

NAME: _____

DATE: _____

PROBABILITY

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How Do You Find the Probability of Dependent Events? (Topic #9)

Events are **dependent events** if the outcome of one event affects the outcome of another.

For example, if you select two colored marbles from a bag, and the first marble *is not replaced* before you select the second marble, then the outcome of the second pick *will be affected* by the outcome of the first pick.

Probability of Dependent Events
If two events A and B are dependent, then the probability of both occurring is the product of the probability of A and the probability of B after A occurs. $P(A \text{ and } B) = P(A) \cdot P(B \text{ following } A)$ <u>NOTE:</u> The problem will often use the phrase " <i>without replacement</i> ".

EXAMPLE 1: Finding the Probability of Dependent Events

A bag contains 9 blue marbles and 3 red marbles. Two marbles are drawn at random, *without replacement*, find the probability of getting two red marbles.

PRACTICE: Read each question carefully. Show your work.

<p>1. In a file, there are 7 science papers, 9 English papers, and 8 history papers. If you select 2 papers at random, what is the probability of getting a science then a history paper from the file, <i>without replacement</i>.</p>	<p>2. A purse contains four \$5 bills, five \$10 bills, and three \$20 bills. Two bills are selected without replacement, find the P (\$5, \$5).</p>
<p>3. The letters from the word "distributive" are written on slips of paper. What is the probability of picking a vowel then picking a vowel, <i>without replacement</i>?</p>	<p>4. A bag contains 6 red, 5 blue and 4 yellow marbles. Two marbles are drawn, but the first marble drawn <i>is not replaced</i>. Find P (red, then blue).</p>
<p>5. A box contains 3 pens, 2 markers, and 1 highlighter. Cara selects one item at random and does not return it to the box. She then selects a second item at random. What is the probability that Cara selects one pen and then one marker?</p>	<p>6. A bag contains 15 beads. Six are black and the rest are white. Two beads are drawn at random, <i>without replacement</i>. Find the probability of picking 2 black beads.</p>

7. The following cards are placed into a bag. Find the following probabilities if you pick one card, and then pick another card, *without replacement*:



a) $P(M, M)$

b) $P(R, \text{vowel})$

c) $P(\text{vowel}, \text{consonant})$

d) $P(R, D)$

8. In a pack of 52 cards, 4 of the cards are Kings and 4 of the cards are Queens. Two cards are randomly picked, without replacement, from the pack. Find the $P(\text{King}, \text{Queen})$.

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HOMEWORK - (Topic #9)

Finding the Probability of Dependent Events

Read each question carefully. Show your work.

There are 4 oranges, 7 bananas, and 5 apples in a fruit basket. Leo selects a piece of fruit at random and then Jack selects a piece of fruit at random.

1. Find the probability that two apples are chosen.

2. P (two bananas)

3. P (orange then apple)

Mr. Greene's class has 5 students with blue eyes, 7 with brown eyes, 4 with hazel eyes, and 4 with green eyes. Two students are selected at random. Find each probability.

4. P (green then brown)

5. P (two blue)

6. P (hazel then blue)

7. P (brown then blue)

8. A laundry basket contains 18 blue socks and 24 black socks. What is the probability of randomly picking 2 black socks, *without replacement*, from the basket?

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KEY

How Do You Find the Probability of Dependent Events?

(Topic #9)

Events are **dependent events** if the outcome of one event affects the outcome of another.

For example, if you select two colored marbles from a bag, and the first marble *is not replaced* before you select the second marble, then the outcome of the second pick *will be affected* by the outcome of the first pick.

Probability of Dependent Events

If two events A and B are dependent, then the probability of both occurring is the product of the probability of A and the probability of B after A occurs.

$$P(A \text{ and } B) = P(A) \cdot P(B \text{ following } A)$$

NOTE: The problem will often use the phrase "**without replacement**".

EXAMPLE 1: Finding the Probability of Dependent Events

A bag contains 9 blue marbles and 3 red marbles. Two marbles are drawn at random, without replacement, find the probability of getting two red marbles. TOTAL = 12

$$P(2 \text{ red}) = P(\text{red}) \times P(\text{red})$$

$$\frac{3}{12} \cdot \frac{2}{11}$$

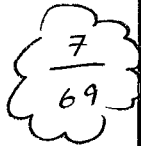
$$\frac{6}{132} = \frac{1}{22}$$

PRACTICE: Read each question carefully. Show your work.

1. In a file, there are 7 science papers, 9 English papers, and 8 history papers. If you select 2 papers at random, what is the probability of getting a science then a history paper from the file, without replacement. TOTAL = 24

$$P(\text{science}) \times P(\text{history})$$

$$\frac{7}{24} \cdot \frac{8}{23}$$



$$\frac{7}{69}$$

2. A purse contains four \$5 bills, five \$10 bills, and three \$20 bills. Two bills are selected without replacement, find the P (\$5, \$5). TOTAL = 12

$$P(\$5) \times P(\$5)$$

$$\frac{4}{12} \cdot \frac{3}{11}$$




$$\frac{1}{11}$$

3. The letters from the word "distributive" are written on slips of paper. What is the probability of picking a vowel then picking a vowel, without replacement? TOTAL = 12

$$P(\text{vowel}) \times P(\text{vowel})$$

$$\frac{5}{12} \cdot \frac{4}{11}$$



$$\frac{5}{33}$$

4. A bag contains 6 red, 5 blue and 4 yellow marbles. Two marbles are drawn, but the first marble drawn is not replaced. Find P (red, then blue.) TOTAL = 15

$$P(\text{red}) \times P(\text{blue})$$

$$\frac{6}{15} \cdot \frac{5}{14}$$



$$\frac{1}{7}$$

5. A box contains 3 pens, 2 markers, and 1 highlighter. Cara selects one item at random and does not return it to the box. She then selects a second item at random. What is the probability that Cara selects one pen and then one marker? TOTAL = 6

$$P(\text{pen}) \times P(\text{marker})$$

$$\frac{3}{6} \cdot \frac{2}{5}$$



$$\frac{1}{5}$$

6. A bag contains 15 beads. Six are black and the rest are white. Two beads are drawn at random, without replacement. Find the probability of picking 2 black beads. TOTAL = 15

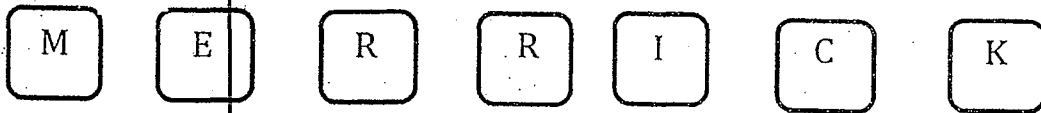
$$P(\text{black}) \times P(\text{black})$$

$$\frac{6}{15} \cdot \frac{5}{14}$$



$$\frac{1}{7}$$

7. The following cards are placed into a bag. Find the following probabilities if you pick one card, and then pick another card, *without replacement*:



a) $P(M, M)$

$$P(M) \times P(M)$$

$$\frac{1}{7} \cdot \frac{0}{6}$$



b) $P(R, \text{vowel})$

$$P(R) \times P(\text{vowel})$$

$$\frac{2}{7} \cdot \frac{2}{6}$$



c) $P(\text{vowel}, \text{consonant})$

$$P(\text{vowel}) \times P(\text{consonant})$$

$$\frac{2}{7} \cdot \frac{5}{6}$$



d) $P(R, D)$

$$P(R) \times P(D)$$

$$\frac{2}{7} \cdot \frac{0}{6}$$



8. In a pack of 52 cards, 4 of the cards are Kings and 4 of the cards are Queens. Two cards are randomly picked, without replacement, from the pack. Find the $P(\text{King}, \text{Queen})$.

$$P(\text{King}) \times P(\text{Queen})$$

$$\frac{4}{52} \cdot \frac{4}{51}$$



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HOMWORK - (Topic #9)

Finding the Probability of Dependent Events

Read each question carefully. *Show your work.*

There are 4 oranges, 7 bananas, and 5 apples in a fruit basket. Leo selects a piece of fruit at random and then Jack selects a piece of fruit at random. $TOTAL = 16$

1. Find the probability that two apples are chosen. $P(\text{apple}) \times P(\text{apple})$

$$\frac{5}{16} \cdot \frac{4}{15} = \frac{1}{12}$$

2. $P(\text{two bananas}) = P(\text{banana}) \times P(\text{banana})$

$$\frac{7}{16} \cdot \frac{6}{15} = \frac{7}{40}$$

3. $P(\text{orange then apple}) = P(\text{orange}) \times P(\text{apple})$

$$\frac{4}{16} \cdot \frac{5}{15} = \frac{1}{12}$$

Mr. Greene's class has 5 students with blue eyes, 7 with brown eyes, 4 with hazel eyes, and 4 with green eyes. Two students are selected at random. Find each probability. $TOTAL = 20$

4. $P(\text{green then brown})$

$$P(\text{green}) \times P(\text{brown})$$

$$\frac{4}{20} \cdot \frac{7}{19} = \frac{7}{95}$$

5. $P(\text{two blue})$

$$P(\text{blue}) \times P(\text{blue})$$

$$\frac{5}{20} \cdot \frac{4}{19} = \frac{1}{19}$$

6. $P(\text{hazel then blue})$

$$P(\text{hazel}) \times P(\text{blue})$$

$$\frac{4}{20} \cdot \frac{5}{19} = \frac{1}{19}$$

7. $P(\text{brown then blue})$

$$P(\text{brown}) \times P(\text{blue})$$

$$\frac{7}{20} \cdot \frac{5}{19} = \frac{7}{76}$$

8. A laundry basket contains 18 blue socks and 24 black socks. What is the probability of randomly picking 2 black socks, without replacement, from the basket? $TOTAL = 42$

$$P(\text{black}) \times P(\text{black})$$

$$\frac{24}{42} \cdot \frac{23}{41} = \frac{92}{287}$$