

Number of Car Accidents during Snow Storms of 4 States

Age Driver	Arkansas	Texas	Missouri	Oklahoma	Total
16-19	1,151	400	219	1564	3334
20-24	1,970	898	186	1758	4812
25-29	2,143	915	191	1900	5149
30-34	3,203	924	184	1892	6203
35-45	2,710	910	183	1874	5677
45+	2,900	1200	692	1427	6219
Total	14077	5247	1658	10415	31394

1. Complete the table. Then answer the following questions.

a. $P(16-19) = 3334/31394 = 1667/15697 \approx 0.106$

b. $P(25-29 \text{ and from Texas}) = 915/31394 \approx 0.029$

c. $P(30-34|Oklahoma) = 1892/10415 \approx 0.182$

d. $P(\text{Texas and } 45+) = 1200/31394 = 600/15697 \approx 0.038$

e. $P(45+) = 6219/31394 \approx 0.198$

f. $P(16-19 \text{ and Missouri}) = 219/31394 \approx 0.00698$

g. $P(\text{Texas}) = 5247/31394 = 477/2854 \approx 0.167$

male
key
score

2. $P(\text{male}) = 1731/2201 \approx 0.786$ $P(\text{Female}) = 470/2201 \approx 0.214$

The Titanic sank in 1912 without enough lifeboats for the passengers and crew. Almost 1500 people died, most of them men. Was that because a man was less likely than a woman to survive? Or did more men die simply because men outnumbered women by more than 3 to 1 on the Titanic? $P(\text{Survived}|\text{male}) = 367/1731 \approx 0.212$

		$P(\text{Survived} \text{Female}) = 344/470 = 0.732$		
		Male	Female	Total
Survived?	Yes	367	344	711
Survived?	No	1364	126	1490
Total	Total	1731	470	2201

$P(\text{male and survived}) = 367/2201 \approx 0.167$ (*)
 $P(\text{Female and survived}) = 344/2201 \approx 0.156$

Key

The probability of surviving depended on the condition of whether the person was male or female. This idea that probability can change if you are given additional information is called **conditional probability**.

What is conditional probability?

The chance of an event given that another event has occurred.

Write a conditional probability statement about Males that survived.

$P(\text{Survived} | \text{male})$

3. You have decided to play Black Jack. The dealer gives you a Queen of Hearts, and an Ace of Spades. The dealer is showing a Jack of Diamonds. What is the probability that his other card is an Ace?

$$3/49 \approx 0.061$$

You pick up a deck of cards and it has a note on the top that says 1 card is missing.

- A. What is the chance that the card that is missing is less than 10. $40/52 = 10/13 \approx 0.77$
- B. What is the chance that the card is missing is a two. $4/52 = 1/13 \approx 0.077$
- C. What is the chance that the card missing is more than 10. $12/52 = 3/13 \approx 0.23$
- D. You count the deck and find out that two cards are missing. What is the probability that both of the Red Ace's are missing. $\frac{4}{52} \cdot \frac{3}{51} = \frac{1}{221} \approx 0.0045$
- E. You count the deck and find out the two cards are missing. What is the probability that it is a two of hearts, and a 5 of spades are the cards that are missing. $\frac{1}{52} \cdot \frac{1}{51} = \frac{1}{2652} \approx 0.000377$
- F. You know that two cards are missing and discover that they are the Queen of Diamonds and a six of Clubs. You shuffle the deck. What is the chance that the first card on top is a Club and the card on bottom is an Ace. $\frac{12}{50} \cdot \frac{4}{49} = \frac{24}{1225} \approx 0.0196$
- G. You open a new deck of cards and only take twenty cards. What is the chance that the top card is a seven of Hearts?

$$\frac{1}{52} \approx 0.0192$$

KEY

4. You decide to do your homework and need four different colored markers for a project. You look in the drawer and find seven red pens, four black pens, two yellow pens, one blue pen, and five pens that are bulldog purple. You decide to grab four pens and draw whatever comes to mind.

a. What is the chance that you get all purple pens? $\frac{5}{19} \cdot \frac{4}{18} \cdot \frac{3}{17} \cdot \frac{2}{16} = \frac{5}{3876} \approx 0.013$

b. What is the chance that you get a red pen, then a blue pen, a yellow pen, and finally and black pen? $\frac{7}{19} \cdot \frac{1}{18} \cdot \frac{2}{17} \cdot \frac{4}{16} = \frac{7}{11628} \approx 0.000602$

c. What is the chance that you get first a red pen, then another red pen, then a black pen, followed by a yellow pen. $\frac{7}{19} \cdot \frac{6}{18} \cdot \frac{4}{17} \cdot \frac{2}{16} = \frac{7}{1938} \approx 0.0036$

d. What is the chance that you don't get the blue pen after four tries?

$$\frac{18}{19} \cdot \frac{17}{18} \cdot \frac{16}{17} \cdot \frac{15}{16} = \frac{15}{19} \approx 0.789$$

5. If you toss three coins. TTT, TTH, THT, THT, TTH, HTT, HTH, HHT, HHH

a. What is the chance all will be tails?

$$\frac{1}{8} = 0.125$$

b. What is the chance that you will get at least two heads?

$$\frac{4}{8} = \frac{1}{2} = 0.50$$

c. What is the chance you will get a tails on the last toss?

$$\frac{1}{2} = 0.50$$

d. What is the chance that you will get two head and then a tails?

$$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{8} = 0.125$$

6. In a particular school 35 % of the students have ridden in another student's car but not left campus to go to lunch. 40% of the students have left campus to go to lunch but have not ridden in another student's car. Only 25% of the students have done neither. Make a table to illustrate this situation. What is the probability that a student chosen at random has ridden in another student's car to go off campus to lunch?

RIDE IN CAR	LEFT CAMPUS	
	YES	NO
YES	0	35
NO	40	25

$$\frac{0}{100} = 0$$