

## Lesson 10.3 Two-Way Tables

### Read a two-way table.

*Example*

The results of a poll of 200 middle-school students about their favorite genre of movie are shown in the table. Some information is missing from the table.

		Favorite Genre of Movie			Total
		Drama	Comedy	Science Fiction	
Students	7th Graders	8	16	12	36
	8th Graders	24	101	?	?
	Total	?	?	?	?

- a) Find the total number of 8th graders.

$$\begin{aligned} \text{Total number of 8th graders} &= 200 - 36 \\ &= 164 \end{aligned}$$

There are 164 8th graders in total.

- b) Find the number of 8th graders whose favorite genre of movie is science fiction.

$$\begin{aligned} \text{Total number of 8th graders whose favorite genre of movie is science fiction} \\ &= \text{Total number of 8th graders} - \text{Number of 8th graders whose genre of movie is} \\ &\quad \text{drama or comedy} \\ &= 164 - 24 - 101 \\ &= 39 \end{aligned}$$

So, there are 39 8th graders whose favorite genre of movie is science fiction.

- c) Complete the table with the total number of students for each genre of movie.

$$\begin{aligned} \text{Total number of students whose favorite genre movie is drama} &= 8 + 24 = 32 \\ \text{Total number of students whose favorite genre movie is comedy} &= 16 + 101 = 117 \\ \text{Total number of students whose favorite genre movie is science fiction} &= 12 + 39 = 51 \end{aligned}$$

		Favorite Genre of Movie			Total
		Drama	Comedy	Science Fiction	
Students	7th Graders	8	16	12	36
	8th Graders	24	101	39	164
	Total	32	117	51	200

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Complete.**

1. Of all of the cars shown in a catalogue, 70 were chosen at random and classified according to their performance and fuel consumption. The results are recorded in the two-way table as shown.

		Performance			Total
		Poor	Medium	Good	
Fuel Consumption	Low	11	8	2	
	Medium	8	14	7	
	High	1	6		
	Total				

- a) Find the total number of cars with high fuel consumption.

Total number of cars with low fuel consumption

= \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_

= \_\_\_\_\_

Total number of cars with medium fuel consumption

= \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_

= \_\_\_\_\_

Total number of cars with high fuel consumption

= \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

= \_\_\_\_\_

There are a total of \_\_\_\_\_ cars with high fuel consumption.

- b) Find the number of cars with good performance and high fuel consumption.

Number of cars with good performance and high fuel consumption

= \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

= \_\_\_\_\_

There are a total of \_\_\_\_\_ cars with good performance and high fuel consumption.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

- c) Complete the table above with the total number of cars for each performance category.

Total number of cars with poor performance

$$= \text{_____} + \text{_____} + \text{_____}$$

$$= \text{_____}$$

Total number of cars with medium performance

$$= \text{_____} + \text{_____} + \text{_____}$$

$$= \text{_____}$$

Total number of cars with good performance

$$= \text{_____} + \text{_____} + \text{_____}$$

$$= \text{_____}$$


Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Solve. Show your work.**

2. A random sample of 220 items is taken from three different suppliers for quality testing. The results are recorded in the two-way table as shown.

		Rating			Total
		Poor	Fair	Good	
Supplier	A	8	22	69	
	B	6	18	53	
	C	12	10		
	Total				

- a) Find the total number of items taken from supplier C for quality testing.

- b) Find the number of supplier C's items which were rated good.

- c) Complete the two-way table above.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Solve. Show your work.**

3. The annual workplace accident rates for 906 construction workers, classified by trade, are shown in the two-way table.

		Trade				Total
		Welder	Framer	HVAC	Electrician	
Workplace Accident Rate	At Least One Accident	130	100	111	72	
	No Accident	79	165	101		
	Total					

- a) Find the total number of employees who work as an electrician.
- b) Find the number of employees who work as an electrician and have no accident.
- c) Complete the two-way table above.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Construct and interpret a two-way table.***Example*

A random sample of 12 music students were asked to indicate their preference of instrument. Results are shown below.

<b>Gender</b>	F	M	M	F	F	F
<b>Instrument Preferred</b>	P	G	G	P	G	G

<b>Gender</b>	M	M	F	F	F	M
<b>Instrument Preferred</b>	G	P	G	P	G	P

F represents female student

M represents male student

G represents guitar

P represents piano

- a) Construct a two-way table to display the data.

		Instrument		Total
		Guitar	Piano	
Gender	Female	4	3	7
	Male	3	2	5
	Total	7	5	12

- b) Which instrument do most music students prefer?

The total number of music students who prefer the guitar and the piano is 7 and 5 respectively. So, most students prefer the guitar.

- c) Is there any association between the gender of the students and the instrument they prefer?

There is no association between the gender of the students and the instrument they prefer.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Complete.**

4. A random sample of 25 students from an Arts and Science college are surveyed as to whether they enjoy reading science fiction novels. Results are shown below.

<b>Faculty</b>	S	A	S	S	A	A	S	S	A	A	A	S
<b>Science Fiction Novel</b>	Y	N	Y	N	Y	N	Y	Y	N	N	Y	Y

<b>Faculty</b>	A	A	S	S	S	A	A	S	A	S	S	A	S
<b>Science Fiction Novel</b>	N	N	Y	Y	N	Y	Y	N	N	Y	N	N	Y

A represents Arts student  
 S represents Science student  
 Y represents like to read science fiction novels  
 N represents do not like to read science fiction novels

- a) Construct a two-way table to display the data.

		Yes	No	Total
Faculty	Arts			
	Science			
	Total			

- b) What percent of the students enjoy reading science fiction novels?

The total number of students being surveyed is \_\_\_\_\_.

The number of students who enjoy reading science fiction novels is \_\_\_\_\_.

Percentage of students who enjoy reading science fiction novels

$$= \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} \cdot 100$$

= \_\_\_\_\_ %

So, \_\_\_\_\_ % of students enjoy reading science fiction novels.

- c) Describe any association between college students and whether they enjoy reading science fiction novels.

From the table, it appears that \_\_\_\_\_ students enjoy reading science fiction novels and

\_\_\_\_\_ students do not enjoy reading science fiction novels.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Solve. Show your work.**

5. A random sample of 20 adults was asked to indicate whether they watch soccer. Results are shown below.

<b>Gender</b>	M	M	F	F	M	M	F	F	M	M
<b>Watch Soccer</b>	Y	Y	N	N	Y	N	Y	N	Y	Y

<b>Gender</b>	F	F	M	F	M	M	F	M	F	M
<b>Watch Soccer</b>	N	N	N	Y	N	Y	N	Y	N	Y

F represents female

M represents male

Y represents watch soccer

N represents do not watch soccer

- a) Summarize the above data in a two-way table.
- b) What percent of the adults watch soccer?
- c) Describe any association between the gender of the adult and whether he/she watch soccer.



Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Solve. Show your work.**

6. A random sample of 18 people was asked to indicate whether they prefer to listen to classical music or contemporary music. Results are shown below.

<b>Age Group</b>	A1	A2	A3	A1	A1	A3	A2	A2	A1
<b>Type of Music</b>	C2	C1	C1	C1	C2	C2	C1	C2	C1

<b>Age Group</b>	A1	A2	A2	A3	A3	A1	A2	A3	A3
<b>Type of Music</b>	C2	C1	C2	C1	C2	C1	C1	C1	C1

A1 represents age group of 18–25

A2 represents age group of 26–39

A3 represents age group of 40 and above

C1 represents prefer to listen to classical music

C2 represents prefer to listen to contemporary music

- a) Summarize the above data in a two-way table.
- b) What percent of people prefer to listen to contemporary music?
- c) Describe any association between age group and the type of music preferred

**Convert data to relative frequencies in a two-way table.***Example*

From the first example, the two-way table below shows the result of a poll of 200 middle-school students about their favorite genre of movie.

		Favorite Genre of Movie			Total
		Drama	Comedy	Science Fiction	
Students	7th Graders	8	16	12	36
	8th Graders	24	101	39	164
	Total	32	117	51	200

- a) Find the relative frequencies to compare the distribution of students among each favorite genre of movie.

		Favorite Genre of Movie		
		Drama	Comedy	Science Fiction
Students	7th Graders	$\frac{8}{32} = 0.25$	$\frac{16}{117} \approx 0.14$	$\frac{12}{51} \approx 0.24$
	8th Graders	$\frac{24}{32} = 0.75$	$\frac{101}{117} \approx 0.86$	$\frac{39}{51} \approx 0.76$
	Total	1	1	1

- b) Describe the distribution of students among each favorite genre of movie.  
For all favorite genres of movie, there are more 8th graders than 7th graders.
- c) Find the relative frequencies to compare the distribution of favorite genre of movie among students.

		Favorite Genre of Movie			Total
		Drama	Comedy	Science Fiction	
Students	7th Graders	$\frac{8}{36} \approx 0.22$	$\frac{16}{36} \approx 0.45$	$\frac{12}{36} \approx 0.33$	1
	8th Graders	$\frac{24}{164} \approx 0.15$	$\frac{101}{164} \approx 0.61$	$\frac{39}{164} \approx 0.24$	1

- d) Describe the distribution of favorite genre of movie among students.  
From the table, it appears that the distribution of the favorite genre of movie among the 7th graders is quite uniform. The majority of 8th graders's favorite genre of movie is comedy.

**Complete.**

7. From **Question 1**, the two-way table below shows the performance and fuel consumption ratings of 70 cars chosen at random from a catalogue.

		Performance			Total
		Poor	Medium	Good	
Fuel Consumption	Low	11	8	2	21
	Medium	8	14	7	29
	High	1	6	13	20
	Total	20	28	22	70

a) Find the relative frequencies to compare the distribution of fuel consumption ratings among each performance rating.

		Performance		
		Poor	Medium	Good
Fuel Consumption	Low	$\frac{\quad}{\quad} =$	$\frac{\quad}{\quad} \approx$	$\frac{\quad}{\quad} \approx$
	Medium	$\frac{\quad}{\quad} =$	$\frac{\quad}{\quad} =$	$\frac{\quad}{\quad} \approx$
	High	$\frac{\quad}{\quad} =$	$\frac{\quad}{\quad} \approx$	$\frac{\quad}{\quad} \approx$
	Total	1	1	1

b) Describe the distribution of fuel consumption ratings among each performance rating.

The fuel consumptions of cars with poor performance are mostly \_\_\_\_\_ or \_\_\_\_\_. \_\_\_\_\_ of the cars with medium performance require medium fuel consumption. Most of the cars with good performance require \_\_\_\_\_ fuel consumption.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

- c) Find the relative frequencies to compare the distribution of performance ratings among each fuel consumption rating.

		Performance			Total
		Poor	Medium	Good	
Fuel Consumption	Low	$\frac{\quad}{\quad} \approx$	$\frac{\quad}{\quad} \approx$	$\frac{\quad}{\quad} \approx$	1
	Medium	$\frac{\quad}{\quad} \approx$	$\frac{\quad}{\quad} \approx$	$\frac{\quad}{\quad} \approx$	1
	High	$\frac{\quad}{\quad} =$	$\frac{\quad}{\quad} =$	$\frac{\quad}{\quad} =$	1

- d) Describe the distribution of performance ratings among each fuel consumption rating.

Most cars with low fuel consumption belong to the \_\_\_\_\_ performance category. Most cars with medium fuel consumption belong to the \_\_\_\_\_ performance category. Most cars with high fuel consumption belong to the \_\_\_\_\_ performance category.