TASK: When working with probability, we often see the data expressed in the form of a two way frequency table such as below. Two-way frequency tables are a visual representation of the possible relationships between two sets of categorical data. In this table, students were asked to identify as male or female and which type of vehicle they prefer.

Example: A survey asked, "If you could have a new vehicle, would you want a sport utility vehicle or a sports car?"

Two Way Frequency Table

	Sport Utility Vehicle (SUV)	Sports Car	Totals
male	21	39	60
female	135	45	180
Totals	156	84	240

Applying our vocabulary: There are four possible "events" occurring:

M = male	F = female
V = Sport Utility Vehicle	C = Sports Car

The categories are labeled at the top and the left side of the table, with the frequency (count) information appearing in the four or more interior cells of the table. The "totals" of each row appear at the right, and the "totals" of each column appear at the bottom.

Note: the "sum of the row totals" **equals** the "sum of the column totals" (the 240 seen in the lower right corner). This value (240) is also the sum of all of the counts from the interior cells.

EXPLORE: Use the two way frequency table on the previous page to answer the following questions:

1. *How many* people responded to this survey?

2. *How many* females responded to the survey?

3. *How many* people chose a sports car?

4. *How many* females chose a sports car?

> Recall from Friday's lesson that the probability of an event 'E' occurring is given by the ratio $P(E) = \frac{n(E)}{n(S)}$, where
> - n(E) is the number of outcomes that fall in the event E
> - n(S) is the number of outcomes that fall in the sample space S

5. *What is the probability* that one of the students picked at random is a female?

6. *What is the probability* that one of the students picked at random prefers a sports car?

7. *What is the probability* that one of the students picked at random is female and prefers a sports car?

[BEFORE MOVING ON TO THE APPLICATION, CHECK YOUR ANSWERS ON OUR WEBSITE]

APPLICATION: Answer each question below using your knowledge of two-way frequency tables.

1. A total of 247 students were surveyed about what they liked best for lunch. The results are shown in a two-way frequency table. Complete the missing cells in the table below and answer the accompanying questions:

	Pizza	Chicken Sandwich	Salad	Total
Freshman		18	39	102
Sophomores			42	87
Juniors		28		
Total	85	65		

(a) How many juniors preferred pizza?   (b) What was preferred most by a freshman?

(c) Were the different grade levels of students equally represented? Why or why not?

(d) What is the meaning of the number 28 in the table?

(e) How can you check your work to be sure you have filled in the table correctly?

2. Eleventh grade students were asked whether they participate in an after-school activity. Complete the two-way frequency table below.

	Yes	No	Total
Male		40	
Female			95
Total	102		187

3. You go to a dance and help clean up afterwards. To help, you collect the soda cans, Coca-Cola and Sprite, and organize them. Some cans were on the table and some were in the garbage, Seventy-two total cans were found. 42 total cans were found in the garbage and fifty total cans were Coca-Cola. 14 Sprite cans were found on the table. Complete the two-way frequency chart below.

	Coca-Cola	Sprite	Total
Table			
Garbage			
Total			