



Compound events

Two things happening together

- Today: find the probability of two events, and know when the first changes the second.

A bag: 3 red, 2 blue. Draw two.

- What is $P(\text{both red})$?

Turn & talk: does it matter whether you put the first one back?

Multiply the probabilities

- Two coins: $P(HH) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$.
- Die and coin: $P(6 \text{ and } H) = \frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$.

WITH replacement: nothing changes

- The marble goes back, so the bag is identical.
- $\frac{3}{5} \times \frac{3}{5} = \frac{9}{25}$

WITHOUT replacement: BOTH numbers change

- One red is gone: 2 reds left, and only 4 marbles.
- $\frac{3}{5} \times \frac{2}{4} = \frac{3}{10}$

$\frac{3}{5} \times \frac{2}{5}$ is the classic error. The bag shrank too.

Your turn

- Same bag, no replacement. $P(\text{both blue})$?
- Thumbs up when you have it.

Ask this before you multiply

- Does the first event CHANGE the second?
- No $\rightarrow$ use the same fractions. Yes $\rightarrow$ recount the bag.

Picture the bag before the second draw. Those two counts are your fraction.

Now you

- → In-class practice sheet