

13.5 Probability Models

Learning Targets for today

- ① To be able to construct and use probability models.
- ① To be able to use two-way frequency tables to organize data and identify sample spaces to approximate probabilities.

Vocabulary!

Two – way Frequency Table (*contingency table*) - A fequency table that contains data from two different categoies. They can be help in finding conditional probablity.

Finding Probability using Contingency Tables

Example for you...

The table at the right shows the number of students who helped coordinate prom this year.

1. What is the probability that the person who helped is a female?

$$P(F) = \frac{6}{12} = \frac{1}{2} = .5$$

50%

2. What is the probability that the person who helped is a senior male?

$$P(\text{Senior Male}) = \frac{3}{12}$$

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

$$= .25$$

25%

Your turn to try...

Year	Male	Female	Totals
Juniors	3	4	7
Seniors	3	2	5
Totals	6	6	12

1. What is probability that the person who helped is a junior?

$$P(J) = \frac{7}{12} = .58$$

58%

2. What is the probability that the person who helped is a junior female?

$$P(\text{Junior F}) = \frac{4}{12} = \frac{1}{3} = .3\bar{3}$$

33%

Finding Probability

Example for you...

The table at the right represents the results from a recent poll that was taken regarding fixing Michigan's Roads. People were allowed to respond if they were for, against, or had no opinion.

1. What is the probability that a person selected randomly is 18 – 29 years old and for the fixing of the roads?

$$P(18-29/\text{Fix}) = \frac{310}{1000}$$
$$= .31$$
$$= 31\%$$

2. What is the probability that a person selected randomly is over 60 years old and does not have an opinion about fixing the roads?

$$P(\text{Over } 60 + \text{No Op}/\text{Total}) = \frac{40}{1000}$$
$$= .04$$
$$= 4\%$$

Your turn to try...

Age Group	For	Against	No Opinion	Totals
18-29	310	50	20	380
30-45	200	30	10	240
45-60	120	20	30	170
Over 60	150	20	40	210
Totals	780	120	100	1000

1. What is the probability that a person selected randomly is 45 – 60 years old and against the fixing of the roads?

$$P(45-60 + \text{Against}) = \frac{20}{1000} = .02$$
$$= 2\%$$

2. What is the probability that a person selected randomly is under 45 years old and is for the fixing of the roads?

$$P(\text{Under } 45 + \text{Fix}) = \frac{510}{1000} = .51$$
$$= 51\%$$

Using Relative Frequency

Example for you...

Researchers asked shampoo users if they applied shampoo directly on their heads or indirectly using their hands.

1. What is the probability that a respondent applies shampoo directly to their head, GIVEN that the respondent is female?

$$P(\text{Directly} \mid \text{Female})? = \frac{\quad}{\text{TOTAL \# of Females}}$$

$$= \frac{6}{30} = .20$$

$$\boxed{20\%}$$

Your turn to try...

Applying Shampoo

	Directly Onto Head	Into Hand First
Male	2	18 = 20
Female	6	24 = 30

1. What is the probability that a respondent applies shampoo indirectly using their hands, GIVEN that the respondent is male?

$$P(\text{Hands} \mid \text{Male})? = \frac{18}{20} = .90$$

$$\boxed{90\%}$$