Compound events continued….. RECALL…

A *OR* B

Mutually Inclusive
Math2 or Bio
On your schedule

Mutually exclusive
At school or home

A *AND* B

Independent
scheduling for
Math3 and Chinese

Dependent
scheduling for
H M3 then Pre-Calc

Two or more events occurring in succession…. This and then that and then……Two events are either Independent or Dependent

Independent Events – If the outcome of one event does not affect the outcome of another event and vise versa, then the events are called independent events.

Ex. A. The choice of a sandwich **and** a drink at a restaurant
B. Choosing an Ace, *replacing the card*, **and** choosing a King
C. A die is rolled **and** then a coin is tossed

If 2 events, A and B, are <u>independent</u>, then the probability of both occurring is
$P(A \text{ and } B) = P(A) \bullet P(B)$. $P(A \cap B) = P(A) \bullet P(B)$

1. What is the probability of rolling a 6 sided die and rolling a 5 **followed by** an even number.

2. Using a standard deck of playing cards, find the probability of selecting a spade, **replacing it** in the deck, and then selecting a face card.

3. According to the U.S. Department of Transportation statistics, the top ten airlines in the United States arrive on time 80% of the time. During their vacation, the Hiroshi family has direct flights to D.C., Seattle, and San Francisco on different days. What is the probability that all their flights arrived on time?

4. 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?

Dependent Events – If the outcome of an event does affect the outcome of another event, the two events are said to be dependent.

Ex. A. Dealing a deck of cards
B. Choosing an Ace followed by another Ace
C. Drawing 3 marbles from a jar, *without replacement*

If 2 events, A and B, are dependent, then the probability of both events occurring is P(A and B) = P(A) •P(B following A)

We cannot just multiply the 2 probabilities b/c one event affects the probability of the other event occurring. You must "adjust" the second probability.

1. 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?

2. What is the probability that you are dealt a Jack followed by an Ace without replacing the card?

3. Chatty Charlie has a bag that contains 4 red, 6 green, and 3 brown candies. He randomly chooses 3 candies from the bag, one after the other without replacing. What is the probability that he will choose all brown?

4. 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*?

5. Determine the probability of randomly selecting two navy socks, one at at time, from a drawer that contains 6 black and 4 navy socks.

6. In Example 3, what is the probability of first drawing all 5 red marbles in succession and then drawing all 5 purple marbles in succession *without replacement*?

Compound events continued..... RECALL...

A *OR* B

- *Mutually Inclusive* — Math2 or Bio On your schedule
- *Mutually exclusive* — At school or home

A *AND* B

- *Independent* — scheduling for Math3 and Chinese
- *Dependent* — scheduling for H M3 then Pre-Calc

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Independent Events

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If 2 events, A and B, are independent, then the probability of both occurring is
P(A and B) = P(A) •P(B). $P(A \cap B) = P(A) \bullet P(B)$

1. What is the probability of rolling a 6 sided die and rolling a 5 **followed by** an even number.

$1/6 \cdot 3/6 = 3/36 = 1/12$

2. Using a standard deck of playing cards, find the probability of selecting a spade, **replacing it** in the deck, and then selecting a face card.

J Q K
4 4 4 = 12

$13/52 \cdot 12/52 = 156/2704 = 3/52$

3. According to the U.S. Department of Transportation statistics, the top ten airlines in the United States arrive on time 80% of the time. During their vacation, the Hiroshi family has direct flights to D.C., Seattle, and San Francisco on different days. What is the probability that all their flights arrived on time?

DC Seattle SF
$.80 \cdot .80 \cdot .80 = .512 = 51\%$

4. 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?

$.30 \cdot .25 = .075 \sim 8\%$

Dependent Events – If the outcome of an event does affect the outcome of another event, the two events are said to be dependent.

Ex. A. Dealing a deck of cards
B. Choosing an Ace followed by another Ace
C. Drawing 3 marbles from a jar, *without replacement*

If 2 events, A and B, are dependent, then the probability of both events occurring is P(A and B) = P(A) •P(B following A)

We cannot just multiply the 2 probabilities b/c one event affects the probability of the other event occurring. You must "adjust" the second probability.

1. 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?

$\underset{7}{4/52} \cdot \underset{7}{3/51} = 1/221$

2. What is the probability that you are dealt a Jack followed by an Ace without replacing the card?

$\underset{J}{4/52} \cdot \underset{A}{4/51} = 4/663$

3. Chatty Charlie has a bag that contains 4 red, 6 green, and 3 brown candies. He randomly chooses 3 candies from the bag, one after the other without replacing. What is the probability that he will choose all brown?

4 R
6 G
3 B / 13 total

$3/13 \cdot 2/12 \cdot 1/11 = 1/286$

4. 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*?

5 R
3 ~~4~~ ~~5~~ P
/ ~~10~~ 9 8 total

$\underset{P}{5/10} \cdot \underset{P}{4/9} \cdot \underset{R}{5/8} = 5/36$

5. Determine the probability of randomly selecting two navy socks, one at at time, from a drawer that contains 6 black and 4 navy socks.

6 B
3 ~~4~~ N
9 ~~10~~ total

$\underset{N}{4/10} \cdot \underset{N}{3/9} = 2/15$

6. In Example ~~3~~ 4, what is the probability of first drawing all 5 red marbles in succession and then drawing all 5 purple marbles in succession *without replacement*?

5 R
5 P
10 total

$\underset{R}{\frac{5}{10}} \cdot \underset{R}{\frac{4}{9}} \cdot \underset{R}{\frac{3}{8}} \cdot \underset{R}{\frac{2}{7}} \cdot \underset{R}{\frac{1}{6}} \cdot \underset{P}{\frac{5}{5}} \cdot \underset{P}{\frac{4}{4}} \cdot \underset{P}{\frac{3}{3}} \cdot \underset{P}{\frac{2}{2}} \cdot \underset{P}{\frac{1}{1}} = 1/252$