

U.S. President Inquiry

Ideal Unit: Data Analysis	Time Range: 2-4 Days	Supplies: Pencil & Paper
Topics of Focus: <ul style="list-style-type: none"> - Box and Whisker Plot - Mean, Median & Mode - Stem and Leaf Plots - Histograms 		
Driving Question	<i>"Do U.S. Presidents with the most children live longer after they have been inaugurated?"</i>	
Culminating Experience	An inquiry investigation	
Common Core Alignment:		
6.SP.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	
6.SP.5c	Summarize numerical data sets in relation to their context, such as by 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.	
8.SP.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	
8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.	
8.SP.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects.	
S-ID.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).	
S-ID.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.	
S-ID.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	

Procedures:

A.) In "They Entered a Young Person...", students will make a parallel box-and-whisker plot by hand of the ages of the US Presidents at the time of their inauguration. They will use the box-and-whisker plot to answer questions.

B.) In "Oval Office Analysis", students will use the data of the presidents to complete a variety of data displays including: stem and leaf plot, histograms, frequency distribution, mean, median, mode, range, and box and whisker plots.

C.) In "Presidential Inquiry", students will explore correlations of bivariate data to determine if a relationship exists between the number of children a president has and their longevity after inauguration.

* Aspects of the project can be completed independently. The entire project does not need to be completed to have a great learning experience, though it is suggested because it will best scaffold the skills and context.

Data of U.S. Presidents



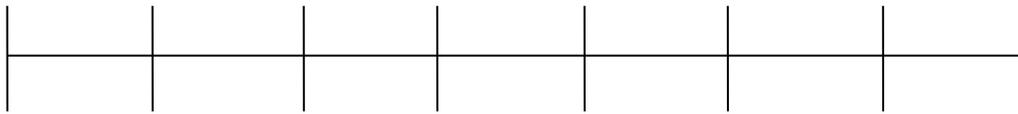
Name	Birth State	Term	Age at Inauguration	Age at Death	Number of Sons	Number of Daughters
Washington	VA	1789-1796	57	67	0	0
Adams	MA	1797-1800	61	90	3	2
Jefferson	VA	1801-1808	57	83	1	5
Madison	VA	1809-1816	57	85	0	0
Monroe	VA	1817-1824	58	73	0	2
JQ Adams	MA	1825-1828	57	80	3	1
Jackson	SC	1829-1836	61	78	0	0
Van Buren	NY	1837-1840	54	79	4	0
W Harrison	VA	1841	68	68	6	4
Tyler	VA	1841-1844	51	71	8	6
Polk	NC	1845-1848	49	53	0	0
Taylor	VA	1849-1850	64	65	1	5
Fillmore	NY	1850-1852	50	74	1	1
Pierce	NH	1853-1856	48	64	3	0
Buchanan	PA	1857-1860	65	77	0	0
Lincoln	KY	1861-1865	52	56	4	0
A Johnson	NC	1865-1868	56	66	3	2
Grant	OH	1869-1876	46	63	3	1
Hayes	OH	1877-1880	54	70	7	1
Garfield	OH	1881	49	49	5	2
Arthur	VT	1881-1884	50	56	2	1
Cleveland *	NJ	1885-88, 1893-96	47	71	2	3
B Harrison	OH	1889-1892	55	67	1	2
McKinley	OH	1897-1900	54	58	0	2
T Roosevelt	NY	1901-1908	42	60	4	2
Taft	OH	1909-1912	51	72	2	1
Wilson	VA	1913-1920	56	67	0	3
Harding	OH	1921-1923	55	57	0	0
Coolidge	VT	1923-1928	51	60	2	0
Hoover	IA	1929-1932	54	90	2	0
F Roosevelt	NY	1933-1945	51	63	5	1
Truman	MO	1945-1952	60	88	0	1
Eisenhower	TX	1953-1960	62	78	2	0
Kennedy	MA	1961-1963	43	46	2	1
LB Johnson	TX	1963-1968	55	64	0	2
Nixon	CA	1969-1974	56	81	0	2
Ford	NE	1974-1976	61	93	3	1
Carter	GA	1977-1980	52	-	3	1
Reagan	IL	1981-1988	69	93	2	2
GHW Bush	MA	1989-1992	64	94	4	2
Clinton	AR	1993-2000	46	-	0	1
GW Bush	CO	2001-2008	54	-	0	2
Obama	HI	2009-2016	47	-	0	2
Trump *	NY	2017-2020, 2025-	70	-	3	2
Biden	PA	2021-2024	78	-	2	2

They Entered a Young Person...



Name _____ Date _____

Make a parallel box-and-whisker plot **by hand** of the ages of the US Presidents at the time of their inauguration. Use the box-and-whisker plot to answer the following questions.



1. What is the median of the ages of the US President at the time of their inauguration?
2. What is the age of the youngest US President at the time of their inauguration?
3. What is the age of the oldest US President at the time of their inauguration?
4. What is the upper quartile age of the US Presidents at the time of their inauguration?
5. The interquartile is the term used to describe the middle 50%. This is the data between the upper and lower quartiles. What is the age range of Presidents in the interquartile?
6. Analyze the results of your investigation and draw at least three conclusions.

Oval Office Analysis



Name _____ Date _____

For this exercise, use the data on the Ages of US Presidents.

1. Find the mean, median, mode, and range of the ages.

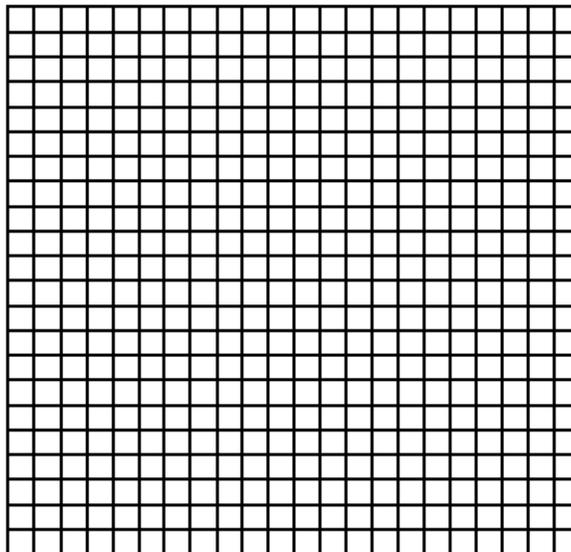
	Mean	Median	Mode	Range
Age of Presidents				

2. Draw a stem-and-leaf plot for the data.

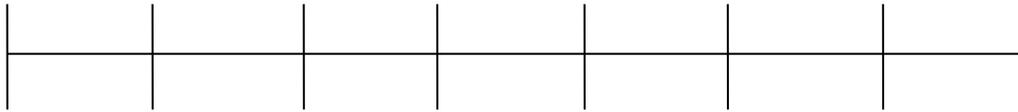
3. Using the below interval for the age of the presidents at their inauguration (x -axis), tally the number of presidents falling into each group – these are the frequencies (y -axis).

Age at Inauguration	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Frequency								

4. Construct a histogram by making a bar graph – with no spaces between bars of the frequency for each interval as categorized in the table above. *It is important that the bars are touching.*



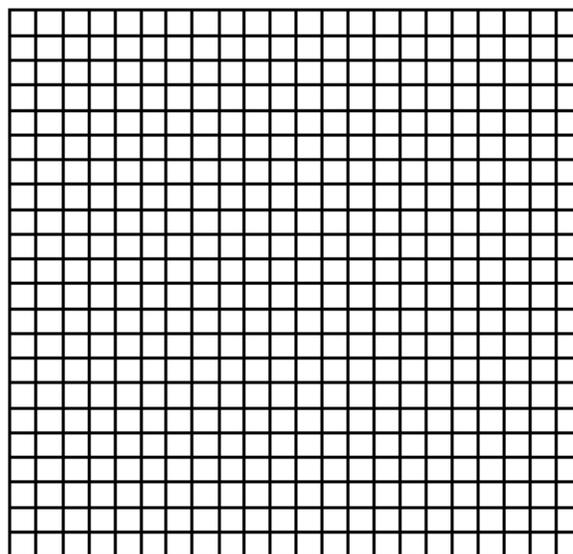
- Compare the distribution of the data to the normal distribution. How well do they match up? What are the differences, if any?
- Using the data on the **age of death**, find the five number summaries, and construct a box-and-whiskers plot.



- Using the below interval for the age of the presidents at their death (x -axis), tally the number of presidents falling into each group – these are the frequencies (y -axis).

Age at Death	40-49	50-59	60-69	70-79	80-89	90-99
Frequency						

- Construct a histogram of the frequency for each rating as categorized in the table above.



Presidential Inquiry



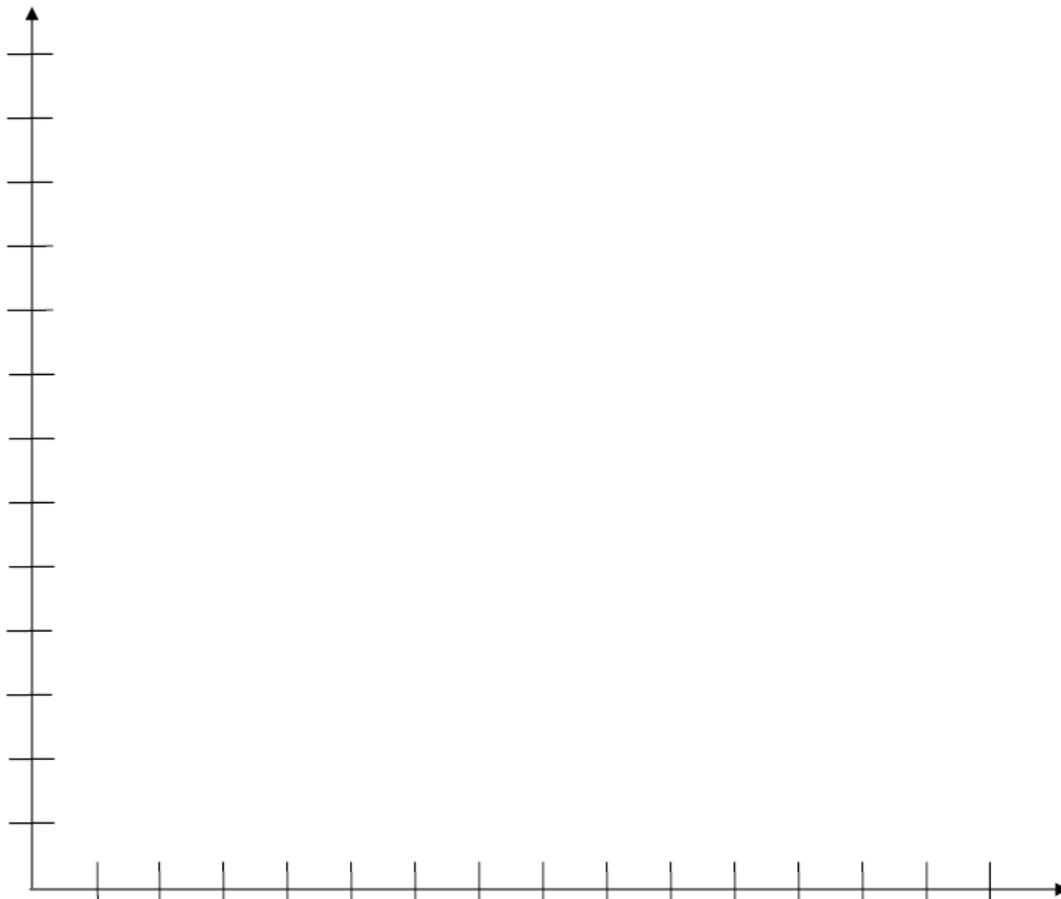
Name _____ Date _____

Inquiring minds may ask . . .

“Do US Presidents with the most children live longer after they have been inaugurated?”

In this activity, you will use the “US President Data” and the notion of correlation of bivariate data to determine if a relationship exists between the number of children a president has and their longevity after inauguration. Recall that data variables can have strong correlation, weak correlation, or no correlation. Before the data can be analyzed, you must first determine which data to use and what you need to do with the data in order to begin answering the question. The questions below will get you thinking on the right track.

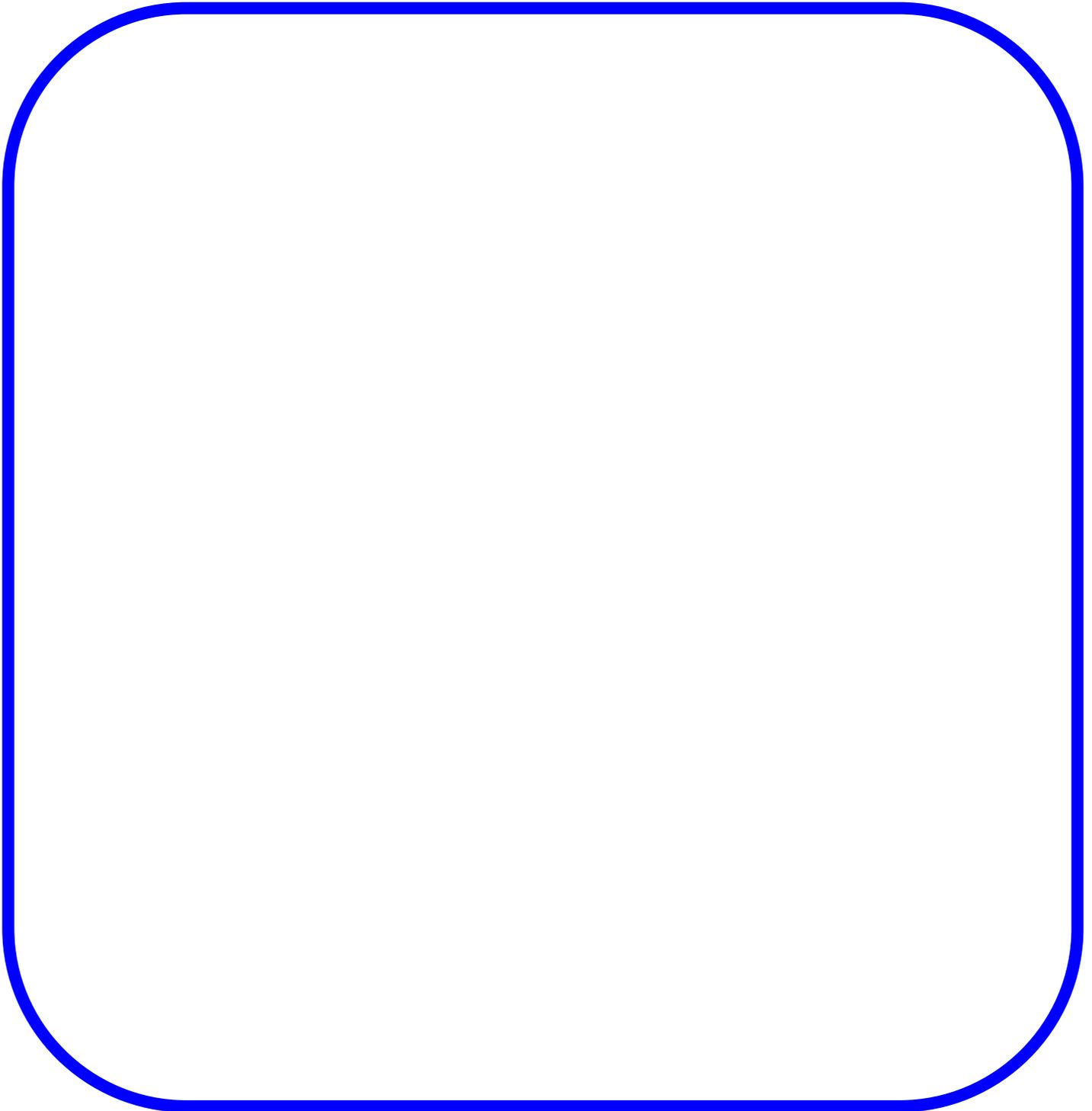
1. What variables are you looking at?
2. Make a scatterplot and label your axes. *Recall that the dependent variable goes on the y-axis and the independent variable goes on the x-axis.*



- Analyze your scatterplot. Are the points clustered together? Are they scattered out, showing no definite trend? Determine the correlation (weak, strong, or none).

Email to the Presidential Candidates

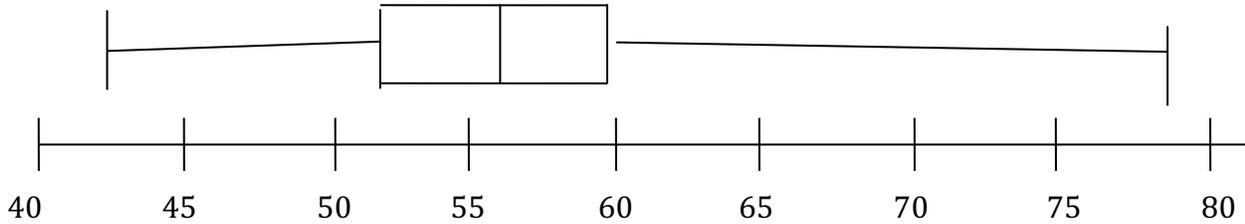
Write a paragraph to the next wave of president candidates about the findings of this project.



He Entered a Young Man **KEY**

Name: _____

Make a parallel box-and-whisker plot **by hand** of the ages of the US Presidents at the time of their inauguration. Use the box-and-whisker plot to answer the following questions.



Ages at time of Inauguration

1. What is the median of the ages of the US President at the time of their inauguration?
55
2. What is the age of the youngest US President at the time of their inauguration?
42 (Teddy Roosevelt)
3. What is the age of the oldest US President at the time of their inauguration?
78 (Joe Biden)
4. What is the upper quartile age of the US Presidents at the time of their inauguration?
60
5. The interquartile is the term used to describe the middle 50%. This is the data between the upper and lower quartiles. What is the age range of Presidents in the interquartile?
51-60
6. Analyze the results of your investigation and draw at least three conclusions.

Oval Office Analysis

Name: _____



For this exercise, use the data on the Ages of **US Presidents**.

1. Find the mean, median, mode, and range of the ages.

	Mean	Median	Mode	Range
Age of Presidents	55.5	55	54	36

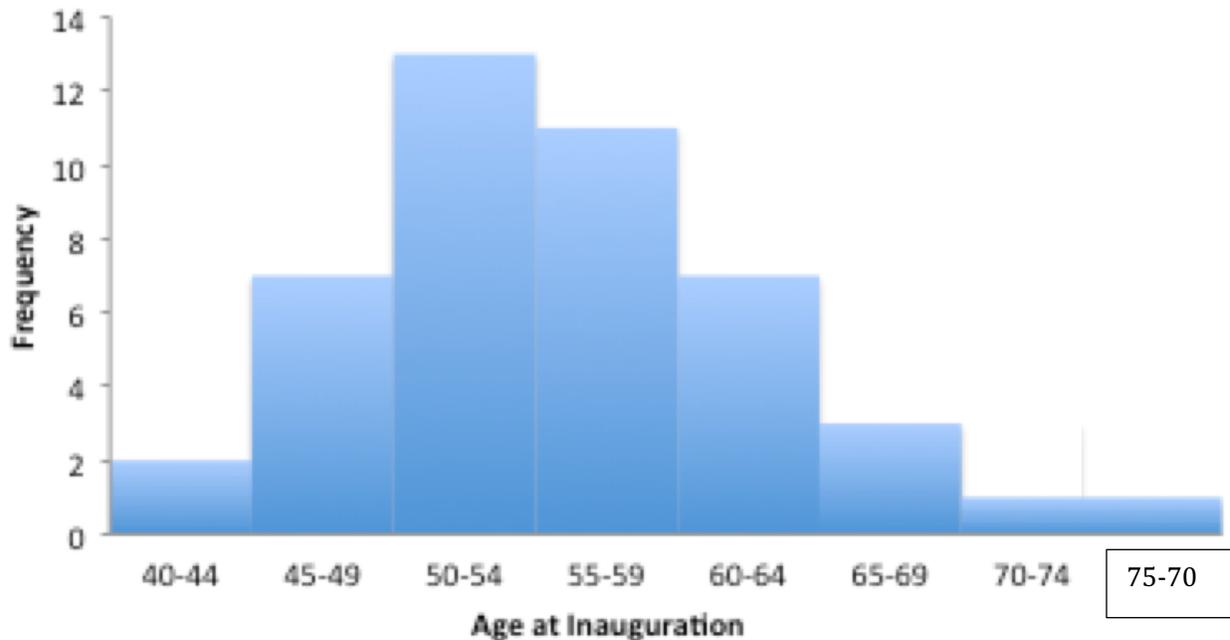
2. Draw a stem-and-leaf plot for the data.

4	2, 3, 6, 6, 7, 7, 8, 9, 9
5	0, 0, 1, 1, 1, 1, 2, 2, 4, 4, 4, 4, 4, 4, 5, 5, 5, 6, 6, 6, 7, 7, 7, 7, 8
6	0, 1, 1, 1, 2, 4, 4, 5, 8, 9
7	0, 8

3. Using the below interval for the age of the presidents at their inauguration (x -axis), tally the number of presidents falling into each group -- these are the frequencies (y -axis).

Age at Inauguration	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Frequency	2	7	13	11	7	3	1	1

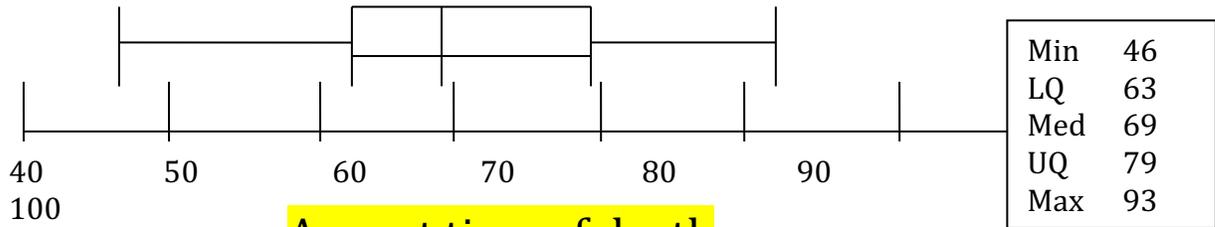
4. Construct a histogram by making a bar graph – with no spaces between bars of the frequency for each interval as categorized in the table above. *It is important that the bars are touching.*



5. Compare the distribution of the data to the normal distribution. How well do they match up? What are the differences, if any?

The distribution is similar to a normal distribution.

6. Using the data on the **age of death**, find the five number summaries, and construct a box-and-whiskers plot.

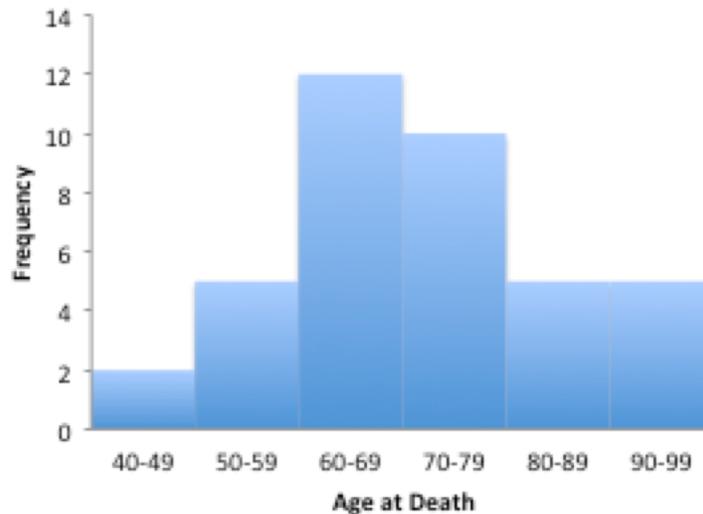


Ages at time of death

7. Using the below interval for the age of the presidents at their death (*x*-axis), tally the number of presidents falling into each group -- these are the frequencies (*y*-axis).

Age at Death	40-49	50-59	60-69	70-79	80-89	90-99
Frequency	2	5	12	10	5	5

8. Construct a histogram of the frequency for each rating as categorized in the table above.



Presidential Inquiry

Name: _____



Inquiring minds may ask . . .

“Do US Presidents with the most children live longer after they have been inaugurated?”

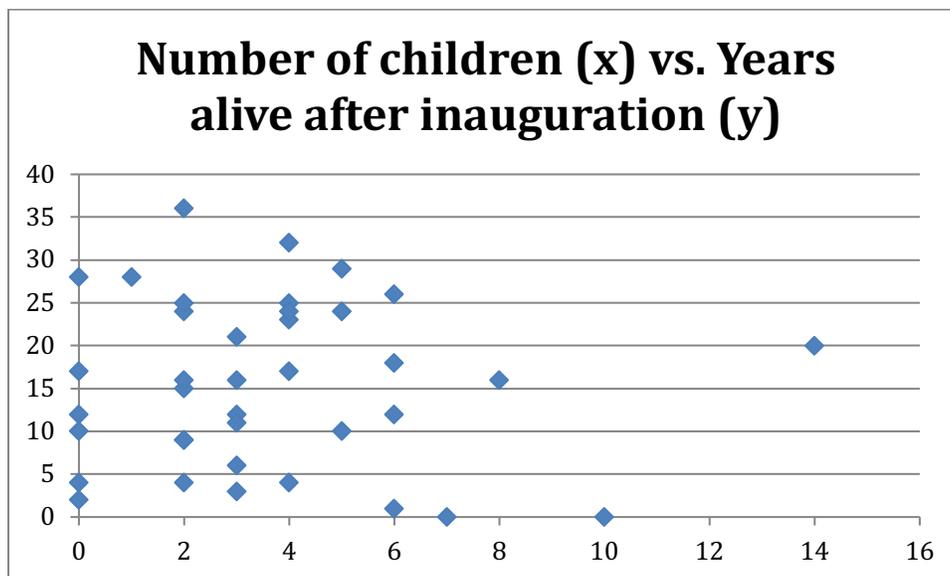
In this activity, you will use the “US President Data” and the notion of correlation of bivariate data to determine if a relationship exists between the number of children a president has and their longevity after inauguration. Recall that data variables can have strong correlation, weak correlation, or no correlation. Before the data can be analyzed, you must first determine which data to use and what you need to do with the data in order to begin answering the question. The questions below will get you thinking on the right track.

1. What variables are you looking at?

Number of children and years alive after inauguration.

2. Make a scatterplot and label your axes. *Recall that the dependent variable goes on the y-axis and the independent variable goes on the x-axis.*

From Excel.

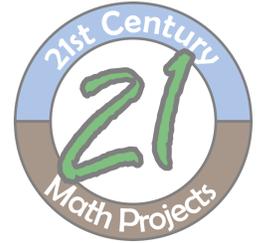


3. Analyze your scatterplot. Are the points clustered together? Are they scattered out, showing no definite trend? Determine the correlation (weak, strong, or none).

There appears to be no correlation between the number of children and the years between inauguration and death.

4. Based on your analysis, write a paragraph about your findings.

U.S. President Inquiry



Rubric

Standards		Exemplary	Proficient	Developing
HSS-ID.A.2	use statistics appropriate to the shape of the data distribution to compare center (median, mean)			
HSS-ID.A.1	represent data with histograms on the real number line			
	represent data with box plots on the real number line			
Math Processes		Exemplary	Proficient	Developing
Skills & Mechanics	<i>accurately performs calculations</i>			
	<i>demonstrates fluency with mathematical skills and processes</i>			
Applications	<i>accurately interprets word problems and addresses them with appropriate math skills</i>			
	<i>can articulate the meaning of calculations in the context of the problems.</i>			
Use of Evidence & Analysis	<i>can determine what evidence is appropriate to answer a question</i>			
	<i>utilizes mathematical outcomes to support their conclusions</i>			

Comments: