Planning Ahead

President Clinton just celebrated his 50th birthday, while candidate Bob Dole is currently 74 years old. It seems possible that age could be a major factor in the upcoming presidential election.

What is the typical age, at inauguration, of the 41 men who have been elected President of the United States in the past? Based on this information, which current candidate seems most likely to be elected?

We all know that age is not the only important characteristic of a presidential candidate. Examine some other characteristics of past presidents and determine which current candidate has the best probability of becoming president based on your analysis.

Based on this information, what are the chances that a member of our team could be elected President of the United States? In what future election year would it be most likely to occur?

Grade Levels 6 - 8

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Context

As this is an election year, this seemed like a good data analysis task that would tie in with the social studies unit we were studying, as well as provide a context for surveying classmates and using reference materials. This was the first problem-solving task of the year, done during the first week of school. Half of the students had been with me last year and were able to partner up with the new students in the preteaching of measures of central tendency (mean, mode and median). These students offered assistance in reviewing the fine points of conducting research and surveys.

What This Task Accomplishes

This is a good opportunity for students to decide on comparison factors, select characteristics that hold interest to them, and find sources of information that fit their needs. They have the opportunity to explore various measures of central tendency and to select the most appropriate for their data and the point they are trying to make. It also gives students a chance to consider their distant future and consider their chances of being elected president.

What the Student Will Do

Students have to conduct research to find the ages of all past presidents at inauguration and determine the typical age. They have to select some other characteristic of these men and determine the chances of the current candidates to be elected this year based on their sharing of this attribute. Students then need to survey their classmates to see which of them share this trait, to determine their current ages and to determine in which election year they will be closest

to the "most electable" age, based on data they analyzed in part one of the task.

Time Required for Task

I gave this task to kids on Friday and asked them to gather materials and information over the weekend. They worked on it for two class periods (two hours) and then were able to complete their write ups at home. I collected them on Friday the following week.

Interdisciplinary Links

This task fit in perfectly with our team study of the upcoming elections. Many classes study past presidents or the office of president, as part of a course in American history or government, and this task could be a useful tie at that time as well.

Teaching Tips

I gave the students a weekend to gather resources before actually beginning to solve the task. An almanac will have a list of presidents and their ages at election. Many students had various books on presidents, as did the school library. Many students had access to the Internet, which has a host of resources available.

For students in my class who have special academic needs, I gave them a version of the task asking only for the typical age of the Presidents of the United States. I also gave them a copy of the list of past presidents from the almanac. This proved to be a sufficient challenge to them at this point of the year.

Suggested Materials

- World Almanacs®
- Reference books on U.S. history
- Calculators
- Graph paper

Possible Solutions

The mean age of the past presidents at inauguration was 55 years of age. The modes are 51, 54, 55 and 57. Clinton will be 50 and Dole 74, so Clinton is closer to both the mean and mode age. The students in this class will be closest to age 55 in the election of 2036 or 2040 depending on the sample of students taken. The student has to make a case for correctness according to the characteristic chosen as the other factor for determining electability.

Benchmark Descriptors

Novice

There were no students who completely misunderstood this task. Many did not have work to support their answers or expressed their solutions in vague or nonmathematical terms. Some students failed to respond to all parts of the question. The Novices did not use much mathematical language and had no representations. The benchmark Novice states s/he found the "typical age to be between 50 and 60." This is too vague. The fact that eight presidents came from Virginia is not useful information.

Apprentice
The Apprentices fell into two categories. They either did not deal with all aspects of comparing Dole and Clinton's chances or did not deal correctly with determining the year when their classmates would most likely be elected. Some of them used older reference books and did not include presidents elected after the publication of that reference. Many did not show calculations, did not use much math language, or did not have suitable representations.

Practitioner
Practitioners generally used more than one measure of central tendency and compared them. They all found some method of determining the chances of a classmate being elected - some, like the benchmark shown here, calculated the odds based on the current U.S. population, which is probably not very valid, but does point out that it is a true long shot! This student mentions that the odds are better for lawyers. Many students looked at the career choices of the past presidents and discovered that many were lawyers. Most of the Practitioners used some form of math representation and had some math language beyond the language of computation.

Expert
There were very few Experts in the group. Probably owing to the fact that this was the first week of school and students had not been given any *Exemplars* tasks yet this year. The benchmark chosen here was about the best of the lot. This student restates the problem clearly and selects more than one characteristic for comparison. The student selected more than one measure of central tendency and compared the results favorably. While the student does not take the time to carefully calculate the odds of a classmate being elected, s/he states that s/he knows how to do so and realizes that the chances are very small.

This student realizes that neither of the characteristics that s/he chose to compare are very significant indicators of the current candidates' success in the upcoming election. This piece would be of better quality if the student had included the spreadsheet formula used to generate the solutions on the second page of his/her solution. There is strong math language throughout the solution and the math representation is accurate and appropriate.

Novice

President Task

In my class I had to decide which president would have a better chance of wining the election which is coming up soon. The choices were president Clinton (age 50) or Bob Dole (age 74). I decided to pick Clinton because I like what he is doing for the USA and a lot of other people that I asked said the same thing. I think that age has a lot to do with it because you don't want some old dude with old ideas you want a young dude with good new ideas on what our country needs.

There is no mathematical basis for this statement.

I found out that the typical age at inauguration, of 40 past presidents is between 50 and 60. I got my information from a list of all presidents in the world book at my house.

Student should be more specific in referring to average age. A 10-year span shows lack of mathematics.

One of the other characteristics that I chose was that since 1789 to 1993 8 of the presidents of the United States lived in Virginia.

Missed the opportunity for some math representation here.

Novice

Another question our teacher asked us is what is the chance of one of our team members becomng president in the near future. I think that the chance of that happening is one out of billions of Americans because only 2 presidents since 1789 to 1993 were elected from Vermont.

Again, "one out of billions" is not a mathematical response.

This student did essentially no mathematics to solve this problem.

Apprentice

I was asked to find out what the average age of the 41 presidents were elected. I was also asked to find another charteristic of all of the presidents and what is the posibility of one of the challengers been elected. To find the average age I made a table showing there names, there political status, age, and where they were born.

After I made the table I added up the ages and then multiplied them by 41 to reach an average age of 55 so Bill Cilinton is closer to that age than Bob Dole is. For the carateristic I chose what State they came from. I found out that these were the states with the most coming from it.

7 came from VA
7 came from OH
4 came from NY
2 came from VT
1 came from AL
2 came from KY

Why does Dole have a better chance? There are no presidents from Kansas.

OK is not much of a measure of probability.

① So Bob Dole has a better chance of becoming president by my characceristic.

② The probility of one of our classmates is O.K. If going by the average age (55) they would be elected in this year.

Student never answered the question "in what year?"

Apprentice

This is the table that I made (4)

This is not a useful title for this table.

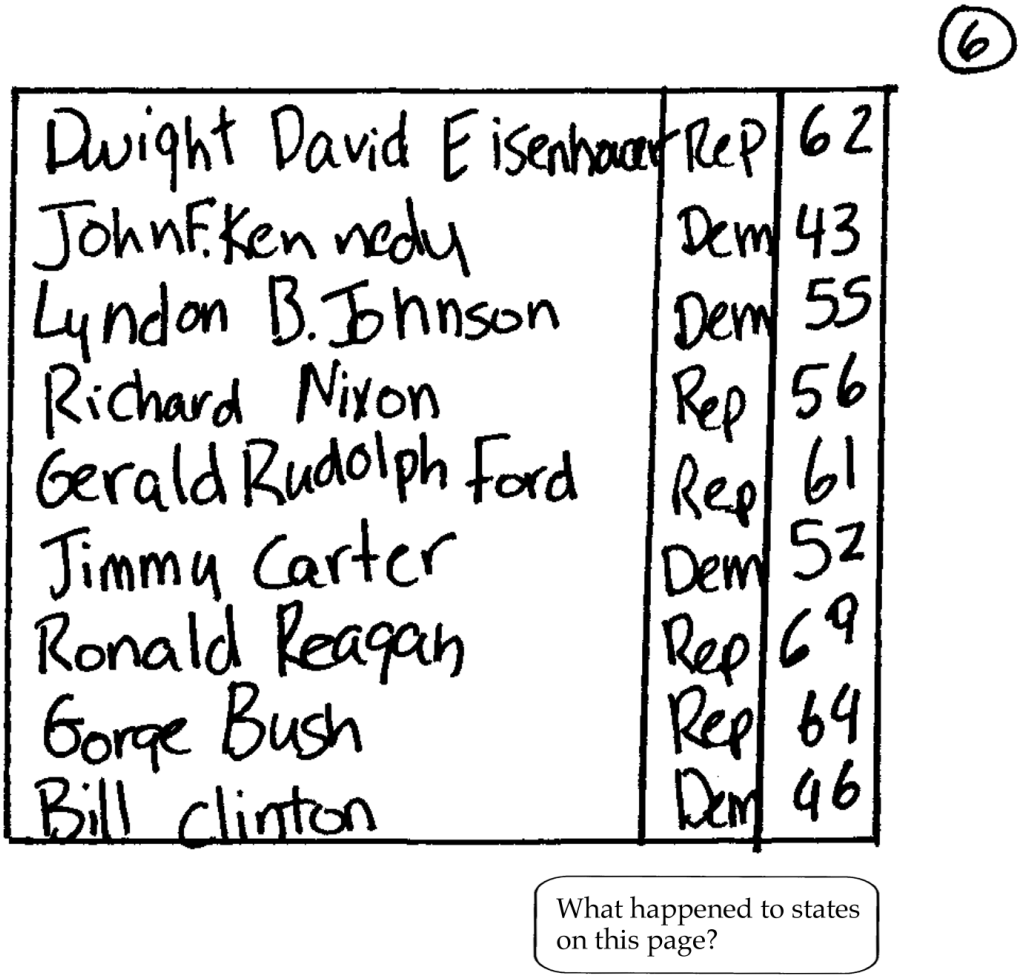
(5)

George Washington	Fed.	VA	57
John Adams	Fed	MA	61
Thomas Jefferson	Dem-Rep	VA	57
James Madison	Dem-Rep	VA	57
James Monroe	Dem-Rep	VA	58
John Quincy Adams	Dem-Rep	MA	57
Andrew Jackson	Dem	SC	61
Martian Van Buren	Dem	NY	54
William Henry Harrison	Whig	VA	68
John Tyler	Whig	VA	51
James Polk	Dem	NC	49
Zachary Taylor	Dem	VA	64
Millard Fillmore	Rep	NY	50
Franklin Pierce	Dem	NH	48
James Buchanon	Rep	PA	65
Abraham Lincoln	Rep	KY	52
Andrew Johnson	Rep	NC	56
Ulysses S.	Rep	OH	46
Rutherford Birandhays	Dem	OH	54
James Abram Garfield	Rep	OH	49
Chester Alan Arther	Dem	VT	50
Grover Cleveland	Rep	NJ	41
William Mckinaly	Rep	OH	55
Grover Cleveland	Dem	NY	55
William Howard Taft	Dem	OH	54
Woodrow Wilson	Dem	VA	42
Warren Gamaliel Harding	Rep	OH	55
Calving Coolidge	Dem	VT	51
Herbert Clark Hoover	Dem	IA	54
Franklin Delano Roosevelt	Rep	NY	51
Harry S. Truman	Rep	MO	60

Columns need labels.

Planning Ahead

Apprentice



Planning Ahead

Practitioner

Well-organized documentation.

Steps are labeled.

Question 1

What is the average age of inauguration?

① Step #1 To help get the answer to this problem I made a stem and leaf plot.

②

Stem	Leaf
4	2-3-6-6-7-8-9-9
5	0-0-1-1-1-1-2-2
	4-4-4-4-5-5-5-5
	6-6-6-7-7-7-7-8
6	0-1-1-1-2-4-4-5
	8-9

Should tell what data was organized in the stem and leaf plot.

Step #2 in step two I went about getting the mean to do this I added up all the presidents ages and divided the sum by the # of presidents (42) as you can see on the page labled "addition page.

③ I got the sum by punching the formula into the spread sheet, to double check I added it twice on the calculator.

mean
55

step #3 Next I went about getting the mode.

④ I decided to get all the different kinds of averages as it turns out there were four.

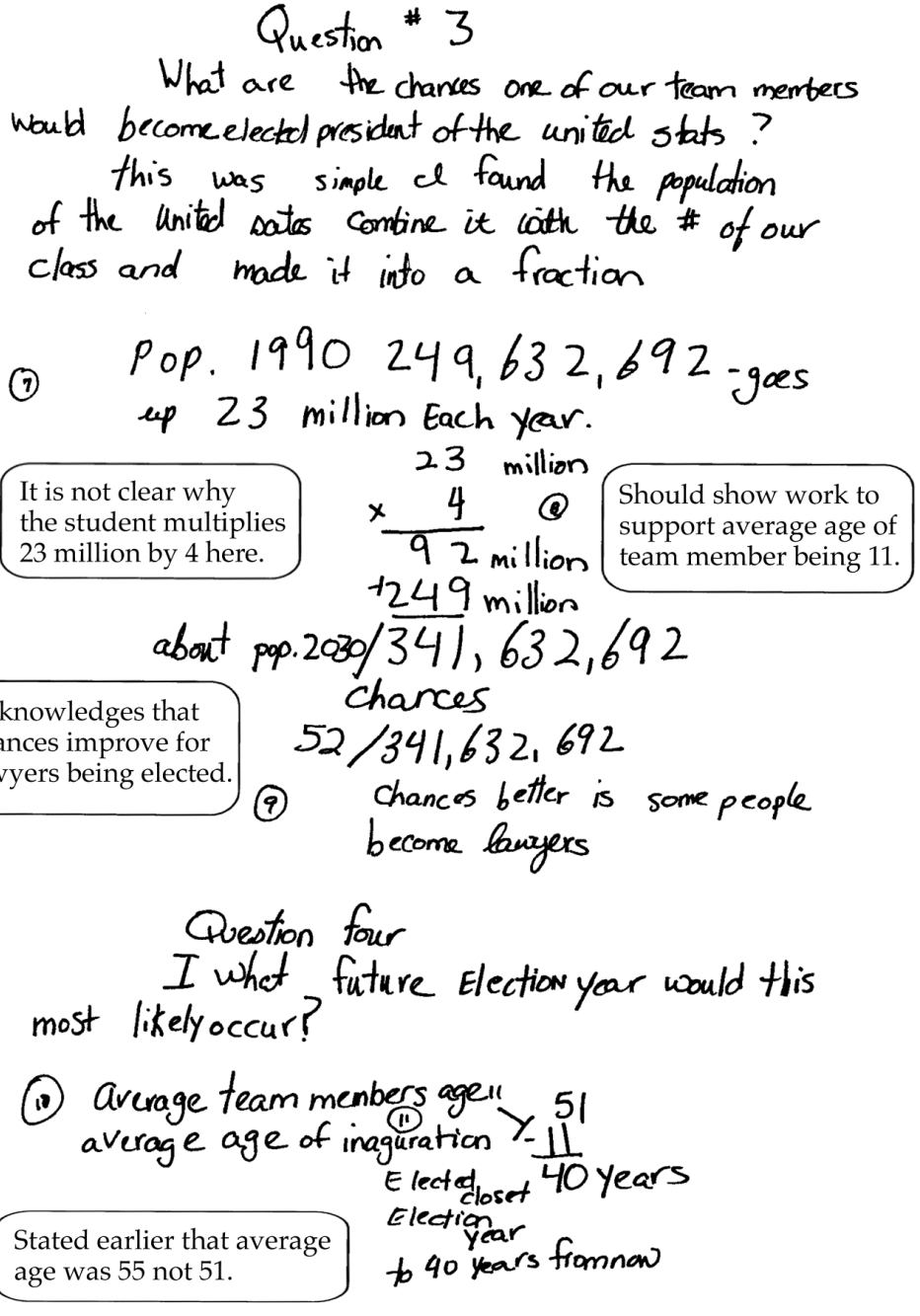
mode 51, 54, 55, 57

Should have included formulas used.

Should tell how mode as obtained.

Planning Ahead

Practitioner



Question # 3

What are the chances one of our team members would become elected president of the united stats ?

this was simple cl found the population of the United states combine it with the # of our class and made it into a fraction

⑦ Pop. 1990 249,632,692 - goes up 23 million Each year.

23 million
× 4 ④
92 million
+249 million

about pop. 2030/341,632,692

It is not clear why the student multiplies 23 million by 4 here.

Should show work to support average age of team member being 11.

Acknowledges that chances improve for lawyers being elected.

chances
52/341,632,692

⑨ Chances better is some people become lawyers

Question four

I what future Election year would this most likely occur?

⑩ Average team members age ⑪ 51
average age of inauguration ⑪ - 11
40 years

Elected closet Election year to 40 years from now

Stated earlier that average age was 55 not 51.

Planning Ahead

Practitioner

Step #4
Then I found the median
by finding the number in the exact middle.
median
55

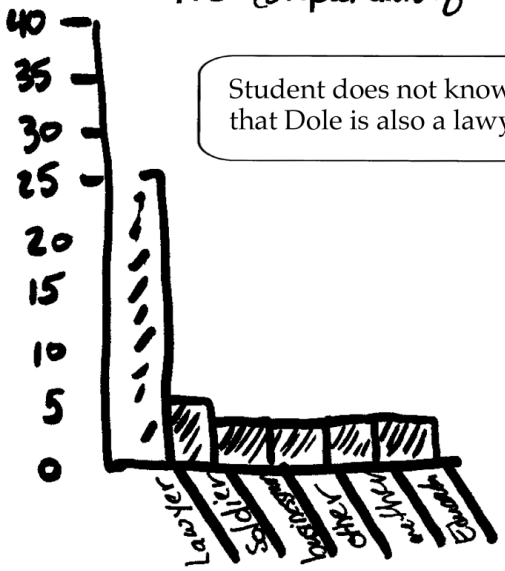
Does not take ages of all of population into account. Not all would be eligible to run or even be alive in 40 years.

Answer: Average age of inauguration
55

⑤ why: Because it showed up in all
The averages. Clinton has a better chance
Because he's closer to 55

Shows sound reasoning for "average" being 55.

Question 2
Who has the best chance at
Becomeing President?
Dole or Clinton?
To get this answer I investigate and found out
The compatations of all the former presidents in the encyclopedia.



Student does not know that Dole is also a lawyer.

⑥ Clinton Lawyer Answer. Ci
Dole Senate

Practitioner

Presidents ages

46
46
47
48
49
49
50
50
51
51
51
51
51
52
52
54
54
54
54
54
55
55
55
55
55
56
56
56
56
57
57
57
57
57
58
60
61
61
61
61
62
64
64
65
68
69
42

42/2303

There are only 41 ages in this list, so why divide by 42?

Expert

Shows clear understanding of the task. Shows sound reasoning for selecting mode of measuring number of children in family.

Shows understanding of method of finding actual percent chance, but opts not to pursue method.

Math
Planning Ahead

In this task I was asked three things. The first was what is the typical age at inauguration for the 41 men that have been selected President of the United States. Then I was asked to determine which candidate, Dole or Clinton, has the best probability of becoming President based on my analysis. I was also asked the chances that someone on our team becoming President and what election year it would be in.

I had to find the average age at inauguration, party, # of children, and state of birth for all of the 41 Presidents to solve this problem.

First, I chose what information I was going to include in my analysis. I decided to use the average age at inauguration, party, # of children, and state of birth. I found all of this information in the Almanac. Then, to answer the first question, I entered the formula to find the mean age at inaug. And it was 55.02 yrs. old. I also found the mode by counting the ages that showed up most and they were 51, 54, 55, and 57. Then for the next question I looked at the other characteristics that I recorded. The first was party. The majority (mode) of the Presidents (17 of them) were Republicans, although Democrats were close behind (14). Then I looked at the state of birth. The majority (mode) of the past Presidents were born in Virginia. And last I looked at the number of children each President had. For this I did the same thing as with the ages, using the spreadsheet to do the calculations to find the mean (add all of the children together and divide by 41), which was 3.15 children, and I also found the mode, two children. So, to solve this question I used two different methods of finding the average (the mean and the mode). I think that both are fairly accurate. But for the # of children I would say that the mode is more accurate, because families are much smaller then they used to, and that a family of two kids is pretty normal. Based on this information I would say that Bill Clinton has a better chance of winning than Bob Dole, because of his age.

For the last question, I would say the chances of a team member becoming the President are EXTREMELY SMALL. First of all, there has never been a female president, and that eliminates half of the team. Then there is the fact that there has only been two Presidents from Vermont. And to make the chances even smaller , I do not believe that anyone in the class wants to be the President of the United States. If I had more time I would try to find the number of males born from around 1956 to around 2040 because that would be most of the people that would fit into the age extremes in terms of inauguration. This would not, of course be very accurate if women started running for president, but would be more accurate than saying extremely small.

To organize all of my statistics I made a table as I previously mentioned. On the table I list the Presidents last name and first initial, there age at inaug., party, state of birth, and # of children in the columns. I also include Bob Dole below the Presidents too. Under Dole I have the means and modes for every characteristic.

As far as the significance of my solution go, they aren't very relevant (except for the typical age at inauguration). First of all the number of children is not very important, and the same with the state of birth. As far as the party goes,

Makes reference to math representation, tying text to representation.

Addresses significance of solution.

Expert

either a Democrat of a Republican could become elected, because both are popular with certain people. Last, there is the fact that the most important characteristic was not included in my analysis. This is the side that each candidate stands for in the issues that the country faces, which is a very important factor in the election. So, overall, I would not trust my analysis to figure out who will be elected.

Expert

Pres #	President	Inaug. at age	Party	State of birth	# of children
1	G. Washington	57	Fed.	Va.	0
2	J. Adams	61	Fed.	Mass.	5
3	T. Jefferson	57	Dem.-Rep.	Va.	6
4	J. Madison	57	Dem.-Rep.	Va.	0
5	J. Monroe	58	Dem.-Rep.	Va.	2
6	J.Q. Adams	57	Dem.-Rep.	Mass.	0
7	A. Jackson	61	Dem.	S.C.	4
8	M. Van Buren	54	Dem	NY	10
9	W.H. Harrison	68	Whig.	Va.	8
10	J. Tyler	51	Whig.	Va.	7
11	J.K. Polk	49	Dem.	N.C.	0
12	Z. Taylor	64	Whig.	Va.	6
13	M. Filmore	50	Whig.	NY	2
14	F. Pierce	48	Dem.	NH	0
15	J. Buchanan	65	Dem.	Pa.	3
16	A. Lincoln	52	Rem.	Ky.	4
17	A. Johnson	56	Dem.	N.C.	5
18	U.S. Grant	46	Rep.	Oh.	4
19	R. Hayes	54	Rep.	Oh.	2
20	J. Garfield	49	Rep.	Oh.	3
21	C. Arthur	50	Rep.	Vt.	3
22/24	G. Cleveland	47/55	Dem.	NJ	3
23	G. Harrison	55	Rep.	Oh.	2
25	W. McKinley	54	Rep.	Oh.	1
26	T. Roosevelt	42	Rep.	NY	2
27	W. Taft	51	Rep.	Oh.	1
28	W. Wilson	56	Dem.	Va.	5
29	W. Harding	55	Rep.	Oh.	3
30	C. Coolidge	51	Rep.	Vt.	0
31	H. Hoover	54	Rep.	Ia.	0
32	F. Roosevelt	51	Dem.	NY	2
33	H. Truman	60	Dem.	Mo.	2
34	D. Eisenhower	62	Rep.	Tex.	1
35	J. F. Kennedy	43	Dem.	Mass.	2
36	L. Johnson	55	Dem.	Tex.	2
37	R. Nixon	56	Rep.	Cal.	2
38	G. Ford	61	Rep.	Neb.	4
39	J. Carter	52	Dem.	Ga.	4
40	R. Reagan	69	Rep.	Il.	2
41	G. Bush	64	Rep.	Mass.	6
42	B. Clinton	46	Dem.	Ark	1
	B. Dole	currently 74	Rep	Ks	1
	Mean	55.02			3.15
	Mode	51, 54, 55, 57	Rep	Va	2

Table is well organized and appropriately labeled.

Accurate information is presented.