

p. 55 Probability of Multiple Events

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When we find the probability of 2 or more events occurring, we will distinguish between

Independent and Dependent events.

Independent events ARE NOT affected by previous events.

A coin does not "know" it landed on tails before;

A 6-sided die does not "know" that it landed on a 4 before, etc.

We can calculate the probability of 2 or more events occurring by

multiplying the probabilities.

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Examples:

- 1) What is the probability of tossing a coin 2 times, and it landing on heads twice?

$$\begin{array}{c} \text{HH} \\ \text{HT} \\ \text{TH} \\ \text{TT} \end{array}$$

$$\frac{1}{4}$$



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



- 2) What is the probability of rolling a standard die 2 times, and getting a "4" then a "1"?

$$\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$$

Another example of **independent** events...

When selecting items from containers multiple times, **WITH REPLACEMENT**, means that each time you take something out you put it back before selecting again.

Example

TOTAL: 18

3) You have a bag containing **4 blue marbles**, **6 red marbles**, and **8 green marbles**.

If 2 marbles are drawn (with replacement), what is the probability of choosing a **red** then a **blue** marble?

$$\frac{6}{18} \cdot \frac{4}{18} = \frac{24}{324}$$

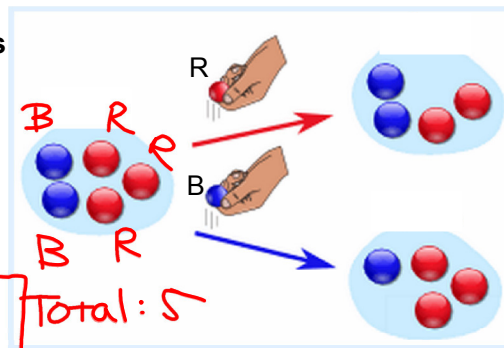
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Dependent Events ARE affected by previous events.

When selecting items multiple times, **WITHOUT REPLACEMENT** means that you **never** put the items back before selecting again.

Examples

A bag contains 2 blue marbles and 3 red marbles. If two marbles are drawn (without replacement)...



4) What is the probability of choosing a **red** then a **blue** marble?

$$\frac{3}{5} \cdot \frac{2}{4} = \frac{6}{20}$$

5) What is the probability of choosing two **blue** marbles?

$$\frac{2}{5} \cdot \frac{1}{4} = \frac{2}{20}$$

6) If you draw 2 cards from a standard deck, WITHOUT REPLACEMENT, what is the probability of drawing 2 queens?

$$\frac{4}{52} \cdot \frac{3}{51} = \frac{12}{2652}$$

7) A bag contains 6 yellow marbles, 4 blue marbles, and 1 orange marble. You draw 2 marbles, WITHOUT REPLACEMENT.

→ a) What is the probability of choosing 2 yellow marbles?

$$\frac{6}{11} \cdot \frac{5}{10} = \frac{30}{110}$$

11
Total

→ b) What is the probability of choosing a blue then orange marble?

$$\frac{4}{11} \cdot \frac{1}{10} = \frac{4}{110}$$

PRACTICE TIME

