

Name \_\_\_\_\_ Date: \_\_\_\_\_ Per: \_\_\_\_\_

## Conditional Probability Notes

Use the sample space of the sum of two standard number cubes to help find the probability of each outcome below.

White →	1	2	3	4	5	6
Red ↓						
1	(1, 1) = 2	(1, 2) = 3	(1, 3) = 4	(1, 4) = 5	(1, 5) = 6	(1, 6) = 7
2	(2, 1) = 3	(2, 2) = 4	(2, 3) = 5	(2, 4) = 6	(2, 5) = 7	(2, 6) = 8
3	(3, 1) = 4	(3, 2) = 5	(3, 3) = 6	(3, 4) = 7	(3, 5) = 8	(3, 6) = 9
4	(4, 1) = 5	(4, 2) = 6	(4, 3) = 7	(4, 4) = 8	(4, 5) = 9	(4, 6) = 10
5	(5, 1) = 6	(5, 2) = 7	(5, 3) = 8	(5, 4) = 9	(5, 5) = 10	(5, 6) = 11
6	(6, 1) = 7	(6, 2) = 8	(6, 3) = 9	(6, 4) = 10	(6, 5) = 11	(6, 6) = 12

1. P(even sum if at least one die is a 3) =
2. P(at least one die is 3 if the sum is even) =
3. P(rolling doubles if the sum is 7) =
4. P(rolling doubles if the sum is 8) =

### **Conditional Probability Formula**

$P(A | B)$  = "Probability of event A happening if event B has happened"  
= "Probability of A given B"

$$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{\text{Probability of BOTH A and B}}{\text{Probability of given event}}$$

Use the conditional formula or just basic counting to find each of the probabilities below. (All card questions refer to drawing one card from a standard deck of cards and all dice questions refer to rolling two standard dice.)

5. P(Sum is 10 | Rolled doubles) =
6. P(Prime sum | Even sum) =
7. P(Queen | Face Card) =
8. P(Heart | Red Card) =
9. P(Red Card | Heart) =

**Conditional Probability with word problems** - use the formula:  $P(A | B) = \frac{P(A \cap B)}{P(B)}$   
 Give answers as a reduced fraction or a percentage.

10. A jar contains black and white marbles. Two marbles are chosen without replacement. The probability of selecting a black marble and a white marble is 0.34, and the probability of selecting a black marble on the first draw is 0.4. What is the probability of selecting a white marble on the second draw, given that the first marble drawn was black?
11. In the United States, 55% of all children get an allowance and 45% of all children get an allowance and do household chores. What is the probability that a child does household chores given the child gets an allowance?

### Probability with Tables of Data

12. Two-way tables are tables that contain information about two variables. The following table shows data about knee/hip arthritis on men in their mid 50's

	Elite soccer	Non elite soccer	Did not play soccer	Total
Arthritis	10	9	24	<b>43</b>
No arthritis	61	206	548	<b>815</b>
Total	<b>71</b>	<b>215</b>	<b>572</b>	<b>858</b>

- a. What is the probability that if we select a person at random from that group, he has been an elite soccer player?  
 $P(\text{elite soccer player}) =$
- b. What is the probability that if we select a person at random from that group, he has arthritis?  
 $P(\text{arthritis}) =$
- c. What is the probability that if we select a person at random from that group he has been an elite soccer player and has arthritis?  
 $P(\text{elite soccer player and arthritis}) =$
- d. What is the probability that if we select a person at random from the elite soccer player group, he has arthritis?  
 $P(\text{having arthritis given that he has been an elite soccer player}) =$   
 $P(\text{arthritis} | \text{elite soccer player}) =$

Show the probability notation then solve each question.

- e. What is the probability that if we select a person at random from those who did not play soccer, that he had arthritis?
- f. What is the probability that if we select a person at random who has arthritis, he did not play soccer?