FREQUENCY DISTRIBUTIONS – HISPANIC OR LATINO POPULATION PERCENTAGES IN 50 STATES AND THE DISTRICT OF COLUMBIA

TEACHER VERSION

Subject Level:
Middle School Math

Grade Level:
6

Approx. Time Required:
45–60 minutes

Learning Objectives:

- Students will be able to complete frequency tables.
- Students will be able to create and interpret histograms.

United States Census Bureau

Classrooms Powered by Census Data

STATISTICS IN SCHOOLS

Activity Description

Students will compare and contrast the frequencies of Hispanic or Latino population percentages for 50 states and the District of Columbia by completing frequency tables and creating histograms that summarize and display the data.

Suggested Grade Level:
6

Approximate Time Required:
45–60 minutes

Learning Objectives:
- Students will be able to complete frequency tables.
- Students will be able to create and interpret histograms.

Topics:
- Frequency distributions
- Frequency tables
- Histograms

Skills Taught:
- Creating a frequency table
- Creating a histogram
- Interpreting a histogram

Materials Required

- The student version of this activity, 14 pages
- Teacher computer with Internet access and a projector to display web sites

Activity Item

The following item is part of this activity. The item, its data source, and instructions for viewing the source data online appear at the end of this teacher version.

- Item 1: Hispanic or Latino Percentage of the Population in 50 States and District of Columbia: 2014

For more information to help you introduce your students to the U.S. Census Bureau, read "*Census Bureau 101 for Students*." This information sheet can be printed and passed out to your students as well.

Standards Addressed

See charts below. For more information, read "*Overview of Education Standards and Guidelines Addressed in Statistics in Schools Activities*."

Common Core State Standards for Mathematics

Standard	Domain	Cluster
CCSS.MATH.CONTENT.6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	6 SP – Statistics & Probability	Summarize and describe distributions.
CCSS.MATH.CONTENT.6.SP.B.5 Summarize numerical data sets in relation to their context, such as by: **CCSS.MATH.CONTENT.6.SP.B.5.A** Reporting the number of observations. **CCSS.MATH.CONTENT.6.SP.B.5.C** Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.	6 SP – Statistics & Probability	Summarize and describe distributions.

Common Core State Standards for Mathematical Practice

Standard
CCSS.MATH.PRACTICE.MP3. Construct viable arguments and critique the reasoning of others. Students will compare and contrast histograms that use different class widths.
CCSS.MATH.PRACTICE.MP4. Model with mathematics. Students will create and interpret histograms to investigate the frequencies of Hispanic or Latino population percentages across states and the District of Columbia and then summarize the behavior of the data distribution.
CCSS.MATH.PRACTICE.MP6. Attend to precision. Students will group raw data correctly in a frequency table and create histograms accurately.

National Council of Teachers of Mathematics' Principles and Standards for School Mathematics

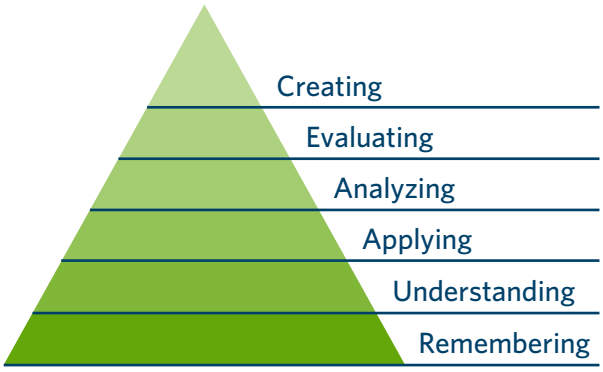
Content Standard	Students should be able to:	Expectation for Grade Band
Data Analysis and Probability	Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.	Select, create, and use appropriate graphical representations of data, including histograms, box plots, and scatterplots.
Data Analysis and Probability	Select and use appropriate statistical methods to analyze data.	Discuss and understand the correspondence between data sets and their graphical representations, especially histograms, stem-and-leaf plots, box plots, and scatterplots.

Guidelines for Assessment and Instruction in Statistics Education

GAISE	Level A	Level B	Level C
Formulate Questions		X	
Collect Data			
Analyze Data	X		
Interpret Results	X		

Bloom's Taxonomy

Students will ***apply*** their mathematics skills to ***create*** frequency tables and histograms from census data and then ***analyze*** those data.



Teacher Notes

Before the Activity

Students must understand the following key terms:

- **Mean** – a measure of center in a set of numerical data, computed by adding the values in a list and then dividing by the number of values in the list
- **Median** – a measure of center in a set of numerical data, identified as the value appearing at the middle of a sorted version of the list (or the mean of the two middle values if the sorted list contains an even number of values)
- **Center** – the middle of a sorted data set, usually identified as the median or mean
- **Frequency** – the number of times a value occurs in a data set, which can be identified by tally marks
- **Frequency distribution** – a list, which can be displayed in a table, of possible values for a variable and the number of instances each value appears in a data set
- **Frequency table** – a way to organize a data set to show the number of times each data point appears in it
- **Histogram** – a way of displaying numerical data on a graph using horizontal or vertical bars so that the height or the length of the bars indicates frequency
- **Class boundary** (aka class limit, class interval) – the limit of a group of possible values for a variable in a frequency table, with no overlap of an adjacent group
- **Range** – the numerical difference between a data set's maximum value and minimum value
- **Class width** (aka bin width) – the range of data for each bar of a histogram, calculated by subtracting a class boundary from the next largest class boundary
- **Skewness** – a measure of the unevenness of values in a data set in which one "tail" of the distribution has more extreme values than the other "tail," described using terms like "skewed right" and "skewed left"
- **Hispanic or Latino** – a term used to describe a person of Mexican, Puerto Rican, Cuban, South or Central American, or another Spanish culture or origin, regardless of race

Students should have the following skill:

- Ability to tally and graph data

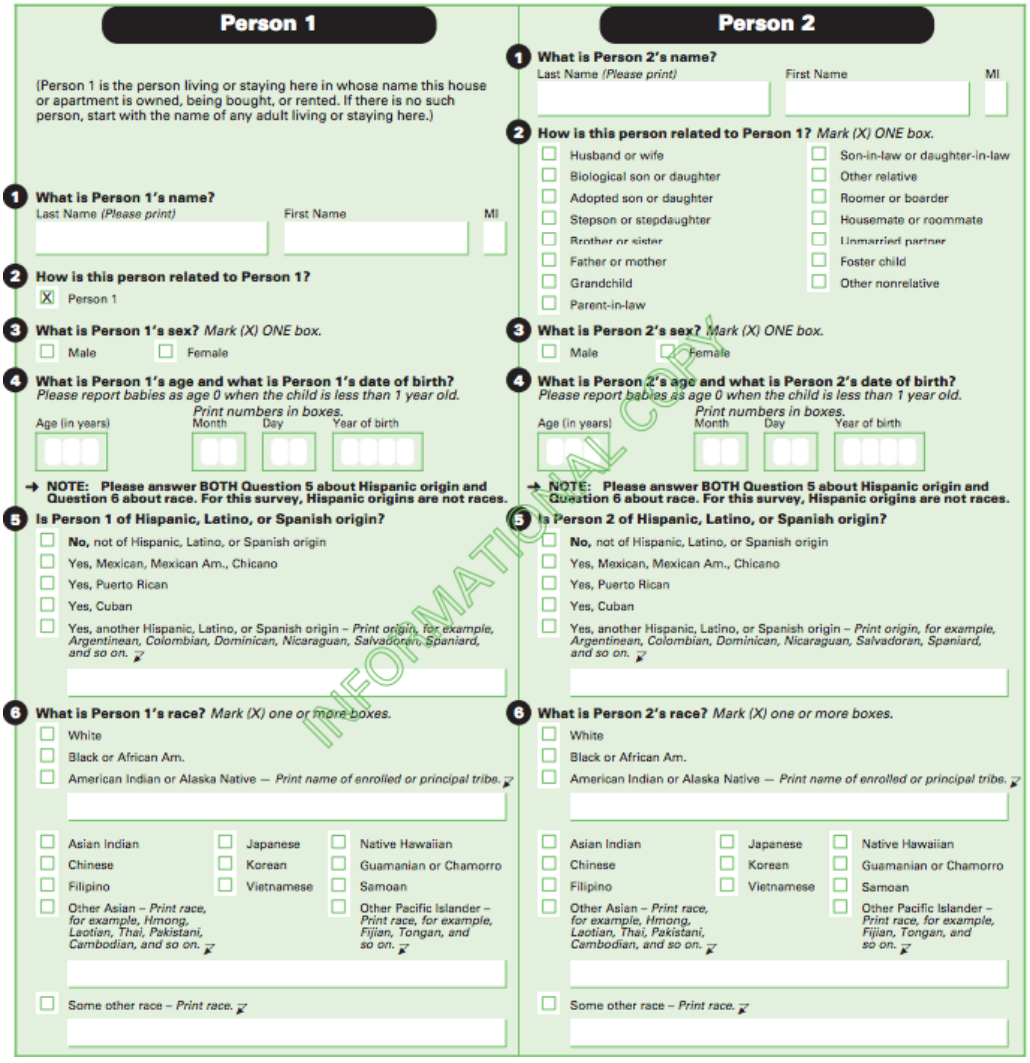
Teachers may want to remind students that bar graphs plot categorical data and their bars do not touch, while histograms plot numerical data and their bars do touch.

Teachers should explain to students that data in this activity come from the American Community Survey (ACS), which is conducted monthly by the Census Bureau and is designed to show how communities are changing. Through asking questions of a sample of the population, it produces national data on more than 35 categories of information, such as education, income, housing, and employment. Then, teachers should review the ACS Sample below with students, projecting it on the screen and explaining that it can help determine the percentage of the population in each state and the District of Columbia that is Hispanic or Latino.

Teachers could ask the following questions to get students thinking:

- Who in our community might be interested in learning the percentage of Hispanics or Latinos in our state, and why? (Teachers should expect answers like: schools, human services, and retail establishments, to communicate with residents whose families speak primarily Spanish and to help them with issues specific to their needs.)
- How do you think the percentage of Hispanic or Latino people in our state compares with the percentage in other states? (Teachers should expect varied student answers.)

American Community Survey Sample



Person 1

(Person 1 is the person living or staying here in whose name this house or apartment is owned, being bought, or rented. If there is no such person, start with the name of any adult living or staying here.)

1 **What is Person 1's name?**
Last Name *(Please print)* First Name MI

2 **How is this person related to Person 1?**
☒ Person 1

3 **What is Person 1's sex?** *Mark (X) ONE box.*
☐ Male ☐ Female

4 **What is Person 1's age and what is Person 1's date of birth?**
Please report babies as age 0 when the child is less than 1 year old.
Print numbers in boxes.
Age (in years) Month Day Year of birth

→ **NOTE: Please answer BOTH Question 5 about Hispanic origin and Question 6 about race. For this survey, Hispanic origins are not races.**

5 **Is Person 1 of Hispanic, Latino, or Spanish origin?**
☐ **No,** not of Hispanic, Latino, or Spanish origin
☐ Yes, Mexican, Mexican Am., Chicano
☐ Yes, Puerto Rican
☐ Yes, Cuban
☐ Yes, another Hispanic, Latino, or Spanish origin – *Print origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.*

6 **What is Person 1's race?** *Mark (X) one or more boxes.*
☐ White
☐ Black or African Am.
☐ American Indian or Alaska Native – *Print name of enrolled or principal tribe.*
☐ Asian Indian ☐ Japanese ☐ Native Hawaiian
☐ Chinese ☐ Korean ☐ Guamanian or Chamorro
☐ Filipino ☐ Vietnamese ☐ Samoan
☐ Other Asian – *Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on.* ☐ Other Pacific Islander – *Print race, for example, Fijian, Tongan, and so on.*
☐ Some other race – *Print race.*

Person 2

1 **What is Person 2's name?**
Last Name *(Please print)* First Name MI

2 **How is this person related to Person 1?** *Mark (X) ONE box.*
☐ Husband or wife ☐ Son-in-law or daughter-in-law
☐ Biological son or daughter ☐ Other relative
☐ Adopted son or daughter ☐ Roomer or boarder
☐ Stepson or stepdaughter ☐ Housemate or roommate
☐ Brother or sister ☐ Unmarried partner
☐ Father or mother ☐ Foster child
☐ Grandchild ☐ Other nonrelative
☐ Parent-in-law

3 **What is Person 2's sex?** *Mark (X) ONE box.*
☐ Male ☐ Female

4 **What is Person 2's age and what is Person 2's date of birth?**
Please report babies as age 0 when the child is less than 1 year old.
Print numbers in boxes.
Age (in years) Month Day Year of birth

→ **NOTE: Please answer BOTH Question 5 about Hispanic origin and Question 6 about race. For this survey, Hispanic origins are not races.**

5 **Is Person 2 of Hispanic, Latino, or Spanish origin?**
☐ **No,** not of Hispanic, Latino, or Spanish origin
☐ Yes, Mexican, Mexican Am., Chicano
☐ Yes, Puerto Rican
☐ Yes, Cuban
☐ Yes, another Hispanic, Latino, or Spanish origin – *Print origin, for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, and so on.*

6 **What is Person 2's race?** *Mark (X) one or more boxes.*
☐ White
☐ Black or African Am.
☐ American Indian or Alaska Native – *Print name of enrolled or principal tribe.*
☐ Asian Indian ☐ Japanese ☐ Native Hawaiian
☐ Chinese ☐ Korean ☐ Guamanian or Chamorro
☐ Filipino ☐ Vietnamese ☐ Samoan
☐ Other Asian – *Print race, for example, Hmong, Laotian, Thai, Pakistani, Cambodian, and so on.* ☐ Other Pacific Islander – *Print race, for example, Fijian, Tongan, and so on.*
☐ Some other race – *Print race.*

www2.census.gov/programs-surveys/acs/methodology/questionnaires/2016/quest16.pdf

To view this sample online, click on the link above and go to Page 2.

Teachers should then divide students into groups of four to complete parts 1–4 of the activity, assigning one

part to each student in the group. Teachers could explain to students that each part requires them to create frequency tables and histograms for different class widths.

Teachers should review the optional part 6 of the activity, estimated to take an additional 15–20 minutes, to see whether they want to assign it.

During the Activity

Teachers should monitor students as they work.

After the Activity

Teachers should review the answers to the activity as part of a class discussion.

Extension Ideas

- Teachers could have students use QuickFacts *(www.census.gov/quickfacts)* to compare data for two states in frequency tables and histograms. Data could include the percentages of people who speak a language other than English at home, who are foreign-born, or who identify as black or African-American.
- Teachers could present to students any of these slides *(census.gov/population/www/socdemo/files/Internet_Hispanic_in_US_2006.pdf)* containing tables, maps, and graphs of several years of census data and projections about the Hispanic or Latino population.

Student Activity

Click ***here*** to download a printable version for students.

Activity Item

The following item is part of this activity and appears at the end of this student version.

- Item 1: Hispanic or Latino Percentage of the Population in 50 States and District of Columbia: 2014

Student Learning Objectives

- I will be able to complete frequency tables.
- I will be able to create and interpret histograms.

How do the percentages of people who are Hispanic or Latino in each state and the District of Columbia vary?

To complete your assigned part of this activity and help your group answer the question above, review the data in **Item 1: Hispanic or Latino Percentage of the Population in 50 States and District of Columbia: 2014**. Start by placing tally marks in the second column of your frequency table for each data value that falls in the appropriate class width in the first column.

Example: In 2014, 1.7 percent of the population in Vermont was Hispanic or Latino, so for that percentage you should add a tally mark to the "0 to less than 5" class width, as shown here:

Class Width	Tally Marks
0 to less than 5	I

After tallying all the percentages, convert the tally marks to frequency values in the third column, as shown here:

Class Width	Tally Marks	Frequency
0 to less than 5	𝍸	5

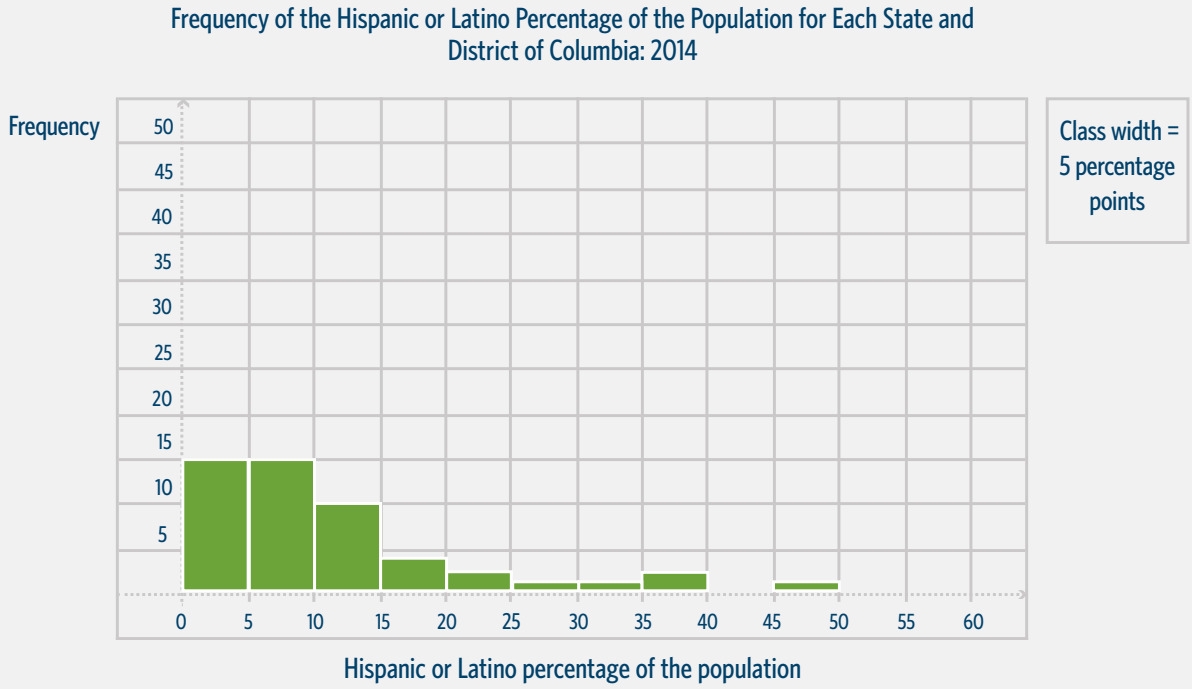
You can add your frequencies in the total row to make sure you didn't miss any data points. The total should always be 51. Use the data in your frequency table to make a histogram on your graph template.

Part 1 – Make a Frequency Table and Histogram With a Class Width of 5 Percentage Points

Frequency of the Hispanic or Latino Percentage of the Population for Each State and District of Columbia: 2014
(Class Width = 5 Percentage Points)

Class Width	Tally Marks	Frequency
0 to less than 5	𝍸 𝍸 𝍸	**15**
5 to less than 10	𝍸 𝍸 𝍸	**15**
10 to less than 15	𝍸 𝍸	**10**
15 to less than 20	𝍸	**4**
20 to less than 25	II	**2**
25 to less than 30	I	**1**
30 to less than 35	I	**1**
35 to less than 40	II	**2**
40 to less than 45		**0**
45 to less than 50	I	**1**
		Total: **51**

Student graphs should look similar to:

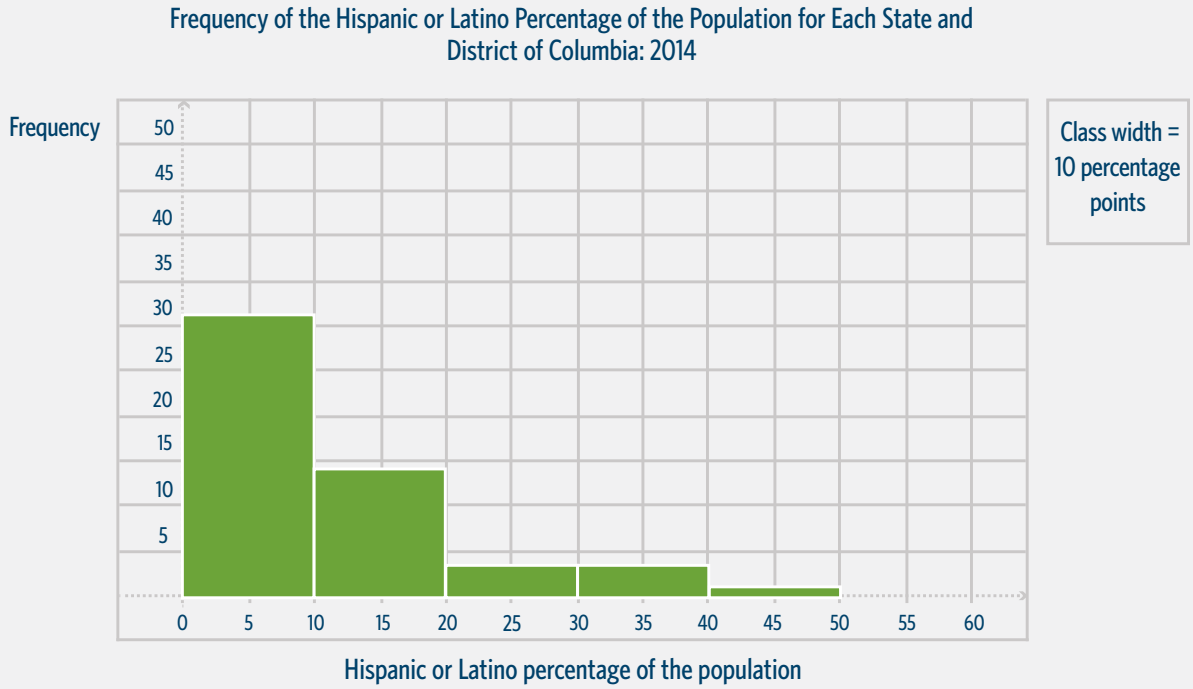


Part 2 – Make a Frequency Table and Histogram With a Class Width of 10 Percentage Points

Frequency of the Hispanic or Latino Percentage of the Population for Each State and District of Columbia: 2014
(Class Width = 10 Percentage Points)

Class Width	Tally Marks	Frequency
0 to less than 10	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	**30**
10 to less than 20	𝍸 𝍸 ||||	**14**
20 to less than 30	|||	**3**
30 to less than 40	|||	**3**
40 to less than 50	|	**1**
		Total: **51**

Student graphs should look similar to:

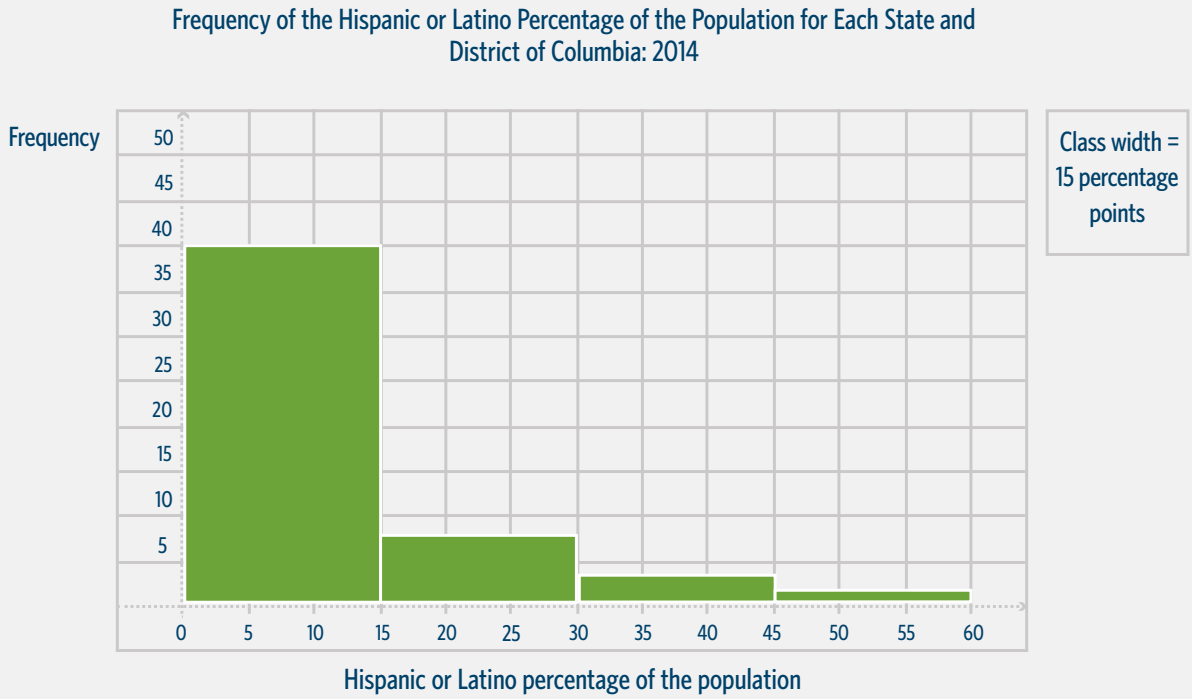


Part 3 – Make a Frequency Table and Histogram With a Class Width of 15 Percentage Points

Frequency of the Hispanic or Latino Percentage of the Population for Each State and District of Columbia: 2014
(Class Width = 15 Percentage Points)

Class Width	Tally Marks	Frequency
0 to less than 15	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	**40**
15 to less than 30	𝍸 ||	**7**
30 to less than 45	|||	**3**
45 to less than 60	|	**1**
		Total: **51**

Student graphs should look similar to:

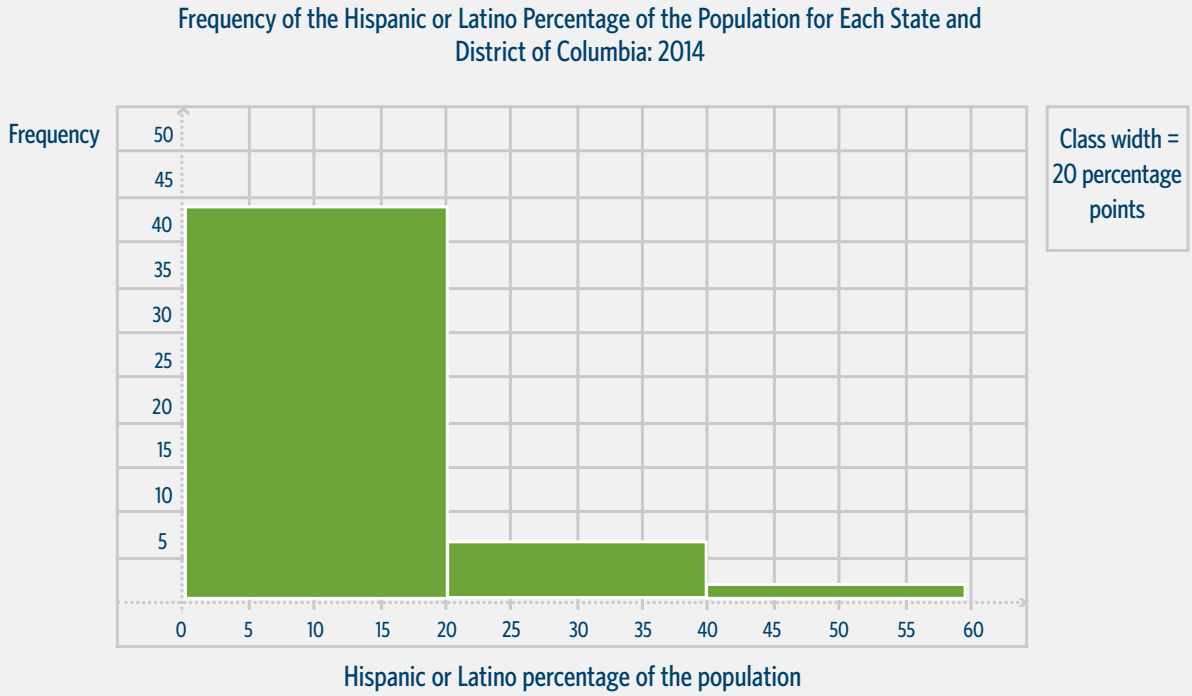


Part 4 – Make a Frequency Table and Histogram With a Class Width of 20 Percentage Points

Frequency of the Hispanic or Latino Percentage of the Population for Each State and District of Columbia: 2014
(Class Width = 20 Percentage Points)

Class Width	Tally Marks	Frequency
0 to less than 20	卌 卌 卌 卌 卌 卌 卌 卌 ||||	**44**
20 to less than 40	卌 |	**6**
40 to less than 60	|	**1**
		Total: **51**

Student graphs should look similar to:



Part 5 – Summarize Your Data

Now work with your group members to review the frequency tables and histograms you each created and to complete the following table, for use in answering the questions below.

Part #	Class Width	Total Number of Class Groups	Class Width x Total Number of Class Groups
1	5	**10**	**50**
2	10	**5**	**50**
3	15	**4**	**60**
4	20	**3**	**60**

1. What do you notice about the numbers in the last column of the table above?

   Student observations will vary but could include that all numbers are either 50 or 60.

2. If you increase the number of class groups, what happens to the class width?

   The class width gets smaller.

3. If you increase the class width, what happens to the number of class groups?

   The number of class groups decreases.

4. Look back at all four histograms that your group members made to fill in the following table.

At what percentage do the data appear to be centered?	**Student answers will vary, but should be around 11 percent (actual mean: 11.3 percent; actual median: 9 percent).**
What appears to be the range of the data?	**From the parts 1 and 2 graphs, the range appears to be 50 percent. From the parts 3 and 4 graphs, it appears to be 60 percent (actual value: 46.4 percent).**
Which way do the data appear to be skewed?	**All of the graphs are skewed right.**

5. Which class width helps you give the most accurate answers to the questions in the table above? How?

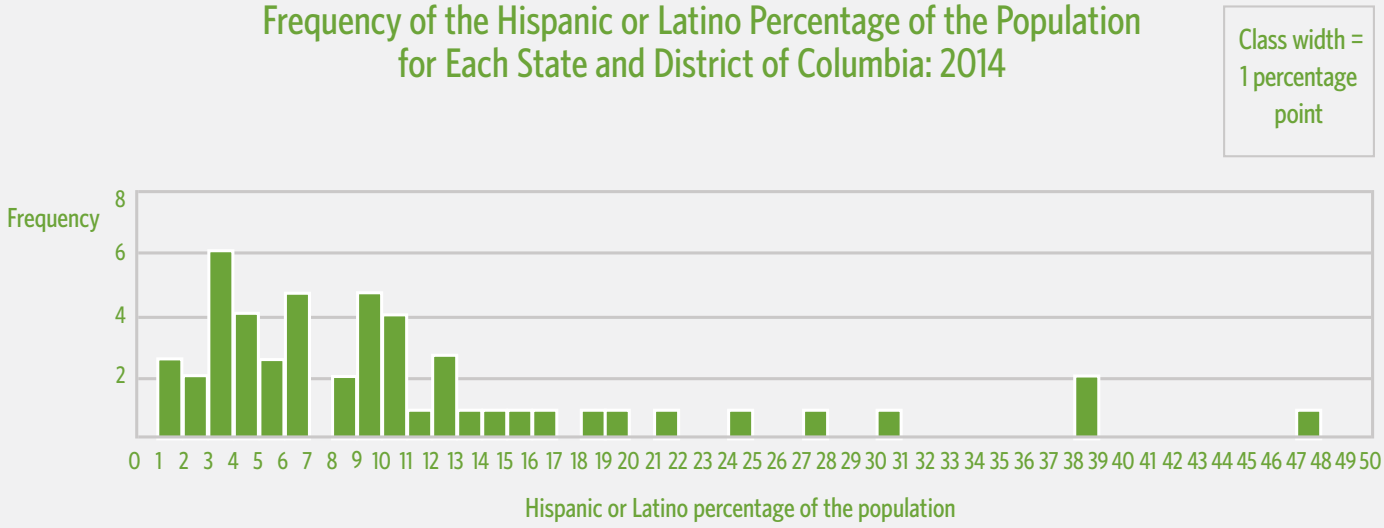
   Student answers will vary, but students should notice that the smaller class widths offer a more detailed look at the distribution of percentages so that, for example, we can see more clearly how unusual the higher values are (for California, Texas, and New Mexico, specifically).

6. What do you think are the disadvantages of the smaller class widths when compared with the larger class widths?

   Student answers will vary but could include: They are time-consuming to figure out by hand. A smaller class width also draws attention to some less important details, such as the distinction between already small percentages (such as in the 0 to less than 5 and the 5 to less than 10 bars in part 1). They might also make it harder to see the overall pattern of the data.

7. What do you think a histogram for these data would look like if the class width were 1 percentage point?

Student answers will vary but should reflect students' understanding that using this class width would make the data difficult to summarize. (This histogram appears below for teachers' reference only.)



Part 6 – Make a Frequency Chart and Histogram About the Asian Population (Optional)

Now that you've practiced creating frequency tables and histograms to learn about Hispanic and Latino population percentages, do the same for the Asian population using data from the table below.

Asian Percentage of the Population in 50 States and District of Columbia: 2014

State/District	Percentage Asian Population
Alabama	1.2
Alaska	6.0
Arizona	3.2
Arkansas	1.2
California	13.9
Colorado	2.9
Connecticut	4.2
Delaware	3.9
District of Columbia	3.8
Florida	2.6
Georgia	3.7
Hawaii	37.6
Idaho	1.5
Illinois	5.2
Indiana	2.0
Iowa	2.2
Kansas	2.6
Kentucky	1.2
Louisiana	1.7
Maine	1.1
Maryland	6.2
Massachusetts	6.1
Michigan	2.8
Minnesota	4.6
Mississippi	0.8
Missouri	1.8

State/District	Percentage Asian Population
Montana	0.8
Nebraska	2.1
Nevada	7.8
New Hampshire	2.6
New Jersey	9.3
New Mexico	1.5
New York	8.2
North Carolina	2.5
North Dakota	1.2
Ohio	1.9
Oklahoma	2.0
Oregon	4.0
Pennsylvania	3.1
Rhode Island	3.4
South Carolina	1.4
South Dakota	1.3
Tennessee	1.6
Texas	4.3
Utah	2.2
Vermont	1.6
Virginia	6.1
Washington	7.8
West Virginia	0.6
Wisconsin	2.6
Wyoming	0.9

U.S. Census Bureau, 2014 American Community Survey 1-Year Estimates

1. Examine the data and decide the appropriate class width for your frequency table, writing it in the blank below. (In general, mathematicians like to separate data into between five and ten class groups.)

   Class Width: _____

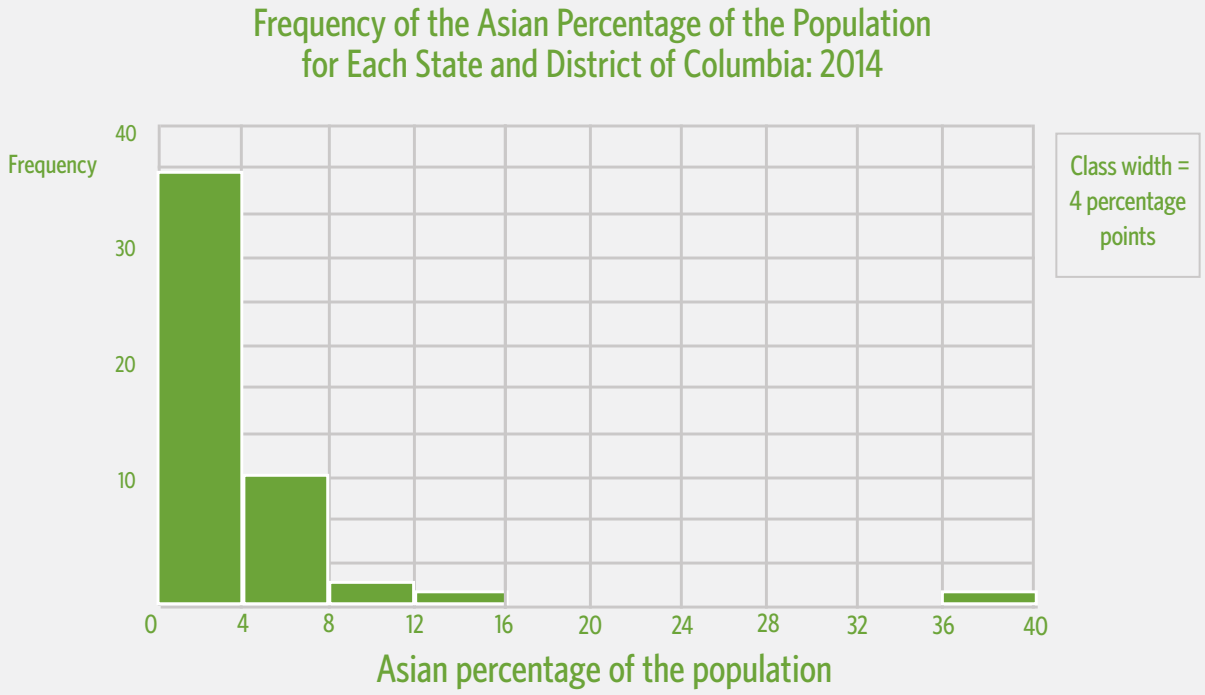
   Student answers will vary. The sample student frequency table and histogram below use a class width of 4 percentage points.

2. Fill in your frequency table, adding a descriptive title in the space provided.

   Title: **Frequency of the Asian Percentage of the Population for Each State and District of Columbia: 2014 (Class Width = 4 Percentage Points)**

Class Width	Tally Marks	Frequency
0 to less than 4	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 |	36
4 to less than 8	𝍸 𝍸 |	11
8 to less than 12	||	2
12 to less than 16	|	1
16 to less than 20		0
20 to less than 24		0
24 to less than 28		0
28 to less than 32		0
32 to less than 36		0
36 to less than 40	|	1

3. Create your histogram of these data on the grid below. Make sure to write the class boundaries along the horizontal axis and the frequency intervals along the vertical axis, to add a title, and to label both your axes.



4. Find a classmate who chose a different class width than you, and then work together to complete the following table about both your histograms.

	At what percentage do the data appear to be centered?	What appears to be the range of the data?	Which way do the data appear to be skewed?
Your histogram	**Student answers will vary but should be around 2–4 percent (actual mean: 4.02 percent; actual median: 2.6 percent).**	**Student answers will vary but should be around 35–40 percent (actual value: 37 percent).**	**Right**
Your classmate's histogram	**Same as above.**	**Same as above.**	**Same as above.**

5. Did you and your classmate discover any unusual observations in the data? If so, explain.

   Student answers will vary.

6. Working on your own now, look at the histogram you just created for this part and the histogram you created earlier in this activity to complete the following table.

	At what percentage do the data appear to be centered?	What appears to be the range of the data?	Which way do the data appear to be skewed?
Your Asian population histogram	**Student answers will vary but should be around 2–4 percent (actual mean: 4.02 percent; actual median: 2.6 percent).**	**Student answers will vary but should be around 35–40 percent (actual value: 37 percent).**	**Right**
Your Hispanic or Latino population histogram **(The sample student answers for this row use the part 1 histogram.)**	**Student answers will vary but should be around 11 percent (actual mean: 11.3 percent; actual median: 9 percent).**	**Student answers will vary but should be around 50 percent (actual value: 46.4 percent).**	**Right**

7. List three ways that your two data distributions (for the Asian and for the Hispanic or Latino populations) are different.

   Student answers will vary but could include:

   - **Most states have a much smaller Asian population percentage than Hispanic or Latino population percentage.**
   - **The Hispanic or Latino population percentages are centered around 11 percent, while the Asian population percentages are centered around 2–4 percent.**
   - **Both histograms are skewed right, but the Asian population histogram has a large gap between the majority of values and the one extreme value (for Hawaii), whereas the gap in values for the Hispanic or Latino population histogram is much smaller.**

8. Thinking back to your class discussion before this activity about the American Community Survey (ACS), list three questions that you think could be answered using ACS data.

   Student questions will vary.

Item 1: Hispanic or Latino Percentage of the Population in 50 States and District of Columbia: 2014

State/District	Percentage Hispanic or Latino Population
Alabama	4.0
Alaska	6.7
Arizona	30.5
Arkansas	6.9
California	38.6
Colorado	21.2
Connecticut	15.0
Delaware	8.9
District of Columbia	10.4
Florida	24.1
Georgia	9.1
Hawaii	10.1
Idaho	12.0
Illinois	16.7
Indiana	6.4
Iowa	5.5
Kansas	11.3
Kentucky	3.3
Louisiana	4.8
Maine	1.5
Maryland	9.3
Massachusetts	10.8
Michigan	4.8
Minnesota	5.1
Mississippi	2.7
Missouri	3.8

State/District	Percentage Hispanic or Latino Population
Montana	3.4
Nebraska	10.1
Nevada	27.8
New Hampshire	3.2
New Jersey	19.3
New Mexico	47.7
New York	18.6
North Carolina	9.0
North Dakota	2.8
Ohio	3.4
Oklahoma	9.8
Oregon	12.5
Pennsylvania	6.5
Rhode Island	14.0
South Carolina	5.3
South Dakota	3.4
Tennessee	4.9
Texas	38.6
Utah	13.5
Vermont	1.7
Virginia	8.8
Washington	12.2
West Virginia	1.3
Wisconsin	6.4
Wyoming	9.8

U.S. Census Bureau, 2014 American Community Survey 1-Year Estimates