

# CATEGORICAL DATA: PERCENT BAR GRAPHS



The student is expected to summarize categorical data with numerical and graphical summaries, including the mode, the percent of values in each category (relative frequency table), and the percent bar graph, and use these summaries to describe the data distribution.



## TELL ME MORE...

**Categorical data** are data sets in which numerical data can be divided into groups or categories. For example, surveying a class to determine their favorite lunch food in the school cafeteria generates categorical data. The categories are the type of lunch food and the data are the number of students who said that food was their favorite.

The table shows the results of such a survey of 50 students. You can represent and describe this data in multiple ways.

### MODE

The **mode** of a set of data is the data value that appears the most often. In the survey, pizza is the mode because pizza is the favorite of the greatest number of students.

Food	Number of Students
Pizza	
Chicken Wrap	
Hamburger	
Salad	
Veggie Burger	

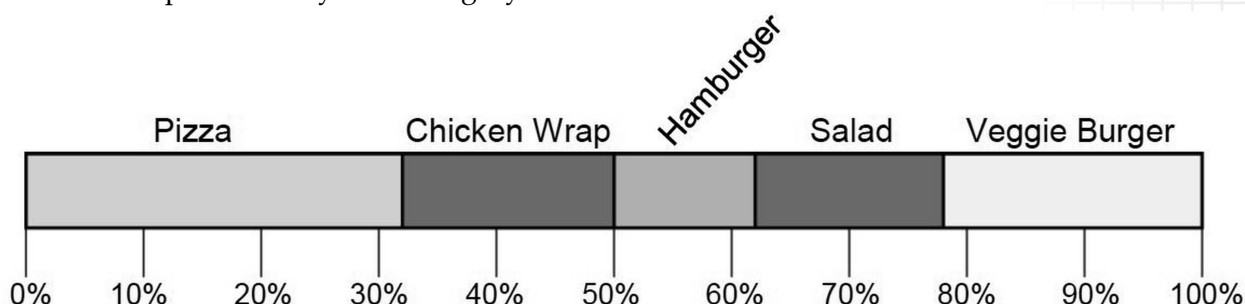
### RELATIVE FREQUENCY TABLE

A **relative frequency table** uses percents to show the frequency of responses relative to other responses and the total number of responses.

Food	Number of Students	Process	Relative Frequency
Pizza		$\frac{16}{50} = \frac{32}{100} = 32\%$	32%
Chicken Wrap		$\frac{9}{50} = \frac{18}{100} = 18\%$	18%
Hamburger		$\frac{6}{50} = \frac{12}{100} = 12\%$	12%
Salad		$\frac{8}{50} = \frac{16}{100} = 16\%$	16%
Veggie Burger		$\frac{11}{50} = \frac{22}{100} = 22\%$	22%

### PERCENT BAR GRAPH

A **percent bar graph** takes the data from each category and shows what percent of the total data set is represented by each category.





## EXAMPLES

**EXAMPLE 1:** The Molenaar family recently went on a fishing trip. The table shows the number of the different types of fish that they caught. Construct a percent bar graph to show this data.

Fish	Number Caught
Catfish	16
Bluegill	12
Bass	4
Perch	8

**STEP 1** Determine the total number of fish that were caught.

■  $16 + 12 + 4 + 8 = 40$

**A total of 40 fish were caught.**

**STEP 2** Determine the percent of the total number of fish that represents how many each type of fish were caught.

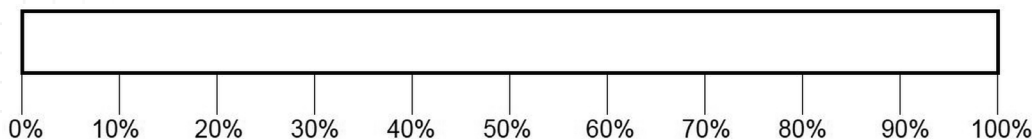
■ Catfish:  $\frac{16}{40} = \frac{40}{100} = 40\%$

■ Bluegill:  $\frac{12}{40} = \frac{30}{100} = 30\%$

■ Bass:  $\frac{4}{40} = \frac{10}{100} = 10\%$

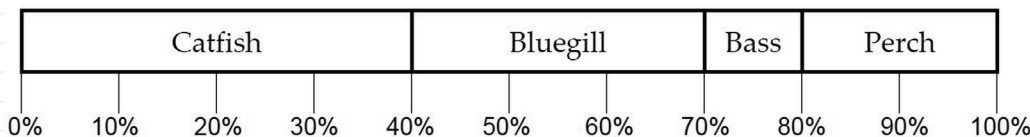
■ Perch:  $\frac{8}{40} = \frac{20}{100} = 20\%$

**STEP 3** Draw a percent bar and divide it into 10% intervals.



**STEP 4** Mark the percent for each type of fish.

- Begin with catfish. Mark a section from 0 % to 40%.
- 30% of the fish caught were bluegill.  $40\% + 30\% = 70\%$ , so mark the end of this section at 70%.
- 10% of the fish caught were bass.  $70\% + 10\% = 80\%$ , so mark the end of this section at 80%.
- 20% of the fish caught were perch.  $80\% + 20\% = 100\%$ , so the remainder of the percent bar represents the percent of perch.



**EXAMPLE 2:** Sabrina counted the colors of cars that were in the grocery store parking lot. The table shows the data she collected. Construct a relative frequency table for Sabrina's data.

Color	Number of Cars
White	12
Grey	9
Red	6
Black	9

**STEP 1** Determine the total number of cars Sabrina counted.

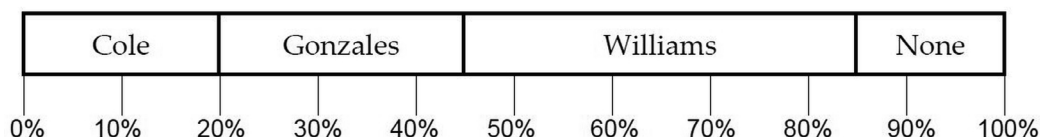
■  $12 + 9 + 6 + 9 = 36$

**Sabrina counted a total of 36 cars.**

**STEP 2** Determine the percent of the total number of cars that represents how many each color were in the parking lot.

Color	Number of Cars	Process	Relative Frequency
White	12	$\frac{12}{36} = \frac{33\frac{1}{3}}{100} = 33\frac{1}{3}\%$	$33\frac{1}{3}\%$
Grey	9	$\frac{9}{36} = \frac{25}{100} = 25\%$	25%
Red	6	$\frac{6}{36} = \frac{16\frac{2}{3}}{100} = 16\frac{2}{3}\%$	$16\frac{2}{3}\%$
Black	9	$\frac{9}{36} = \frac{25}{100} = 25\%$	25%

**EXAMPLE 3:** The percent bar graph shows the percent of people surveyed who prefer each of three candidates in a local city council race. If there were 200 people responding in the survey, construct a table to show the number of people who prefer each candidate.



**STEP 1** Determine the percent of the whole group surveyed who prefer each of the three candidates as well as None of the Above.

- Cole: 20%
- Gonzales:  $45\% - 20\% = 25\%$
- Williams:  $85\% - 45\% = 40\%$
- None of the Above:  $100\% - 85\% = 15\%$

**STEP 2** Multiply each percent (as a decimal number) by the total number of people surveyed, 200, to determine the number of people represented in each category.

- Cole:  $0.20 \times 200 = 40$
- Gonzales:  $0.25 \times 200 = 50$
- Williams:  $0.40 \times 200 = 80$
- None of the Above:  $0.15 \times 200 = 30$

**STEP 3** Use a table to organize the data.

Candidate	Number of People
Cole	40
Gonzales	50
Williams	80
None of the Above	30

### YOU TRY IT!

The table shows data regarding Ms. Salinas' class's favorite flavors of ice cream. What is the mode of this data set?

Ice Cream Flavor	Number of Students
Vanilla	3
Strawberry	5
Chocolate	4
Mocha	10
Lemon	6

Which category (flavor) has the greatest number of students as its favorite?

Mode: \_\_\_\_\_

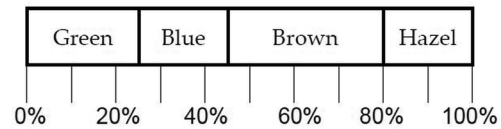


## PRACTICE

1. The students in Ms. Gearhart's homeroom class took a survey about pets. The frequency table shows the results. What is the mode of the data?

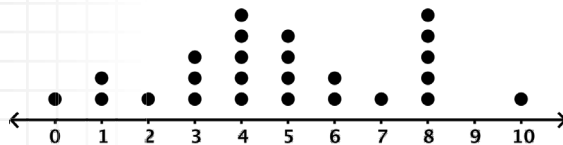
Type of Pet	Frequency
Dog	
Cat	
Bird	
Hamster	
Snake	
Other	

2. Ms. Melborne recorded the eye color of each student in her science class while studying genetics. The results are shown in the percent bar graph. What is the mode of the data?



Use the following information for questions 3-4.

Mrs. Hastings surveyed students on the first day of school about the number of books read over the summer. The plot shows the results.



3. What is the mode number of books read over the summer?

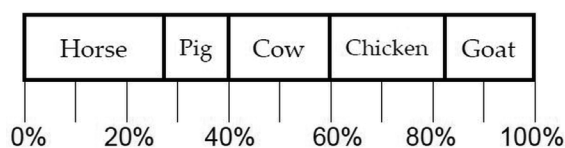
4. Complete the table to show the relative frequencies of reading each number of books.

Books Read	Frequency	Relative Frequency
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

5. Hal Roberts owns a car dealership and is taking inventory of the colors of cars on the new car lot. The table shows the number of each color car in inventory. Complete the table to show the percentage of the inventory that is composed of each color car.

Car Color	Number	Percent of Inventory
Blue	84	
Red	20	
Black	68	
White	48	
Tan	8	
Silver	12	

6. The percent bar graph represents the 50 animals on a farm by type.



Complete the table to show the number of each type of animal on the farm.

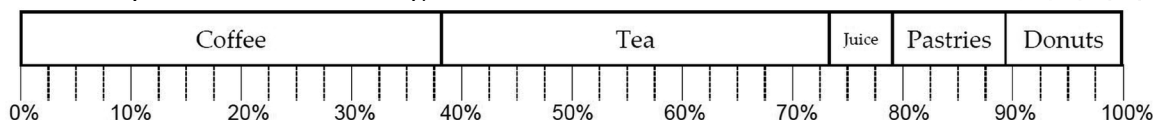
Animal	Count
Horse	14
Pig	
Cow	
Chicken	
Goat	

7. The table represents the frequency of each of several pizza toppings being ordered on a Friday night at Pete's Pizza Shack. Which of the statements best describes the data?

Topping	Frequency
Pineapple	9
Sausage	40
Hamburger	62
Olives	5
Pepperoni	58
Extra Cheese	29

- A** The mode of 62 means most pizza orders were for 62 pizzas.
- B** The mode of hamburger means the topping is ordered 62% of the time.
- C** Olives are a favorite of 5% of customers.
- D** The mode of hamburger means the greatest percent of orders have this topping.

8. Callie's Bakery plotted a percent bar graph to show the portion each item composes of their morning sales.



Which table best reflects the frequencies of each item if total sales average each morning is \$1,200.

**A**

Item	Sales (\$)
Coffee	\$380
Tea	\$360
Juice	\$50
Pastries	\$100
Donuts	\$110

**C**

Item	Sales (\$)
Coffee	\$1,162
Tea	\$1,126
Juice	\$1,121
Pastries	\$1,111
Donuts	\$1,100

**B**

Item	Sales (\$)
Coffee	\$456
Tea	\$432
Juice	\$60
Pastries	\$120
Donuts	\$132

**D**

Item	Sales (\$)
Coffee	\$380
Tea	\$740
Juice	\$790
Pastries	\$890
Donuts	\$1,000