Unit 6-Lesson 3- Probability of Independent/Dependent Events and Theoretical/Experimental

- Two events are _____ if the result of the 2nd event _____ affected by the result of the first event.

- Two events are _____ if the result of the first event _____ the outcome of the second event so that the probability is changed.

.

Suppose a die is rolled and then a coin is tossed.
- Explain why these events are independent.
_____

Fill in the table to describe the sample space:

	Roll 1	Roll 2	Roll 3	Roll 4	Roll 5	Roll 6
Head						
Tail						

1. How many outcomes are there for rolling the die? _____
2. How many outcomes are there for tossing the coin? _____
3. How many outcomes are there in the sample space of rolling the die and tossing the coin? _____
4. Is there another way to decide how many outcomes are in the sample space? _____

Let's see if this works for another situation.

A fast food restaurant offers 5 sandwiches and 3 sides. How many different meals of a sandwich and side can you order?
- If our theory holds true, how could we find the number of outcomes in the sample space? _____
- Make a table to see if this is correct.

- Were we correct? _____

Probabilities of Independent Events

Fill in the table again and then use the table to find the following probabilities:

1. P(rolling a 3) = _____

2. P(Tails) = _____

3. P(rolling a 3 AND getting tails) = _____

4. P(rolling an even) = _____

5. P(heads) = _____

6. P(rolling an even AND getting heads) = _____

What do you notice about the answers to 3 and 6? _____

Multiplication Rule of Probability

- The probability of two independent events occurring can be found by the following formula:

_____

Examples:

1. At City High School, 30% of students have part-time jobs and 25% of students are on the honor roll. What is the probability that a student chosen at random has a part-time job and is on the honor roll? Write your answer in context.

_____

2. The following table represents data collected from a grade 12 class in DEF High School.

Plans after High School

Gender	University	Community College	Total
Males	28	56	84
Females	43	37	80
Total	71	93	164

* Suppose 1 student was chosen at **random** from the grade 12 class.
(a) What is the probability that the student is female? _____
(b) What is the probability that the student is going to university?

_____

* Now suppose 2 people both randomly chose 1 student from the grade 12 class. Assume that it's possible for them to choose the same student.
(c) What is the probability that the first person chosen is female and the second person chosen is going to university?

_____

3. Suppose a card is chosen at random from a deck of cards, replaced, and then a second card is chosen.
   - Would these events be independent? How do we know?
   _____
   _____
   - What is the probability that both cards are 7s?
   _____

Probabilities of Depended on Independent Events
Determine whether the events are independent or dependent:
   1. Selecting a marble from a container and selecting a jack from a deck of cards.
   _____
   2. Rolling a number less than 4 on a die and rolling a number that is even on a second die.
   _____
   3. Choosing a jack from a deck of cards and choosing another jack, without replacement.
   _____
   4. Winning a hockey game and scoring a goal. _____

   5. Suppose a card is chosen at random from a deck, the card is NOT replaced, and then a second card is chosen from the same deck. What is the probability that both will be 7s?
   (a) This is similar the earlier example, but these events are dependent. How do we know?
   _____
   (b) How does the first event affect the sample space of the second event?
   _____
   (c) Find the probability that both cards will be 7s.
   _____
   6. A box contains 5 red marbles and 5 purple marbles. What is the probability of drawing 2 purple marbles and 1 red marble in succession *without replacement*?
   _____
   7. In Example 6, what is the probability of first drawing all 5 red marbles in succession and then drawing all 5 purple marbles in succession *without replacement*?
   _____

Experimental vs. Theoretical Probability
What do we know about probability?

   - Probability is a number from 0 to 1 that tells you how likely something is to happen.
   - Probability can have two approaches
        1. _____
        2. _____

Experimental probability

Experimental probability is found by repeating an _____ and observing the _____

P(head)= _____   A head shows up 3 times out of 10 trials,

P(tail) = _____   A tail shows up 7 times out of 10 trials

Theoretical probability

P(head) = _____

P(tail) =_____   Since there are only two outcomes, you have 50/50 chance to get a head or a tail.

Examples:

Determine whether each example is theoretical or experimental, then give probability value.

1. Thomas bought a bag of jelly beans that contained 10 red jelly beans, 15 blue jelly beans, and 12 green jelly beans. What is the probability of Thomas reaching into the bag and pulling out a blue or green jelly bean?

   _____

2. A card is chosen at random from a standard deck of cards. What is the probability that the card chosen is a heart or spade? Are these events mutually exclusive?

   _____

3. A card is chosen at random from a standard deck of cards. What is the probability that the card chosen is a heart or a face card? Are these events mutually inclusive?

   _____

4. You roll a fair six-sided die. What is the probability the die shows an even number or a number greater than three?

   _____

Unit 6-Lesson 3-Practice

Independent and Dependent Events.

Determine whether the scenario involved independent or dependent events then give the probability value.

1. You flip a coin twice. The first flip lands heads-up and the second flips also lands heads-up.

2. There are thirteen shirts in your closet, five blue and either green. You randomly select one to wear on Monday and then a different one on Tuesday. You wear a blue shirt on Monday and a green shirt on Tuesday.

3. A basket contains five apples and eight peaches. You randomly select one piece of fruit and eat it. Then you randomly select another piece of fruit. Both pieces of fruit are apples.

4. A bag contains seven red marbles and eight blue marbles. You randomly pick a marble and then return it to the bag before picking another marble. Both the first and the second marbles are red.

5. A spinner has an equal chance of landing on each of its six numbered regions. You spin twice. The first spin lands in region three and the second spin lands in region three.

Theoretical and Experimental Probability

6. Amanda used a standard deck of 52 cards and selected a card at random. She recorded the suit of the card she picked, and then replaced the card. The results are in the bale below.

Diamonds	JHT II
Hearts	JHT IIII
Spades	JHT JHT I
Clubs	III

1. Based on her results, what is the experimental probability of selecting a heart?
2. What is the theoretical probability of selecting a heart?
3. Based on her results, what is the experimental probability of selecting a diamond or a spade?
4. What is the theoretical probability of selecting a diamond or a spade?
5. Compare these results, and describe your findings.

7. Dale conducted a survey of the students in his classes to observe the eye color. The table shows the results of his survey.

Eye color	Blue	Brown	Green	Hazel
Number	12	58	2	8

a. Based on the survey, what is the experimental probability that a student in Dale's class has blue or green eyes?
b. Based on the survey, what is the experimental probability that a student in Dale's class does not have green or hazel eyes?
c. If the distribution of eye color in Dale's grade is similar to the distribution in his classes, about how many of the 360 students in his grade would be expected to have brown eyes?