

Statistics of Immigration in Philadelphia

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Overview

“Statistics of Immigration in Philadelphia” is a topic that will support the Philadelphia School District and State Standards for Mathematics and will enhance learning of statistics as part of Algebra II for 11th graders. Throughout the unit students will be able to explore the history of the repopulating of Philadelphia by different ethnic groups in earlier years and have the chance to manipulate the numbers and create different charts with the data and make predictions for the future.

Since there is a huge data and information about rates of immigration, I think it will be interesting using statistics to study and make predictions about population change. With the exception of the indigenous people of the land, all Americans are immigrants in one way or another, and through math students can learn more about their roots.

Students can make classifications of data about the flux of immigrants that come from different countries based on race, religion, age, sex, education, and their beliefs. In order to obtain information about large groups, statistic study smaller parts or samples of population. By using carefully the sampling method students should be able to provide a reasonable representation of immigrant populations.

This unit lesson will fully complement the curriculum and PA math standards. Thought this unit students would be able to apply measure of central tendency and displacement to a data set, display data with bar graphs, circle graphs, stem-and-whisker plots, scatter plots, and histograms. Also students would be able to analyze measures of central tendency, compose and contrast different plots of data, and make valid inferences, predictions and arguments based on probability.

During this unit students also would be able to use computers and the Internet to search for the data and work with this data by using graphing calculators to create tables

and graphs. Through their participation in this research, students may find both interest and enjoyment in math.

Rationale

Statistics is a branch of applied mathematics that involves collecting, organizing, interpreting, and making predictions from data. The rate of immigration to the USA during the last decade is the highest in 150 years. During this unit students will be able to use tables, graphs, and summarize measures to describe data, as part of descriptive statistics. Then, using the inferential statistics students should be able to analyze and interpret data that they will collect during their independent or group research that will focus mostly in Philadelphia area. Also students will be able to learn more about measures of central tendency, stem-and leaf plots, histograms, circle graphs, and box-and-whisker plots.

As the first step of this work student will collect data in order to provide information. Data has been collected by local and central government, businesses, community groups or individual about the population and economy, social trends, etc. The information collected from these institutions is often developed through surveys, but in this case students will collect data through research about the trends of immigration in Philadelphia. The students' work is to summarize the data and retain the information by using single values with the help of measures of central tendency- *mean, median, and mode*. The *mean* represents the average value of the data in the set. The *median* is the middle value of the data set after we arrange the values in ascending or descending order. If there are two values in the middle then the median comes as average of two values. *Mode* is the most repeated value of data in the set.

After data is collected there are different ways to represent it and the easiest and more effective visual way is by using graphs which are commonly used by print and electronic media. Often people understand data better when it is represented by a graph rather than by tables because it can reveal trend or comparison. Also students can use better the graphs since they are geometric shapes made of lines, dots, and blocks that students easily can draw. The graphs show relationship between variables and the spread of the values of a variable.

The data observed can be shown in a frequency table which tells us the number of times the values occur. It is helpful to use this tables when there a huge number of observations that are often repeated with the same value.

The values of the data set can be represented in a stem-and-leaf plots which look like bar graph of numbers. The numbers are split; the last digit is under the leaf and the rest of the digits of the number are under the stem. The advantage of using the stem-and-leaf plot is the grouping of the data and at the same time all the data is shown too. A popular way of representing the data is the histogram which has been used to summarize data on interval scale and divides the range of values of data set into groups. Then for each group students will draw a rectangle with base length equal to the range of

values in that group. The histogram is similar to the vertical graph but in difference is that usually there are no gaps between bars.

Another way to represent data is the pie chart which is nothing else but a circle divided into segments, where the area of each is in the same proportion to the whole circle as the category stays to the total of data set. The use of pie chart is very popular but on the other hand it has its own limitations; is not good idea to display more than six statistical information components because it makes the chart very complicated and difficult to read. Also the chart is not useful when the values of components are close to each other because one cannot see the difference between the values of components.

Description of data set only by using the most representative values of measures of central tendency is not complete without calculating the spread variability. There are some methods of measuring the dispersion of data such as *range, quartiles, variance, and standard deviation*. The *range* shows the difference between the largest and the smallest values of the data set. It doesn't make a good representation of the entire data set because it's determined by two extreme values and ignores all the other values of data set. The range is used as supplement of the other information tools. If we divide the values of data set into four parts after we arrange the values on ascending and descending order, the middle values of each quarter are called *quartiles*. There are three quartiles; Q2 is the median of the data set, Q1 is the middle value of the lower half of the values of data set, and Q3 is the middle value of the upper half of the data set. The difference between the upper and lower quartile ranges (Q3- Q1) is called *interquartile range*. The negative side of this measurement is that takes in consideration only half of the values of the data set and eliminates the highest and lowest quartiles.

After we calculate the values of spread of the data set we are ready to represent them on a graph which is called *box-and-whisker plot*. This kind of graphing doesn't show as much on details as histogram does but it's useful when we have a large number of observations of the data set or when we need to compare two data sets. Two ends of the box are the values of upper and lower quartiles, the median is marked by a line that goes inside the box and the whiskers are two lines that end up to the lowest and highest values of the data set.

Since the statistics they are going to use is about the city where they live or have born, students will learn more about the history of immigration, groups of different population during periods of time and how has it changed, economics that have determined the changes, the development of different neighborhoods. Also students will be able to visit by person different museums and organizations or surf their web pages to find more numbers about the immigration of different race and nationality groups. During their research students can use statistics that include overall numbers of population in Philadelphia or they can use statistics for specific groups to help them learn more about even their own national origins.

Historical Background

From its beginnings Philadelphia was a haven for immigrants despite the fact that the access was only through Delaware River which was frozen during the winter and it was far longer than other ports like New York for example. Philadelphia served as destination for about 5 percent of the nation. By the First World War this percentage reduced. However, after 1950 Philadelphia has seen an increase on immigration in absolute numbers, which still are lower than other U.S. major cities.

Students will be able to learn the reason and factors of immigration. For example, the immigrants improve the quality of life by bringing their culture, religion, food, etc. However, the most significant reason that these people left their countries to come to the U.S. is economic. Economic difficulty in their origin's countries was the major reason that forced them to emigrate. Immigration has helped Philadelphia and other cities to replenish loss of population that has occurred during deindustrialization.

Through this unit plan students will be able to learn about the immigration laws and how they have affected the flux of immigrants from different countries to Philadelphia. For example, based on legislation passed in 1924, the number of immigrants entering the U.S. from a specific country was calculated with the same percentage of this population who lived in the U.S. In this way it was impossible for people from several regions of the world to immigrate to the U.S. because it favored more immigration from Western European countries.

The new legislation enacted in 1965 and reinforced with the Immigration Act of 1990 increased legal immigration by 40 percent, tripled employment-based immigration and increased the diversity of immigrants. In this way the changes in law gave opportunity to immigrants from Asia, Africa, and Latin America to come to large cities of the South and West, to states such as Texas, Florida, and California. As part of this influx they arrived in Philadelphia, too, but not as much as in the other metropolitan areas. The new law stimulated immigration based on families reuniting with the existing immigrants -- this cohort representing 75 percent of all newly-arrived immigrants.

Because of American society's preference for skill-based immigrants, we can see nowadays a growing number of educated immigrants arriving, especially in Philadelphia. Although this is true for the immigrants who enter the country as part of a skilled workforce, for those who come based on family reunion, the job opportunities are not as important in their decision to immigrate as being closer to their family or their community. In this circumstance, the city may need to help create employment opportunities for these new arrivals once they are here.

Also the colleges and universities have become more affordable for foreign students who in most of the cases stay to work in the U.S. after they finish their studies, especially in engineering and science fields. Almost half of the doctoral graduates from the U.S. universities are foreign students, a number that is increasing year after year.

Based on statistics, Philadelphia received the least number of immigrants during the period of 1870-1920 compared to other metropolitan areas such as New York, Boston, Chicago, among others despite the fact that we were one of the most industrialized cities of the nation. During this period the population never exceeded 27% foreign-born. (Golab, p.11) The major groups of immigrants who preferred to live in Philadelphia were southern Italians and eastern European Jews bringing their cultural heritage and work experience from the industrialized Europe. Despite the fact that Polish immigrants preferred the Pennsylvania more than other states, they avoided being in Philadelphia. A small number of Poles was settled in the city after 1920 (counting 50,000) that came from other parts of the country (Golab, p.13).

The greatest influx of immigrants preferring Philadelphia, and who by 1870 constituted more than half of the foreign-born residents, were the Irish. Almost all the eastern European immigrants were Jews who arrived especially after 1870. By 1890 the foreign-born population of Philadelphia was: 40%, Irish; 25%, Germans, and 3%, Italians and Russians each (Golab, p.15). At the beginning of twentieth century, Philadelphia saw a 30% percent growth in population from immigration which still was lower than other big cities (Golab, p.17).

There has been a connection between the high rate of black population and the low rate of immigrants in Philadelphia and other cities. The explanation about this contradiction is the competition of these two groups in unskilled or secondary labor market. Until 1870 there was poor railroad transportation between south and north cities and it was expensive for poor blacks to move toward north. At that time it was more convenient for employers to bring labor force from Europe since the transatlantic steamship were available. However, African Americans were employed in branches of industries that relied traditionally on immigrants including building construction (13%), railroad construction (10%), steel and iron forging (16%) (Golab, p.22). In this way the presence of blacks and Irish as unskilled labor forces reduced the opportunity for other newer immigrants such as the Poles. In addition, the Poles and the Irish competed for the same unskilled jobs.

By the year 1915 the immigrant force in Philadelphia was 25% or about 250,000 industrial workers; and 27% of the total workforce was comprised of women, mainly from the Jewish and Irish population (Golab, p.30). There were only a few Jewish individuals in Philadelphia before 1880, but between 1880 and 1890 an increasing number of them immigrated to the city, having been driven from the eastern European countries such as Russia through pogroms. They were mostly employed in jobs such as peddlers, hucksters, merchants and shopkeepers. Almost 40% of Jews were employed during this period in the garment industry; only a few were employed temporarily in unskilled jobs such heavy industry and construction. The clothing industry employed about 15,000 Jewish workers (Golab, p.55).

Another major population of immigrants in Philadelphia was from southern Italy and Sicily. By 1910 the population of Italians in Philadelphia counted almost 100,000 habitants who came to America as result of rapidly increasing population in their native

country and shrinking possibility of land ownership. (Golab, p.57) Their purpose was not to stay, but to raise funds in order increase their land holdings back home. This is obvious on the high number of return of Italians to their native country in rate almost 63% Golab, p.58).

The specialty of Italians was construction which was channeled at that time by the *padrone* Golab, p.62). The *padrone* was a professional labor broker, who for Italian peasants was a powerful person, and was able to provide cheap labor force. They were looking for big construction contracts especially with government officials, promising in exchange support from Italian community. Usually this *padrone* was able to arrange housing, transportation and food. At that time the Italian labor was vital for the railroad work and nation's public works projects such as Philadelphia's City Hall, Reading Terminal, Market Street subway, etc. (Golab, p.60). On the other side, by 1915 one-half of women employed in the men's clothing industry were Italian. They were able to do the work from home and care for there children at the same time.

After 1900 another group of immigrants that started to arrive to Philadelphia searching for jobs were Poles. Most of these immigrants who came to America were unskilled peasant-farmers and the statistics show that sixty percent of them worked in unskilled occupations (Golab, p.102). They tried to make money and return to Poland; more than half of them did to preserve their little holdings or possessions. The majority of Poles were unskilled ironworkers, steelworkers, leatherworkers and general workers that worked on chemical factories, petroleum and sugar refineries, and loaded and unloaded railroad cars and ships. They settled themselves in Philadelphia in places that offered more for them since they came with the idea to make quick money and leave, like they did. Their settlements were spread on twelve different places around the city with a high density of population on each of these settlements.

Like Poles, other groups of new immigrants that arrived to Philadelphia between 1880 and 1920 established a high ethnic concentration in their neighborhoods. For example the eastern European Jews settled in South Philadelphia, Northern Liberties, Port Richmond, Frankford, Nicetown, Southwest and West Philadelphia. Also in these areas were settled Ukrainians, and Slovaks. The majority of Italians lived in South Philadelphia, however inside these neighborhoods, people separated by specific origin, such as Italians from Sicily, or Calabria, or Abruzzi or Campania (Golab, p.116). Also there were smaller populations of Italians who lived in places I mentioned above. Near these residential areas there existed a diversity of industries -- metal, chemicals, glass, lumber, leather and textile, railroad and shipping in Port Richmond, and other locales. At that time it was imperative that these new immigrants live close to the areas where these industries were located. The idea was that in this way they would be able to same money by walking to the job instead of riding and saving the time that they could use to work more or sleep more.

Often the neighborhoods were dominated from a specific group of immigrants, but they never monopolized the area or lived totally apart from other groups. Often there were conflicts between the groups of immigrants, especially between old established

groups and new arrivals. The conflicts were rare among older groups of immigrants that were simultaneously established in these neighborhoods such as Italians, Jews and Poles. According to the Pennsylvania Department of Labor, most of these immigrants and their families were considered to live in poverty, except for those who were single and who could thus live cheaply in order to save money and send to their families in their native countries (Golab, p.141).

Objectives

Through this unit lesson I plan for students achieve the following:

- Find the mean, median, and mode of a data set.
- Find or estimate the mean from a frequency table of data.
- Make a stem-and-leaf plot, a histogram, or a circle graph for a data set.
- Find and use relative frequencies to solve probability problems.
- Find the range, quartiles, and interquartile range for a data set.
- Make a box-and-whisker plot for a data set.
- Learn about the immigration process and experience over time.

Strategies

In order to achieve the desired results of this unit certain strategies and techniques have to be applied during the lesson:

- Cooperative pairs or groups of three or four will be created.
- These groups will identify and apply the appropriate math vocabulary.
- Students will collect, organize, analyze, and justify the data.
- Students will use the graphing calculators to work with the data.
- Students will perform independent study to extend student's learning and make investigations.
- Students will use the data that is relevant to the unit and display it in a variety of forms including lists, tables, charts, and graphs.
- Students will make research online to collect data that is relevant to the unit in order to work with it.

Classroom Activities/Lesson Plans

Lesson One: *Measures of Central Tendency*

Lesson Objectives: Students will find the mean, median and mode of a data set. Also they will find and estimate the mean from a frequency table of data.

Materials: Calculators, hand-outs with tables of the data of immigration in Philadelphia.

Activities: Students are going to work in groups of three or four and after they finish their work in groups they will report their results to class. After presenting the vocabulary and the definitions of mean, median, and mode students will get the direction on how to work

with tables and what they have to report out after they manipulate the data they will receive with hand-outs. Also they will discuss about their results, interpret the data, and make their own conclusions about the immigration in Philadelphia on the past and nowadays. In order for students to be able to expand their knowledge and be able to understand the factors that have influenced the immigration in Philadelphia, students will make a research on the Internet and read about this topic. With each of the following tables groups will perform a specific activity by manipulating and then interpreting the data. The information for these tables is taken from the article “*Immigration to the City of Philadelphia: An Economic and Historical Overview*” by Daniel Amsterdam. The following table provides information about the number of foreign born (FB) people who lived in Philadelphia between 1900 and 1950.

Number and Percentage of FB by Country, City of Philadelphia, 1900-1930

	Number of FB by Country				Percentage of Total FB			
	1900	1910	1920	1930	1900	1910	1920	1930
Russia	28,339	90,072	85,277	82,820	9.44%	23.48%	20.96%	22.52%
Italy	24,111	44,136	68,420	67,367	8.03%	11.51%	16.82%	18.32%
Ireland*	95,080	82,440	61,961	49,187	31.66%	21.49%	15.23%	13.38%
Germany	71,399	60,408	40,070	34,239	23.77%	15.75%	9.85%	9.31%
Poland	7,231	2,088	30,565	31,411	2.41%	0.54%	7.51%	8.54%
England	40,691	33,768	31,089	24,038	13.55%	8.80%	7.64%	6.54%
Austria**	6,235	20,952	16,659	10,302	2.08%	5.46%	4.10%	2.80%
Hungary	3,615	12,528	11,804	9,191	1.20%	3.27%	2.90%	2.50%
Scotland	6,832	7,560	9,683	9,292	2.27%	1.97%	2.38%	2.53%

* Includes N. Ireland in 1930

** Includes entries for Austria-Hungary and Austria-Tyrol

Number and Percentage of FB by Country, City of Philadelphia, 1940-1950

	Number FB		Perc. of Total FB	
	1940	1950	1940	1950
USSR	76,106	54,997	24.87%	21.19%
Italy	59,696	51,537	19.51%	19.85%
Ireland	25,447	25,286	8.32%	9.74%
Northern Ireland	12,625	615	4.13%	0.24%
Poland	25,379	23,406	8.30%	9.02%
Germany	29,760	17,561	9.73%	6.76%
England	16,307	11,658	5.33%	4.49%
Austria	10,312	9,072	3.37%	3.49%
Scotland	8,978	7,934	2.93%	3.06%
Hungary	6,359	6,999	2.08%	2.70%

The first thing that students have to do is to put the numbers in ascending or descending order by rounding them to thousands. Putting the numbers in order is necessary for finding the middle number and easily identifying the mode.

1,2,4,6,6,7,7,7,8,8,9,9,9,9,10,10,10,12,12,13,13,16,17,18,21,23,24,24,25,25,25,28,28,31,31,31,34,34,40,41,44,49,52,55,60,60,62,67,68,71,76,82,83,85,90,95.

The **mean** is calculated by adding all these values and dividing by their number. So, the results are:

$$\text{Mode} = 1787/56 = 32 \text{ in thousands}$$

So, the average number of immigrants that came to Philadelphia during these years was about 32,000 people. There are immigrants from three different countries who there number is close to this average, which are; from Poland on 1920 and 1930, and from England on 1920.

Let's find now the **mode**. From the information we easily can identify that the mode is 9,000 immigrants. If we refer to the table we can identify that these people have been from Scotland on 1940 and 1930, from Hungary on 1930, and from Austria on 1950. At this point we can raise the question if there can be more than one mode. The answer is yes, the mode can be one, more than one, or no mode.

The other feature of central tendency is the **median**. In our set of data there are two numbers in the middle. In this case to find the median we need to get the average of these two numbers:

$$\text{Median} = (23+24)/2 = 23.50 \text{ in thousands}$$

According to our table of immigration data the closest numbers are those of Italian immigrants on 1900, of English on 1930, and of Poles on 1950.

As part of this lesson students should be able to build a frequency table. This table lists the number of times, frequency that every single value of the data appears. In our example building this table may not seem worthwhile because much of the data is not often repeated, but students can create it anyway with the part of the data that is repeated. In this way students cannot interpret the entire data, but they will learn how to create a frequency table. Here is a model, but students can have more or less included values there.

Number of immigrants in thousands	Frequency	Product
6	2	12
7	3	21
8	2	16
9	4	36
10	3	30
12	2	24
13	2	26

24	2	48
25	3	75
28	2	56
31	3	93
34	2	68
60	2	120
Total	30	505

Similar tables will be given to groups so not all students work on the same values. One represents the number of foreign born immigrants, but this time, based on Region/Country like the following table:

Number and Percentage of FB by Region/Country, City of Philadelphia, 1980-2006

	Number of FB by Country/Region			
	1980	1990	2000	2006
Eastern and Central Europe	29,520	21,154	23,770	22,577
Other Central America/ Spanish Speaking Carribean	3,180	3,277	11,619	20,646
East Asia	5,940	13,206	16,218	19,710
Southeast Asia	6,480	13,617	23,215	19,516
South Asia	2,740	4,992	8,949	14,726
Carribean (Not Spanish Speaking)	4,940	6,504	12,382	14,131
Western Europe	42,500	29,563	20,300	12,876
South America	2,680	4,832	7,789	9,351
Sub-Saharan Africa	1,540	2,117	6,579	8,762
Mexico	520	593	3,177	5,842
Middle East	1,940	2,101	2,480	4,995
Canada	2,020	1,339	1,312	2,851
Central Asia	260		638	2,174
North Africa	440	601	1,148	1,796
South Pacific	180	357	643	556
Born in Puerto Rico	24,880	29,867	41,143	34,557

The table below shows the number of immigrants who came to Philadelphia in years between 1790 and 1990 and classified based on race. The numbers in the table are in thousands and since there is a lot of data it will be divided in two or three different periods of time. The numbers for this table are taken from the Pennsylvania State Data Center.

Census year	Total popula.	White	Black	Americ. Indian	Asian	Other Race	Hispanic	White Non Hispanic
1990	1586	849	632	4	44	58	89	826
1980	1688	983	639	2	18	46	64	963
1970	1949	1279	654	2	7	7	N/A	N/A

1960	2003	1467	529	1	4	1	N/A	N/A
1950	2072	1693	376	-	2	1	2	1676
1940	1931	1679	251	-	2	-	-	-
1930	1951	1729	220	-	2	-	-	-
1920	1824	1688	134	-	1	-	-	-
1910	1549	1463	84	-	1	-	-	-
1900	1294	1230	63	-	1	-	-	-
1890	1047	1007	39	-	1	-	-	-
1880	847	815	32	-	-	-	-	-
1870	674	652	22	-	-	-	-	-
1860	566	543	22	-	-	-	-	-
1850	121	111	11	-	-	-	-	-
1840	94	83	11	-	-	-	-	-
1830	80	71	10	-	-	-	-	-
1820	64	56	7	-	-	-	-	-
1810	54	47	6	-	-	-	-	-
1800	41	37	4	-	-	-	-	-
1790	29	27	2	-	-	-	-	-

The table below extracted from the Balch Online Resources, “Philadelphia: Immigrant City” by Frederic M. Miller, shows the number of immigrants arriving in Philadelphia in longer periods of times between years 1820 and 1930.

Years	Arrivals in Philadelphia	Annual Average	National Immigration (in 000s)	Phila. % of National Immigration
1820-31	24,231	2,019	200.4	12.1
1832-46	58,297	4,164	1,227.5	4.7
1847-54	124,583	15,572	2,817.3	4.4
1855-66	54,600	4,550	2,199.0	2.4
1867-73	7,093	1,013	2,380.6	0.3
1874-79	42,310	7,051	1,168.7	3.6
1880-89	276,229	27,623	4,910.2	5.6
1890-99	208,234	20,823	3,694.2	5.6
1900-09	204,265	20,426	8,202.4	2.8
1910-14	248,223	49,644	5,174.7	4.8

1915-24	55,977	5,598	3,947.1	1.4
1925-30	2,447	408	1,762.4	0.1

Assessment: Students will be assessed based on their understanding of the measures of central tendency and their participation and cooperation inside their groups.

Lesson Two: *Stem-and-Leaf Plots, Histograms, and Circle Graphs*

Objectives: Students will make stem-and-leaf plots, histograms, also use relative frequencies to manipulate and interpret data.

Materials: Students will use the data from the previous lesson and will use calculators.

Activities: *Stem-and-leaf* plot is a quick method to arrange the data set in order to see the distribution. To create these plots students will use the same data that they had in the previous lesson. To build the stem-and-leaf plot we split the data values in two parts; a *stem* and a *leaf*. This is the rule that applies to split the values: on the leaf part we put the last digital of the number and on the stem part will be the rest of the digitals. However, on the right top corner of the plot we display the *key* that explains what the stem-and-leaf plot represent. In this example we will keep working with the table that represents the number of immigrants that came to Philadelphia during the years 1900 and 1950. In similar way groups will work with the other tables that have other information about the immigration in Philadelphia. Again in this part we'll continue using the values rounded to thousands to make it easier for calculations.

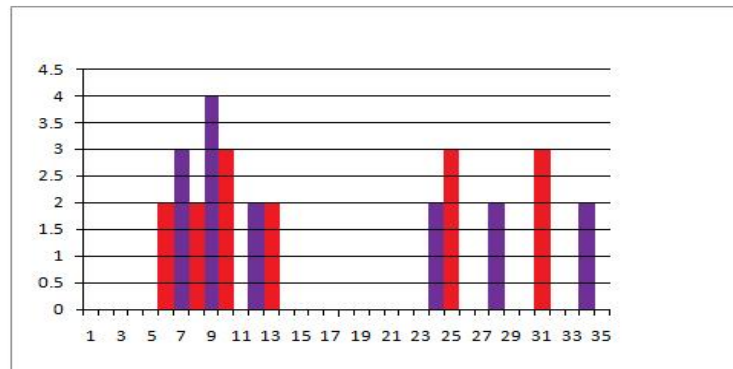
2	3 = 23
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Stem	Leaf
0	1,2,4,6,6,7,7,7,8,8,9,9,9,9
1	0,0,0,2,2,3,3,6,7,8
2	1,3,4,4,5,5,5,8,8
3	1,1,1,4,4
4	0,1,4,9
5	2,5
6	0,0,2,7,8
7	1,6
8	2,3,5
9	0,5

By observing the stem-and-leaf plot we can see that data is distributed toward the small values of numbers of immigrants that came to Philadelphia from smaller European countries such as Hungary, Scotland, Northern Ireland, and Austria mostly during earlier and middle 20th century, by creating a *mound-shaped* distribution.

Now is time to create a *histogram* which is a bar graph that represents the distribution of the values of the data set. In order to create the histogram we need to create a relative frequency table. In our case we are going to use the table that we created from the previous lesson. The best case is to create this histogram by using the Microsoft Excel, a task which of course requires having the students in computer lab. A different way would be for students to sketch their histograms on their worksheets. The following are a relative frequency table and a histogram created by using Windows Excel:

Number of immigrants in thousands	Frequency	Relative Frequency
6	2	$2/30=.066$
7	3	$3/30=.10$
8	2	$2/30=.066$
9	4	$4/30=.133$
10	3	$3/30=.10$
12	2	$2/30=.066$
13	2	$2/30=.066$
24	2	$2/30=.066$
25	3	$3/30=.10$
28	2	$2/30=.066$
31	3	$3/30=.10$
34	2	$2/30=.066$
Total	30	$30/30=1.00$

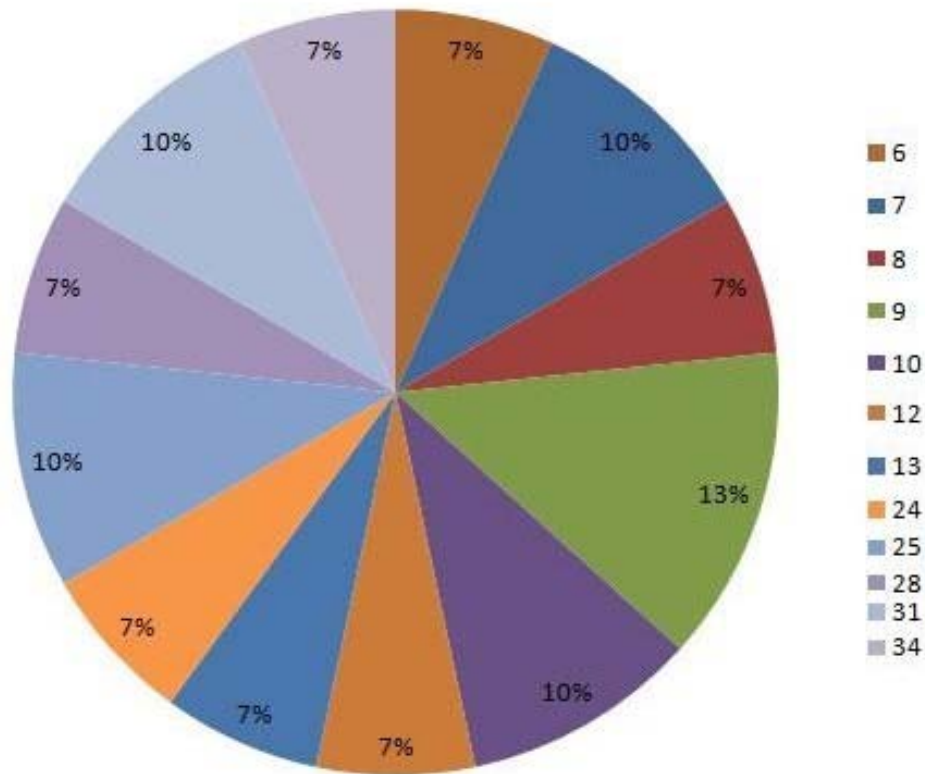


The horizontal axis is a line number divided in equal width with the values of numbers of people who immigrated to Philadelphia. The vertical axis shows the frequency of the values of immigrants during earlier and middle 20th century.

In addition to other methods students can use graphing calculators to create the histograms. With the help of keystroke guide that is provided in *Algebra 2* textbook or using the graphing calculator's handbook *TI-83 Plus* students will be able to create the histogram, which they have to sketch it in their own papers.

To represent the non-overlapping values of data set, especially when there are not many values on the set, then we can use the *circle graphs* or *pie charts*. As we did with the histogram, to create a circle graph we can use Microsoft Excel. Otherwise students have to use the relative frequency chart. The percentage of each value of the data set toward the total has to be multiplied by 360 degrees in order to find the degrees of the central angle that belongs to that value. The total has to agree with the whole surface area of the circle. When we use Microsoft Excel we get the chart simply by putting the information in spreadsheet and then using the chart wizard we can get the expected results. In case a computer is not available to the groups, students have to create the relative frequency table and then using geometric tools they can draw the circle graph. The following are a relative frequency table and a pie chart created by using Microsoft Excel:

Number of immigrants in thousands	Frequency	Relative Frequency	Central Angle on Degrees
6	2	$2/30=.07$	$.06 \times 360=24$
7	3	$3/30=.10$	$.10 \times 360=36$
8	2	$2/30=.07$	$.06 \times 360=24$
9	4	$4/30=.13$	$.13 \times 360=48$
10	3	$3/30=.10$	$.10 \times 360=36$
12	2	$2/30=.07$	$.06 \times 360=24$
13	2	$2/30=.07$	$.06 \times 360=24$
24	2	$2/30=.07$	$.06 \times 360=24$
25	3	$3/30=.10$	$.10 \times 360=36$
28	2	$2/30=.07$	$.06 \times 360=24$
31	3	$3/30=.10$	$.10 \times 360=36$
34	2	$2/30=.07$	$.06 \times 360=24$
Total	30	$30/30=1.00$	$1.00 \times 360=360$



Assessment: Students will be assessed based on their participation and cooperation in their groups. Also students will be assessed based on their understanding and the accuracy of their calculations and manipulations. Also they will be assessed based on their ability to construct the tables and charts and the interpretation of the data information.

Lesson Three: *Box-and-Whisker Plots*

Objectives: Students will find the range, quartiles, and quartile range for a data set. In addition they will make a box-and-whisker plot for a data set.

Materials: Students will use the same data set that they manipulated during the two previous lessons. Also students will use graphing calculators.

Activities: *Quartiles* divides the data set into four quarters after we divide the data set into two halves from the median. The quartile Q2 is the median and at the same time divides the set of data on lower and upper halves. The lower quartile, Q1, is the median of the lower half and the upper quartile, Q3, is the median of the upper half of the data set.

Range is the difference between the maximum and the minimum values of the set. *Interquartile range*, denoted IQR, is the difference between the upper quartile Q3 and lower quartile Q1. Also we look for *outliers* which are the values of data less than $Q1 - 1.5(IQR)$ or more than $Q3 + 1.5(IQR)$. For this activity we are going to use the data used on the previous lessons and is expressed in thousands. First we arrange the values of data on ascending order, then we find the median, quartiles, maximum, minimum, range, interquartile range, and any possible outliers.

6,6,7,7,7,8,8,9,9,9,9,10,10,10,10,12,12,13,13,24,24,25,25,25,28,28,31,31,31,34,34,60,60

	Q1=9	Q2=12.5	Q3=28	
Minimum value	Median of lower half	Median	Median of upper half	Maximum value

Median = $(12+13)/ 2 = 12.5$

Range= maximum – minimum = $60- 6 = 54$

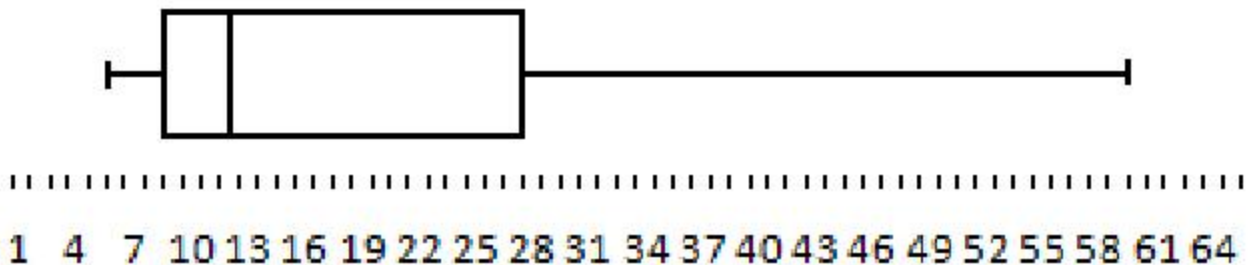
IQR = $Q3 - Q1 = 28 - 9 = 19$

Possible outlier below Q1; $Q1 - 1.5(IQR) = 9 - 1.5(19) = -19.5$

Possible outlier over Q3; $Q3 - 1.5(IQR) = 28 - 1.5(19) = - 0.5$

All the set of numbers are possible outliers since all the values are greater than $- 0.5$.

Now is time to make the box-and-whisker plot which shows how the data values are distributed. The shortest and easiest way to draw the box-and-whisker plot is to use the graphing calculator by following the steps that are given on *Algebra 2* textbook, or to draw the box-and-whisker plot by sketching it based on the data values and using a numbered line.



Annotated Bibliography/Resources

Teacher Resources:

Countryman, Mathew, Up South: Civil Rights and Black Power in Philadelphia

The author provides a perspective on civil rights in Philadelphia and gives a background of little known civil leaders and actors.

Ellison, Elaine Krasnow and Elaine Mark Jaffe, Voices from Marshall Street: Jewish Life in a Philadelphia Neighborhood, 1920- 1960

The book is a collection of oral histories from the author who grew up in Marshall Street in Philadelphia, through which is representing the cultural richness of Jewish immigrants.

Golab, Caroline. Immigrant Destinations (Philadelphia: Temple University Press, 1977)

The book is a study of different ethnic group that came to Philadelphia during the late of 19th century and beginning of 20th century searching for jobs and their establishment in different parts of the city.

Gregg, Robert, Sparks from Anvil of Oppression: Philadelphia's African Methodists and Southern Migrants, 1890- 1940

In his book the author focuses on the African Methodist churches during the Great Migration and the rise of black ghettos in Philadelphia to show the richness of African American culture at this time.

Licht, Walter, Getting Work, Philadelphia, 1840-1950, (Philadelphia: University of Pennsylvania Press, 1999)

The author in his book makes a research on a major industrial city such as Philadelphia for a period of over 100 years on how working people found jobs in the past, the influence of agencies on the hiring process, schools and work, apprenticeship programs, unions, the state as employer, the role of firms in structuring work opportunities, and the problem of losing jobs.

Luconi, Stefano, From Paesani to White Ethnics: The Italian Experience in Philadelphia

The book examines the transformations of Italian- American ethnic identity during 20th century in Philadelphia.

Kazal, Russell, Becoming Old Stock: The Paradox of German- American Identity

The book is a detailed study of German- American identity in Philadelphia during the early 20th century.

Ngai, Mae M., Impossible Subjects: Illegal Aliens and the Making of Modern America, (Princeton: Princeton University Press, 2005)

The author in this book examines the immigration restrictions starting with 1924 Johnson- Reed Act and ending with Immigration Act of 1965.

http://www.balchinstitute.org/resources/phila_ellis_island.html

This site gives information about the immigration in Philadelphia during 19th and 20th century. It provides also a chart with immigrants entered during different periods of time and the percentage of immigrants entered to Philadelphia compared to the nation.

Immigration and the New Metropolitan Geography.

Paper presented at Canadian Metropolis Project Conference, Halifax, NS, on April 2008, by *Michael B. Katz, Mathew Creighton, Daniel Amsterdam, and Merlin Chowkwanyan.*

Immigration to the City of Philadelphia: An Economic and Historical Overview.

A research paper with facts and numbers about the immigration in Philadelphia from late 19th century until nowadays, by *Daniel Amsterdam (University of Pennsylvania).*

Students Resources:

Textbook: Algebra 2, by Holt, Rinehart, and Winston, 2004. ISBN-0-03-070049-3

<http://www.hsp.org>

By visiting the Historical Society of Pennsylvania web site students can explore the origin and diversity of population in Pennsylvania.

<http://en.wikipedia.org/wiki/Statistics>

This site provides information about the statistics; its definition, some history, its branches, and the areas and fields of application.

<http://home.att.net/~wee-monster/passengers.html>

In this web site students will find the lists of immigrants arrived in the 19th & 20th by ports and time frame.

<http://genealogy.about.com/cs/philadelphia/>

By exploring this web site students can find passenger lists, ships, history, and more for immigrants into the port of Philadelphia in Pennsylvania.

<http://www.statcan.ca/english/edu/power/toc/contents.htm>

Exploring this web site students will be able to learn more about measures of central tendency, stem-and leaf plots, histograms, circle graphs, and box-and-whisker plots.

Appendix/Standards

The unit thoroughly will incorporate the Pennsylvania Academic Standards for Mathematics which are as follow:

2.6 Statistics and Data Analysis (A): Design and conduct an experiment using random sampling. Describe the data as an example of a distribution using statistical measures of center and spread. Organize and represent the results with graphs. (Use standard deviation, variance, and t-tests.)

2.6 Statistics and Data Analysis (C): Determine the regression equation of best fit (e.g., linear, quadratic, exponential).

2.6 Statistics and Data Analysis (D): Make predictions using interpolation, extrapolation, regression, and estimation using technology to verify them.