLITICS The table shows the gender of United States governors who served in 2007, 1997, and 1987.

Year	Male Governors	Female Governors
2007	42	8
1997	47	3
1987	47	3

Source: National Governors Association

a. Find the probability that a governor is female, given that the governor served in 1987.

$\frac{P(\text{and})}{P(\text{given})} = \frac{3}{50}$

b. Find the probability that a governor is female, given that the governor served in 2007.

$\frac{P(\text{and})}{P(\text{given})} = \frac{8}{50} = \frac{4}{25}$

c. Find the probability that a governor listed in the table served in 1997, given that the governor is male.

$\frac{P(\text{and})}{P(\text{given})} = \frac{47}{136}$

Name_____ CCM2 Unit 6 Lesson 2 Quiz

Conditional Probability

1. A pet store contains 35 light green parakeets (14 females and 21 males) and 44 sky blue parakeets (28 females and 16 males). Arrange this information in a two-way table.

	Male	Female	Total
Light Green Parakeet	21	14	35
Sky Blue Parakeet	16	28	44
Total	37	42	79

females + skyBlue or Addition Rule P(Female) + P(blue) − P(Female and Blue)

a. You randomly choose one of the parakeets. What is the probability that it is a female or a sky blue parakeet? "OR" means Add $\frac{42}{79} + \frac{16 \text{ more}}{79} = \frac{58}{79}$ $\frac{42}{79} + \frac{44}{79} - \frac{28}{79} = \frac{58}{79}$

b. What is the probability that the randomly chosen parakeet is both green and male? $\frac{21}{79}$

c. What is the probability that the randomly chosen parakeet is female, given it is green? $P(\text{given}) = \frac{14}{35} = \frac{2}{5}$

2. At Kennedy Middle School, the probability that a student takes Technology and Spanish is 0.087. The probability that a student takes Technology is 0.68. What is the probability that a student takes Spanish given that the student is taking Technology? $\frac{P(\text{and})}{P(\text{given})} = \frac{.087}{.68} = .1279$ or 12.8%

3. In New York State, 48% of all teenagers own a skateboard and 39% of all teenagers own a skateboard and roller blades. What is the probability that a teenager owns roller blades given that the teenager owns a skateboard? $\frac{P(\text{and})}{P(\text{given})} = \frac{.39}{.48} = .8125 = 81\%$

4. What is the probability of choosing the ace of spades from a standard deck of cards given that the card you draw is a black card? $P(\text{given}) = \frac{1 \text{ Black ace of spades}}{26 \text{ Black}} = \frac{1}{26}$

5. You put a CD that has 8 songs in your CD player. You set the player to play the songs at random. The player plays all 8 songs without repeating any song. What is the probability that the songs are played in the same order they are listed on the CD? $\frac{1}{40,320}$ Multiplication Rule for 8 $\frac{1}{8}_{1st} \cdot \frac{1}{7}_{2nd} \cdot \frac{1}{6}_{3} \cdot \frac{1}{5}_{4} \cdot \frac{1}{4}_{5} \cdot \frac{1}{3}_{6} \cdot \frac{1}{2}_{7} \cdot \frac{1}{1}_{8} = \frac{1}{40,320}$

6. There are 16 teams in the state basketball tournament. If each team has an equal chance of winning, what are the chances that the places will go as follows:
   1st place – West Jordan HS
   2nd place – Riverton
   3rd place – Bingham
   4th place – Copper Hills

$\frac{1}{16}_{1st} \cdot \frac{1}{15}_{2nd} \cdot \frac{1}{14}_{3rd} \cdot \frac{1}{13}_{4th} = \frac{1}{43,680}$

7. There are 204 students in the 10th grade. Five of these students will be selected randomly to represent your class on a 5-person bowling team. What is the probability that the team chosen will be you and your 4 best friends? $\frac{1}{204}_{1st} \cdot \frac{1}{203}_{2nd} \cdot \frac{1}{202}_{3rd} \cdot \frac{1}{201}_{4th} \cdot \frac{1}{200}_{5th} = \frac{1}{840,750,120}$ $\frac{1}{2,802,350,040}$

*tried to cancel factors BEFORE multiplying.

8. What are all the different ways the letters HTAM can be arranged? What is the probability that if you randomly selected one of these arrangements, you would select the one that spells MATH?

$\frac{4}{M}_{\text{letters}} \cdot \frac{3}{A}_{\text{letter}} \cdot \frac{2}{T}_{\text{letter}} \cdot \frac{1}{H}_{\text{letters.}} = 24 \text{ ways}$

$\frac{1}{4} \cdot \frac{1}{3} \cdot \frac{1}{2} \cdot \frac{1}{1} = \frac{1}{24}$ probability

CCM2 – Probability Review

Name: _____

Probability Test – Be able to answer the following:

1. Venn Diagrams:
   a. draw them
   b. answer simple questions
   c. determine probability
2. Union, intersection and complement of sets
3. Determine sample space
4. Determine number of possible outcomes
   a. counting principle
5. Probability
   a. "baby" probability of one item
   b. compound probability
      i. multiplying (independent vs dependent)
      ii adding (mutually exclusive vs inclusive)
   c. conditional probability

REVIEW:

1. Draw a Venn Diagram to represent the following: 74 models were hired for the spring shows at a certain Paris design house and the following information about their body piercing was compiled. Note: Ears count as one piercing.

- Among the models with pierced ears combined with another body piercing, half the difference between all three parts pierced and only ears and nose pierced have only their ears and tongue pierced.
- There are 10 models who had all three parts pierced.
- 18 models have multiple piercings.
- All but 5 models have pierced ears.
- No model has pierced her nose or her tongue without piercing her ears as well, but one pierced both her nose and her tongue without piercing her ears.

(see next page)

2. The following table shows the results of a survey in which 90 dog owners were asked (1) how much they have spent in the last year on their dog's health care and (2) whether their dogs were purebred or mixed breeds. The results are summarized in the table below.

		Type of Dog		
		Purebred	Mixed Breed	Total
Health Care	Less than $100	19	21	40
	$100 or more	35	15	50
	Total	54	36	90

a. Find the probability that $100 or more was spent on a randomly selected dog's health care in the last year.

$\frac{50}{90} = \frac{5}{9}$

b. Given that a randomly selected dog owner spent less than $100, find the probability that the dog was a mixed breed.

$\frac{P(\text{and})}{P(\text{given})} = \frac{21}{40}$ (spent less $100 AND mixed breed) / (spent less $100)

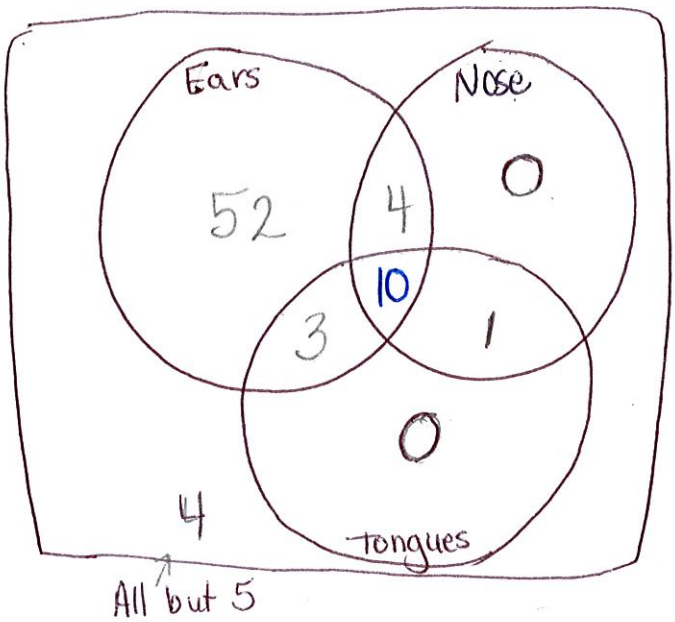
c. Find the probability that a randomly selected dog owner spent $100 or more on health care and the dog was a mixed breed.

$\frac{15}{90} = \frac{1}{6}$

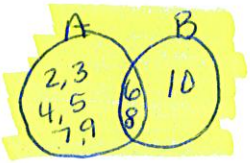
3. If you roll a die and pick a card from a standard deck, how many outcomes are possible?

6 numbers $\cdot$ 52 cards $= 6 \cdot 52 =$ 312 outcomes

1. Review



All but 5 had ears pierced.
74-5=69 in ears.



4. IF A = {2,3,4,5,6,7,8,9} B = {6,8,10} Create a Venn Diagram of the sets
   a. find AUB b. find A∩B c. A^c – A "complement" or NOT A

$\{2,3,4,5,6,7,8,9,10\}$ $\{6,8\}$ $\{10\}$

5. In homeroom, 3 of the 16 girls have red hair and 2 of the 15 boys have red hair. What is the probability of selecting a boy or a red-haired person as homeroom representative to student council?

Addition Rule $P(\text{Boy}) + P(\text{Red-hair}) - (\text{Redheaded Boys})$

$\frac{15}{31} + \frac{5}{31} - \frac{2}{31} = \frac{18}{31}$

6. Lynn collects stamps from different countries. He has five from Canada, two from France, one from Russia, four from Great Britain, and one from Germany. If he accidentally loses one stamp, what is the probability that it is the stamp from Russia?

$5+2+1+4+1 = 13$ total stamps

$\frac{1}{13}$ $\frac{1 \text{ Russian stamp}}{13 \text{ total stamps}}$

7. Compute the probability of drawing two aces from a well-shuffled deck of 52 cards if the first card is not replaced before the second card is drawn.

Multiplication Rule $\frac{4}{52} \cdot \frac{3}{51} = \frac{1}{13} \cdot \frac{1}{17} = \frac{1}{221}$ (1st, 2nd)

8. Suppose you are going to throw two fair dice. What is the probability of getting a 5 on the first die and a 5 on the second die?

Multiplication Rule $\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$

9. If a fair die is thrown. Find the probability the face shows a number greater than 2 given that it is prime.

Conditional probability $\frac{P(\text{and})}{P(\text{given})} = \frac{2}{3}$ $\frac{\text{prob. } >2 \text{ and prime}}{\text{prob. \# is prime}}$ 2, 3, 5 are prime

10. A standard deck of cards is shuffled and one card is drawn. Find the probability that the card is red or a jack.

Addition Rule $P(\text{Red}) + P(\text{Jack}) - P(\text{Red AND Jack})$

$\frac{26}{52} + \frac{4}{52} - \frac{2}{52} = \frac{28}{52} = \frac{7}{13}$

11. In a box of 11 parts, four of the parts are defective. Two parts are selected at random, one at a time, without replacement.

a. Find the probability that both parts are defective.

Multiplication Rule $\frac{4^{2}}{11} \cdot \frac{3}{10_{5}} = \frac{6}{55}$

b. Find the probability that both parts are not defective.

$\frac{7}{11} \cdot \frac{6^{3}}{10_{5}} = \frac{21}{55}$

12. The two-way table shows the favorite leisure activities for 50 adults - 20 men and 30 women. If a person were selected at random from the above survey:

	Dance	Sports	TV	Total
Men	2	10	8	20
Women	16	6	8	30
Total	18	16	16	50

a) What is the probability that a person selected is a women? $\frac{30}{50} = \frac{3}{5}$

b) What is the probability that a person selected likes to dance? $\frac{18}{50} = \frac{9}{25}$

c) What is the probability that a person selected likes sports given that they are male?

$\frac{P(\text{and})}{P(\text{given})} = \frac{10}{20} = \frac{1}{2}$