

Compound Probability



A _____ to determine the likelihood of two _____ events occurring at the _____.

***Events can be classified as independent or dependent events.

- **Independent Events** are events in which the result of _____ event _____ affect the result of the _____ event.
 - **Example:** Suzie selects two chips from a bag of red and blue chips.

Selecting one chip and _____ it before the next selection.

- **Dependent Events** are events in which the result of the first event _____ the results of the event _____.
 - **Example:** Suzie selects two chips from a bag of red and blue chips.

Selecting one chip and _____ it before the next selection.

Determine if the following problems are simple, independent, or dependent theoretical probability.

1) On a shelf there are 60 novels and 20 poetry books. What is the probability that Person A chooses a novel and walks away with it and then Person B walks up shortly after and picks another novel?	Simple	Compound Independent Dependent
2) What is the probability of getting a 7 after rolling a single number cube number 1 to 6?	Simple	Compound Independent Dependent
3) Numbers 1 to 20 are placed in a bag. Without replacing the first number, what is the probability that the first number drawn will be odd and the second will be even?	Simple	Compound Independent Dependent
4) Diamond is playing a game. In the game she has to spin a spinner that is divided into equal sections of orange, red, purple, and pink. What is the probability that on her first spin she will land on pink and then red on her second spin?	Simple	Compound Independent Dependent
5) A deck of playing cards contains 52 cards. What is the probability of pulling out a King of Diamonds and without replacing it, then an Ace of Spades?	Simple	Compound Independent Dependent
6) What is the probability of rolling a 4 on a number cube and pulling a red marble out of a bag that contain 3 red, 2 black, and 5 yellow marbles?	Simple	Compound Independent Dependent

Compound Probability

Dependent Events Example:

We put 2 red counters and 2 white counters in a bag. What is the probability(P) of choosing a red counter **not** replacing it and then choosing a white counter?

Step 1:

Find the probability of the first event.

P(red on the first draw) *(simplify if possible)*

Step 2:

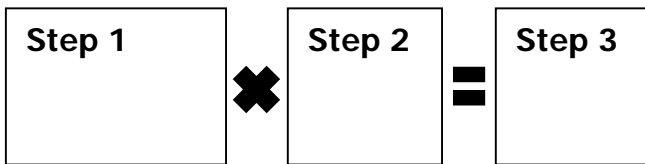
Find the probability of the second event.

P(white on the second draw)

(Remember, we have ____ white counters remaining out of ____ counters that are left.)

Step 3:

Multiply the two probabilities together.



Independent Events Example:

We put 2 red counters and 2 white counters in a bag. What is the probability(P) of choosing a red counter followed by a white counter? *with replacement – putting the red counter back*

Step 1:

Find the probability of the first event.

P(red on the first draw) *(simplify if possible)*

Step 2:

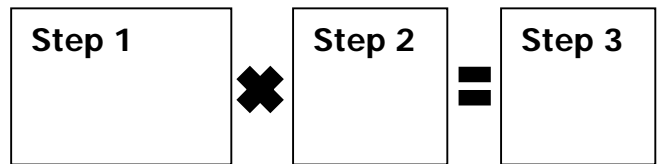
Find the probability of the second event.

P(white on the second draw)

(Remember, we have still have ____ counters; ____ red and ____ white)

Step 3:

Multiply the two probabilities together.



Ricky takes 2 coins at random from 3 quarters, 5 dimes, and two nickels in his pocket.

- 1) What is the (P) nickel then a quarter, **without replacement**?
- 2) What is the (P) nickel then a dime, **with replacement**?
- 3) What is the (P) quarter then a dime, **with replacement**?
- 4) What is the (P) nickel then a nickel, **without replacement**?

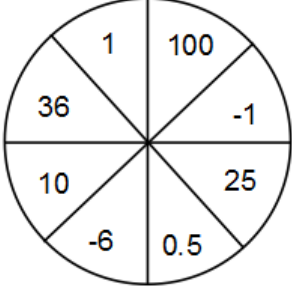
Compound Probability

Directions: First determine whether the example given is an independent (I) or dependent (D) event and then solve for the given probability. Your answer should **include an I or D and the simplified fraction**.

1) When flipping a coin, what is the probability of heads and then heads?	2) There are 3 quarters, 5 dimes, and 2 nickels in a jar. $P(\text{dime then dime without replacement})$?
3) When rolling a six-sided number cube and flipping a coin, what is $P(3 \text{ then tails})$?	4) If you have 3 quarters, 5 dimes, and 2 nickels in your pocket what is the probability you will pick a nickel and then a dime without putting the nickel back in your pocket?
5) If you have 3 quarters, 5 dimes, and 2 nickels in your pocket what is the probability you will pick a dime and then a quarter without putting the dime back in your pocket?	6) If there are 4 green jelly beans, 2 white jelly beans and 5 purple jelly beans in a jar, what is the probability of choosing a green jelly bean and then a purple if you don't put the green jelly bean back in the jar?
7) If there are 4 green jelly beans, 2 white jelly beans and 5 purple jelly beans in a jar, what is the probability of choosing a white jelly bean and then a purple if you put the white jelly bean back in the jar?	8) When rolling a die and flipping a coin, what is $P(\text{greater than 5 then tails})$?

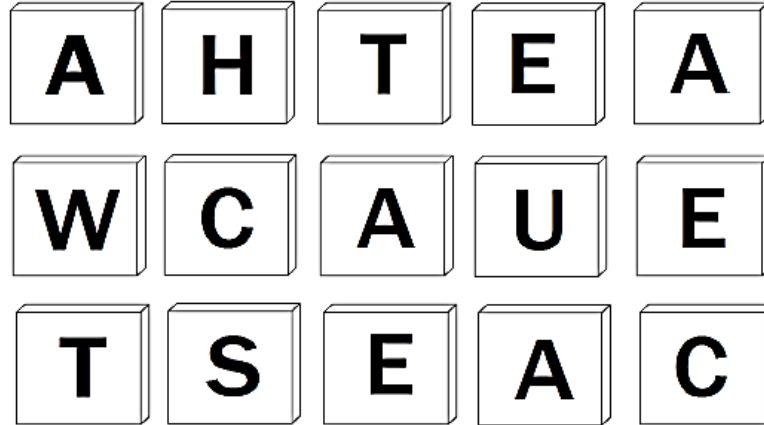
Compound Probability

Directions: First determine whether the example given is an independent (I) or dependent (D) event and then solve for the given probability. Your answer should **include an I or D and the simplified fraction**.

<p>1) Diamond is playing a game. In the game she has to spin a spinner that is divided into equal sections of orange, red, purple, and pink. What is the probability that on her first spin she will land on pink and then red on her second spin?</p>	<p>2) On a shelf there are 60 novels and 20 poetry books. What is the probability that Person A chooses a novel and walks away with it and then Person B walks up shortly after and picks another novel?</p>
<p>3) Numbers 1 to 20 are placed in a bag. Without replacing the first number, what is the probability that the first number drawn will be odd and the second will be even?</p>	<p>4) What is the probability of rolling a 4 on a number cube and pulling a red marble out of a bag that contain 3 red, 2 black, and 5 yellow marbles?</p>
<p>5) A spinner is divided into 8 equal sections as shown.</p>  <p>What is the probability that the spinner will land on a section that is an integer and then land on a section that is a decimal?</p>	<p>6) You have a bag of 17 colored chips. Four are blue, 6 are green, 2 are red, and the others are yellow. What is the probability of drawing a blue chip, replacing it, and then drawing a yellow chip?</p>
<p>7) What is the probability of rolling a 3 on a 6-sided number cube and then NOT rolling a 3 on a 6-sided number cube?</p>	<p>8) Using the spinner from #5, what is the probability of spinning a negative number then a positive number?</p>

Homework

The letter tiles pictured to the right are placed in a bag. Without looking, Zachary draws them from the bag one at a time.



1. What is the probability that Zack will draw the letter T from the bag?
2. What is the probability that Zack will draw the letter A from the bag?
3. What is the probability that Zack will draw a vowel from the bag?
4. Is Zack more likely to draw a vowel or a consonant from the bag?
5. What is the probability of Zack drawing the letter A, **replacing it**, and then drawing the letter T?
6. What is the probability of Zack drawing the letter C, **keeping it**, and then drawing the letter E?
7. What is the probability of Zack drawing the letter S, **replacing it**, and then drawing the letter U?
8. What is the probability of Zack drawing a letter that **is not** a vowel, **keeping it**, and then drawing the letter A?

Compound Probability



A calculation to determine the likelihood of two simple events occurring at the same time.

***Events can be classified as independent or dependent events.

- **Independent Events** are events in which the result of first event DOES NOT affect the result of the second event.
 - Example: Suzie selects two chips from a bag of red and blue chips.

Selecting one chip and REPLACES it before the next selection.

- **Dependent Events** are events in which the result of the first event DOES affect the results of the event that follows.
 - Example: Suzie selects two chips from a bag of red and blue chips.

Selecting one chip and KEEPS it before the next selection.

Determine if the following problems are simple, independent, or dependent theoretical probability.

1) On a shelf there are 60 novels and 20 poetry books. What is the probability that Person A chooses a novel and <u>walks away</u> with it and then Person B walks up shortly after and picks another novel?	Simple	Compound Independent <u>Dependent</u>
2) What is the probability of getting a 7 after rolling a single number cube number 1 to 6?	<u>Simple</u>	Compound Independent Dependent
3) Numbers 1 to 20 are placed in a bag. <u>Without replacing</u> the first number, what is the probability that the first number drawn will be odd and the second will be even?	Simple	Compound Independent <u>Dependent</u>
4) Diamond is playing a game. In the game she has to spin a spinner that is divided into equal sections of orange, red, purple, and pink. What is the probability that on her first spin she will land on pink and then red on her second spin?	Simple	Compound <u>Independent</u> Dependent
5) A deck of playing cards contains 52 cards. What is the probability of pulling out a King of Diamonds and <u>without replacing</u> it, then an Ace of Spades?	Simple	Compound Independent <u>Dependent</u>
6) What is the probability of rolling a 4 on a number cube and pulling a red marble out of a bag that contain 3 red, 2 black, and 5 yellow marbles?	Simple	Compound <u>Independent</u> Dependent

Compound Probability

Dependent Events Example:

We put 2 red counters and 2 white counters in a bag. What is the probability(P) of choosing a red counter *not* replacing it and then choosing a white counter?

Step 1:

Find the probability of the first event.

P(red on the first draw) *(simplify if possible)*

Step 2:

Find the probability of the second event.

P(white on the second draw)

(Remember, we have 2 white counters remaining out of 3 counters that are left.)

Step 3:

Multiply the two probabilities together.

Step 1 $\frac{2}{4} = \frac{1}{2}$	✖	Step 2 $\frac{2}{3}$	=	Step 3 $\frac{2}{6} = \frac{1}{3}$
----------------------------------------------	---	--------------------------------	---	----------------------------------------------

Independent Events Example:

We put 2 red counters and 2 white counters in a bag. What is the probability(P) of choosing a red counter followed by a white counter? *with replacement – putting the red counter back*

Step 1:

Find the probability of the first event.

P(red on the first draw) *(simplify if possible)*

Step 2:

Find the probability of the second event.

P(white on the second draw)

(Remember, we have still have 4 counters; 2 red and 2 white)

Step 3:

Multiply the two probabilities together.

Step 1 $\frac{2}{4} = \frac{1}{2}$	✖	Step 2 $\frac{2}{4} = \frac{1}{2}$	=	Step 3 $\frac{1}{4}$
----------------------------------------------	---	----------------------------------------------	---	--------------------------------

Ricky takes 2 coins at random from 3 quarters, 5 dimes, and two nickels in his pocket. *10 total*

1) What is the (P) nickel then a quarter, without replacement?

$$P(n) \frac{2}{10} = \frac{1}{5}$$

$$\frac{1}{5} \cdot \frac{1}{3} = \frac{1}{15}$$

$$P(q) \frac{3}{9} = \frac{1}{3}$$

2) What is the (P) nickel then a dime, with replacement?

$$P(n) \frac{2}{10} = \frac{1}{5}$$

$$\frac{1}{5} \cdot \frac{1}{2} = \frac{1}{10}$$

$$P(d) \frac{5}{10} = \frac{1}{2}$$

3) What is the (P) quarter then a dime, with replacement?

$$P(q) \frac{3}{10}$$

$$\frac{3}{10} \cdot \frac{1}{2} = \frac{3}{20}$$

$$P(d) \frac{5}{10} = \frac{1}{2}$$

4) What is the (P) nickel then a nickel, without replacement?

$$P(n) \frac{2}{10} = \frac{1}{5}$$

$$\frac{1}{5} \cdot \frac{1}{9} = \frac{1}{45}$$

$$P(n) \frac{1}{9}$$

Compound Probability

Directions: First determine whether the example given is an independent (I) or dependent (D) event and then solve for the given probability. Your answer should include an I or D and the simplified fraction.

- 1) When flipping a coin, what is the probability of heads and then heads?

$$P(h) = \frac{1}{2}$$

$$P(h) = \frac{1}{2} \quad \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

I

- 2) There are 3 quarters, 5 dimes, and 2 nickels in a jar. P(dime then dime without replacement)?

$$P(d) = \frac{5}{10} = \frac{1}{2}$$

$$P(d) = \frac{4}{9}$$

$$\frac{1}{2} \cdot \frac{4}{9} = \frac{4}{18} = \frac{2}{9}$$

D

- 3) When rolling a six-sided number cube and flipping a coin, what is P(3 then tails)?

$$P(3) = \frac{1}{6}$$

$$P(\text{tails}) = \frac{1}{2}$$

$$\frac{1}{6} \cdot \frac{1}{2} = \frac{1}{12}$$

I

- 4) If you have 3 quarters, 5 dimes, and 2 nickels in your pocket what is the probability you will pick a nickel and then a dime without putting the nickel back in your pocket?

$$P(n) = \frac{2}{10} = \frac{1}{5}$$

$$P(d) = \frac{5}{9}$$

$$\frac{1}{5} \cdot \frac{5}{9} = \frac{5}{45} = \frac{1}{9}$$

D

- 5) If you have 3 quarters, 5 dimes, and 2 nickels in your pocket what is the probability you will pick a dime and then a quarter without putting the dime back in your pocket?

$$P(d) = \frac{5}{10} = \frac{1}{2}$$

$$P(q) = \frac{3}{9} = \frac{1}{3}$$

$$\frac{1}{2} \cdot \frac{1}{3} = \frac{1}{6}$$

D

- 6) If there are 4 green jelly beans, 2 white jelly beans and 5 purple jelly beans in a jar, what is the probability of choosing a green jelly bean and then a purple if you don't put the green jelly bean back in the jar?

$$P(g) = \frac{4}{11}$$

$$P(p) = \frac{5}{10} = \frac{1}{2}$$

$$\frac{4}{11} \cdot \frac{1}{2} = \frac{4}{22} = \frac{2}{11}$$

D

- 7) If there are 4 green jelly beans, 2 white jelly beans and 5 purple jelly beans in a jar, what is the probability of choosing a white jelly bean and then a purple if you put the white jelly bean back in the jar?

$$P(w) = \frac{2}{11}$$

$$P(p) = \frac{5}{11}$$

$$\frac{2}{11} \cdot \frac{5}{11} = \frac{10}{121}$$

I

- 8) When rolling a die and flipping a coin, what is P(greater than 5 then tails)?

$$P(>5) = \frac{1}{6}$$

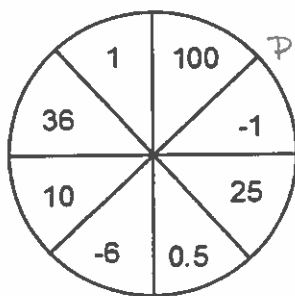
$$P(\text{tails}) = \frac{1}{2}$$

$$\frac{1}{6} \cdot \frac{1}{2} = \frac{1}{12}$$

I

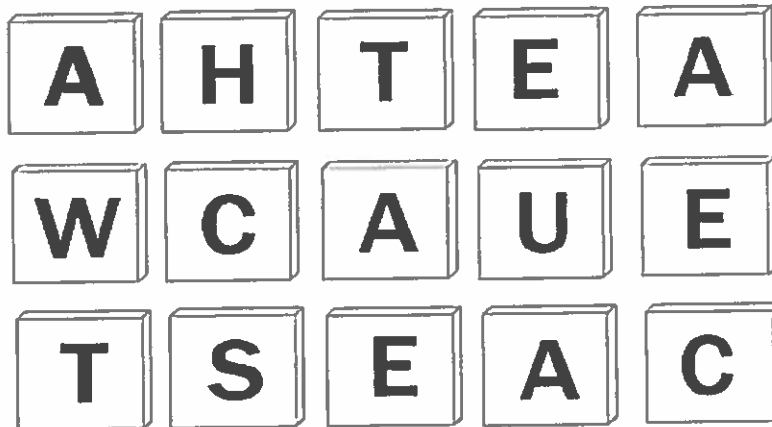
Compound Probability

Directions: First determine whether the example given is an independent (I) or dependent (D) event and then solve for the given probability. Your answer should include an I or D and the simplified fraction.

<p>1) Diamond is playing a game. In the game she has to spin a spinner that is divided into equal sections of orange, red, purple, and pink. What is the probability that on her first spin she will land on pink and then red on her second spin?</p> <p>$P(p) \frac{1}{4}$ $P(r) \frac{1}{4} \quad \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$</p> <p style="text-align: right; border: 1px solid black; display: inline-block; padding: 2px;">I</p>	<p>2) On a shelf there are 60 novels and 20 poetry books. What is the probability that Person A chooses a novel and <u>walks away with it</u> and then Person B walks up shortly after and picks another novel?</p> <p>$P(n) \frac{60}{80} = \frac{3}{4}$ $P(n) \frac{59}{79}$ $\frac{3}{4} \cdot \frac{59}{79} = \frac{177}{316}$</p> <p style="text-align: right; border: 1px solid black; display: inline-block; padding: 2px;">D</p>
<p>3) Numbers 1 to 20 are placed in a bag. <u>Without replacing the first number</u>, what is the probability that the first number drawn will be odd and the second will be even?</p> <p>$P(\text{odd}) \frac{10}{20} = \frac{1}{2}$ $P(\text{even}) \frac{10}{19}$ $\frac{1}{2} \cdot \frac{10}{19} = \frac{10}{38} = \frac{5}{19}$</p> <p style="text-align: right; border: 1px solid black; display: inline-block; padding: 2px;">D</p>	<p>4) What is the probability of rolling a 4 on a number cube and pulling a red marble out of a bag that contain 3 red, 2 black, and 5 yellow marbles?</p> <p>$P(4) \frac{1}{6}$ $P(r) \frac{3}{10}$ $\frac{1}{6} \cdot \frac{3}{10} = \frac{3}{60} = \frac{1}{20}$</p> <p style="text-align: right; border: 1px solid black; display: inline-block; padding: 2px;">I</p>
<p>5) A spinner is divided into 8 equal sections as shown.</p> <div style="text-align: center;">  </div> <p>$P(\text{int}) \frac{7}{8}$ $P(\text{dec}) \frac{1}{8}$ $\frac{7}{8} \cdot \frac{1}{8} = \frac{7}{64}$</p> <p>What is the probability that the spinner will land on a section that is an integer and then land on a section that is a decimal?</p> <p style="text-align: right; border: 1px solid black; display: inline-block; padding: 2px;">I</p>	<p>6) You have a bag of 17 colored chips. Four are blue, 6 are green, 2 are red, and the others are yellow. What is the probability of drawing a blue chip, <u>replacing it</u>, and then drawing a yellow chip?</p> <p>$P(b) \frac{4}{17}$ $P(y) \frac{5}{17}$ $\frac{4}{17} \cdot \frac{5}{17} = \frac{20}{289}$</p> <p style="text-align: right; border: 1px solid black; display: inline-block; padding: 2px;">I</p>
<p>7) What is the probability of rolling a 3 on a 6-sided number cube and then NOT rolling a 3 on a 6-sided number cube?</p> <p>$P(3) \frac{1}{6}$ $P(\text{not } 3) \frac{5}{6}$ $\frac{1}{6} \cdot \frac{5}{6} = \frac{5}{36}$</p> <p style="text-align: right; border: 1px solid black; display: inline-block; padding: 2px;">I</p>	<p>8) Using the spinner from #5, what is the probability of spinning a negative number then a positive number?</p> <p>$P(\text{neg}) \frac{2}{8} = \frac{1}{4}$ $P(\text{pos}) \frac{6}{8} = \frac{3}{4}$ $\frac{1}{4} \cdot \frac{3}{4} = \frac{3}{16}$</p> <p style="text-align: right; border: 1px solid black; display: inline-block; padding: 2px;">I</p>

Homework

The letter tiles pictured to the right are placed in a bag. Without looking, Zachary draws them from the bag one at a time.



1. What is the probability that Zack will draw the letter T from the bag?

$$P(T) = \frac{2}{15}$$

2. What is the probability that Zack will draw the letter A from the bag?

$$P(A) = \frac{4}{15}$$

3. What is the probability that Zack will draw a vowel from the bag?

$$P(\text{vowel}) = \frac{8}{15}$$

4. Is Zack more likely to draw a vowel or a consonant from the bag?

$$P(\text{vowel}) = \frac{8}{15}$$

$$P(\text{consonant}) = \frac{7}{15} \quad \text{vowel}$$

5. What is the probability of Zack drawing the letter A, replacing it, and then drawing the letter T?

$$P(A) = \frac{4}{15}$$

$$P(T) = \frac{2}{15} \quad \frac{4}{15} \cdot \frac{2}{15} = \frac{8}{225}$$

6. What is the probability of Zack drawing the letter C, keeping it, and then drawing the letter E?

$$P(C) = \frac{2}{15}$$

$$P(E) = \frac{3}{14} \quad \frac{2}{15} \cdot \frac{3}{14} = \frac{6}{210} = \frac{3}{105}$$

7. What is the probability of Zack drawing the letter S, replacing it, and then drawing the letter U?

$$P(S) = \frac{1}{15}$$

$$P(U) = \frac{1}{15} \quad \frac{1}{15} \cdot \frac{1}{15} = \frac{1}{225}$$

8. What is the probability of Zack drawing a letter that is not a vowel, keeping it, and then drawing the letter A?

$$P(\text{not vowel}) = \frac{7}{15}$$

$$P(A) = \frac{4}{14} = \frac{2}{7} \quad \frac{7}{15} \cdot \frac{2}{7} = \frac{14}{105} = \frac{2}{15}$$