

Mon Mar 23

ALGEBRA 2 HONORS NOTES 12.5 INDEPENDENT AND DEPENDENT EVENTS

Two events are *dependent* if one event affects the other. Two events are *independent* if one event has no effect on the other.

probability of B depending on A

If A and B are dependent, then $P(A \text{ and } B) = P(A) \cdot P(B|A)$.

If A and B are independent, then $P(A \text{ and } B) = P(A) \cdot P(B)$.

Example 1 There are 3 red markers, 4 blue markers, and 5 black markers in a box.

(a) Suppose you choose 2 markers at random, one at a time, with replacement. (after 1st choice, put it back & choose another)
Find the probability of choosing blue, then black.

$$\frac{4}{12} \times \frac{5}{12} = \frac{1}{3} \cdot \frac{5}{12} = \frac{5}{36}$$

$P(\text{Blue}) \cdot P(\text{Black})$ Independent events

(b) Suppose you choose 3 markers at random, one at a time, without replacement. (choose 1st, don't put it back, choose 2nd, etc.)
Find the probability of choosing red, then blue, then blue.

$$\frac{3}{12} \times \frac{4}{11} \times \frac{3}{10} = \frac{1}{4} \cdot \frac{4}{11} \cdot \frac{3}{10} = \frac{3}{110}$$

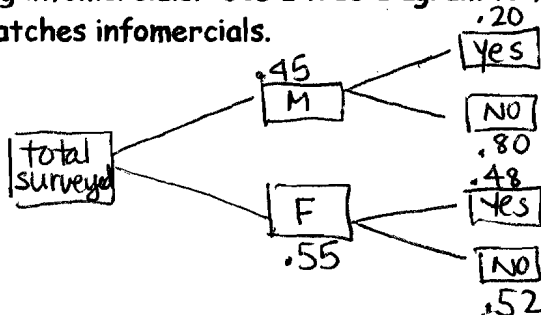
$P(\text{Red}) \cdot P(\text{Blue}) \cdot P(\text{Blue})$

Example 2 The probability of rain in on a certain day is 10% in Placentia and 20% in Laguna Beach. Find the probability that it rains in at least one of the cities.

3 possible events! They are mutually exclusive!

$$\begin{aligned} & (P)(LB \text{ no}) + (LB \text{ rain})(P \text{ no}) + (LB \text{ rain})(P \text{ rain}) \\ & (.10)(.80) + (.20)(.90) + (.20)(.10) = .28 \approx \boxed{28\%} \end{aligned}$$

Example 3 In a survey of adults 35-60 years old, 45% was male. Twenty percent of the males surveyed admitted they watched infomercials, and 48% of the females admitted watching infomercials. Use a tree diagram to find the probability that a randomly selected adult watches infomercials.



2 possibilities!

$$\begin{aligned} & (MALE)(YES) + (FEMALE)(YES) \\ & (.45)(.20) + (.55)(.48) \approx \boxed{.354} \\ & \approx \boxed{35.4\%} \end{aligned}$$