

12-2 Conditional Probability

- contains a condition that may limit the sample space for an event.

You can write the conditional probability using the notation:

$P(B|A)$ It is read "the probability of event B, given event A"

$$P(B|A) = \frac{P(A \text{ and } B)}{P(A)}$$

e.) $P(\text{employee earns over } \$30,000 \mid \text{high schooled.})$

$$= \frac{P(\text{earn over } \$30,000 \text{ and have high ed})}{P(\text{high schooled.})} = \frac{14}{(112+98+14)}$$

$$= \frac{14}{224} = 6.3\%$$

f.) $\frac{P(\text{earn } \$30,000 \text{ and high ed or less})}{P(\text{earn } \$30,000)}$

$$= \frac{2+14}{2+14+143+245} = \frac{16}{404} \approx 4\%$$

$P(\text{Female})$

55%

Practice 12-2

Conditional Probability

1. The table contains information about the 1205 employees at one business. Find each probability. Round to the nearest tenth of a percent.

Education and Salary of Employees

| | Under \$20,000 | \$20,000 to \$30,000 | Over \$30,000 |
|-----------------------|----------------|----------------------|---------------|
| Less than high school | 69 | 36 | 2 |
| High school | 112 | 98 | 14 |
| Some college | 102 | 193 | 143 |
| College degree | 13 | 178 | 245 |

- a. $P(\text{employee has less than a high school education})$

$69 + 36 + 2 = 107$
 $\frac{107}{1205} \approx 8.9\%$

- b. $P(\text{employee earns under } \$20,000)$

$69 + 112 + 102 + 13 = 296$
 $\frac{296}{1205} \approx 24.6\%$

- c. $P(\text{employee earns over } \$30,000 \text{ and has less than a high school education})$

$\frac{2}{1205} = .2\%$

- d. $P(\text{employee earns under } \$20,000 \text{ and has a college degree})$

$\frac{13}{1205} \approx 1.1\%$

- e. given that the employee has only a high school education, the probability that the employee earns over \$30,000

$\frac{14}{226} \approx 6.3\%$

- f. given that the employee earns over \$30,000, the probability that the employee has only a high school education or less

$\frac{16}{441} \approx 4\%$

2. High school students in one school chose their favorite leisure activity. Find each probability. Round to the nearest tenth of a percent.

Favorite Leisure Activities

| | Sports | Hiking | Reading | Phoning | Shopping | Other |
|--------|--------|--------|---------|---------|----------|-------|
| Female | 39 | 48 | 85 | 62 | 71 | 29 |
| Male | 67 | 58 | 76 | 54 | 68 | 39 |

334
362

106 106 161 116 139 68

- a. $P(\text{sports} | \text{female})$ b. $P(\text{female} | \text{sports})$ c. $P(\text{reading} | \text{male})$ d. $P(\text{male} | \text{reading})$

$\frac{P(S \text{ and } F)}{P(F)}$

$\frac{39}{334} = 11.7\%$

$\frac{P(F \text{ and } S)}{P(S)} = \frac{39}{106} \approx 36.8\%$

- e. $P(\text{hiking} | \text{female})$ f. $P(\text{hiking} | \text{male})$ g. $P(\text{male} | \text{shopping})$ h. $P(\text{female} | \text{shopping})$

$\frac{58}{362} = 16\%$

$\frac{68}{139} \approx 48.9\%$

3. The senior class is 55% female, and 32% are females who play a competitive sport. Find the probability that a student plays a competitive sport, given that the student is female.

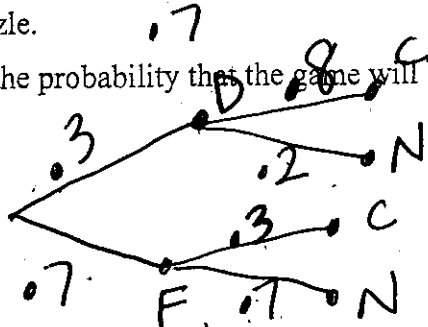
$\frac{P(F \text{ and play sport})}{P(F \text{ female})} = \frac{32\%}{55\%} \approx 58.2\%$

D = drizzle F = Fog C = canceled
N = Not Canceled

Draw a tree diagram. Find each probability.

4. A softball game has an 80% chance of being canceled for a light drizzle and a 30% chance of being canceled for a heavy fog when there is no drizzle. There is a 70% chance of heavy fog and a 30% chance of light drizzle.

- a. Find the probability that the game will be canceled. $.3(.8) + .7(.3)$



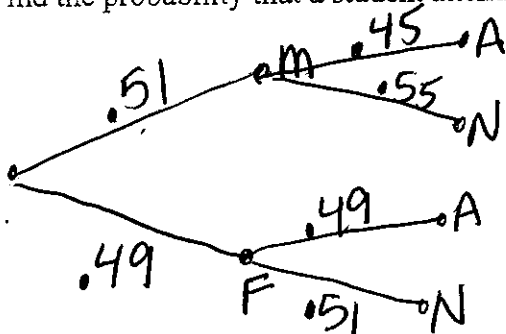
$$.24 + .21 = .45 \approx 45\%$$

- b. Find the probability there will be a light drizzle and the game will not be canceled.

~~$.3(.2) = .06 \approx 6\%$~~

5. The students of a high school are 51% males; 45% of the males and 49% of the females attend concerts.

- a. Find the probability that a student attends concerts. $.51(.45) + .49(.49)$



$$\approx 47\%$$

- b. Find the probability that a student is a female and does not attend concerts.

~~$.49(.51) \approx 25\%$~~

p. 656 - 657

(1-12, 13 a-c, 19-22, 25-27)