Mathematics of Voting

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Date: November 3rd, 2016 (STEM Thursday)
Subject / grade level: 6th, 7th, 8th

Materials:

1. Copies of student guided questions.
2. Candy ballots (one blank per students)
3. Electoral college and population reference sheet
4. Candy (optional) one piece per student
5. Calculators (optional)

TEKS:

Sixth Grade:

(5) Proportionality. The student applies mathematical process standards to solve problems involving proportional relationships. The student is expected to:

(A) represent mathematical and real-world problems involving ratios and rates using scale factors, tables, graphs, and proportions;

(B) solve real-world problems to find the whole given a part and the percent, to find the part given the whole and the percent, and to find the percent given the part and the whole, including the use of concrete and pictorial models; and

Seventh Grade:

(4) Proportionality. The student applies mathematical process standards to represent and solve problems involving proportional relationships. The student is expected to:

(D) solve problems involving ratios, rates, and percents, including multi-step problems involving percent increase and percent decrease, and financial literacy problems; and

Eighth Grade:

(5) Proportionality. The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions. The student is expected to:

(F) distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form $y = kx$ or $y = mx + b$, where $b \neq 0$;

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(H) identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems; and
Vocabulary: proportional, non-proportional, electoral college, representative

ENGAGE (5 minutes)

Teacher will show video, 'Some Iowa Caucus Contests Decided by Coin Tosses:
https://www.youtube.com/watch?v=N93GoJxTqz8

Probing/Eliciting Questions:
1. Do you think that the presidential election should be decided by a coin toss?
2. If not, how should we elect our president?
3. How could the coin toss result in an unfair representation?

Transition Statement: We can all agree hopefully that a coin toss is NOT the best way to elect a president. In the next activity, we will explore some other ways of voting.

EXPLORE (20 minutes)

1. Model popular vote with candy election.

Directions:
- Teacher passes out ballot.
- Students write down their favorite kind of candy **without any discussion**.
- Calculate what candy is the most popular based on which one got the most votes

Probing questions:
- Is this method fair? Why or why not?
- Are there any problems with this method? What are they?
- Do you think it is the best way to decide the class' favorite candy?

2. Model representative vote with candy election.

Directions:
- Teacher divides the class into unequal groups (to model populations of states). For example in a class of 25: 10, 8, 5, 2
- A group representative is chosen based on whose birthday comes first in the year.
- The group representative decides his/her favorite candy from the following four choices: starburst, skittles, jolly ranchers, M&Ms. S/he does not consult the rest of the group.
- Each group, regardless of its size, gets one vote.
- Class calculates the favorite candy.

Probing questions:
- Is this method fair? Why or why not?
- Are there any problems with this method? What are they?
- Do you think it is the best way to decide the class' favorite candy?

3. Model Modified Electoral vote with candy election.

Directions:
- Step Two is repeated only this time the representative consults his group members before making a decision.
- Each group, regardless of its size, gets one vote.
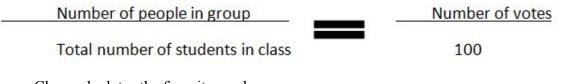- Class calculates the favorite candy.

Probing questions:
- Is this method fair? Why or why not?
- Are there any problems with this method? What are they?
- Do you think it is the best way to decide the class' favorite candy?

4. Model Electoral vote with candy election.

Directions:
- The class is told that there are a total of 100 votes. The groups need to calculate how many votes out of 100 they should get so that their votes are proportional to the size of their group relative to the total number of students in the class. They can use this proportion to help them:

$$\frac{\text{Number of people in group}}{\text{Total number of students in class}} = \frac{\text{Number of votes}}{100}$$

- Class calculates the favorite candy.

Probing questions:
- Is this method fair? Why or why not?
- Are there any problems with this method? What are they?
- Do you think it is the best way to decide the class' favorite candy?

Transition Statement: Now that we have explored a few different ways of voting for candy, let's look at how our country actually determines who will become the next president.

EXPLAIN: Electoral College and Population (7 minutes)

1. How the Electoral College Works: Stop video at 2 minutes 30 seconds.
https://www.youtube.com/watch?v=OUS9mM8Xbbw

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Probing/Eliciting Questions:
1. Do voters directly vote for president?
2. Describe the Electoral College?
3. Do you think citizens in the territories should have the right to vote for President?

Transition Statement: Now that you have a bit more

ELABORATE: Is the US voting system proportional? (15 minutes)

6th and 7th Grade: Students will use the data given from the table that compares the amount of votes per state to the total amount of votes to create proportions between the states. They will then determine the percentages of votes that each state has using the formula of state votes/total votes. Students will decide whether the amount of percentage per state is fair and how it affects the outcomes of voting.

8th Grade: Students will use the table that compares the state population, state votes, country population, and total votes to determine proportions and whether or not the way we do voting is proportional or nonproportional. Students will create a proportion with the state's population and nation population for each of the states given and compare whether or not the proportion is the same. They will then do the same thing with the state votes and the nation total votes and compare whether or not these are proportional. The last thing they will do is compare the proportions for each state population to votes and see if there is any proportional relationship there.

Algebra: Students will use the table that compares the state population, state votes, country population, and total votes to determine proportions and whether or not the way we do voting is proportional or nonproportional. The students will be given a table and asked to try to develop an equation that determines the number of votes each state gets. The students may use their calculators to help them to solve for the difference. **Provide each student with the fact that each state automatically gets 2 votes from the senate and that the remaining total of votes will be 435. Also let them know that the amount of votes is determined by using the states' populations and the equation is in slope intercept form and that the constant rate of change (slope) is something that does not change.**

The equation will be y, number of votes per state and x, the state population:
y= 435/309183463 x + 2

1. What percent of the total population is California?
2. What percent of the electoral votes does it get?

3. What percent of the total population is Wyoming?
4. What percent of the electoral votes does it get?
5. What percent of the population is Texas?
6. What percent of the electoral votes does it get?
7. What would be the equation that tells how many votes a state gets?
8. Does your vote count more in a small state or a large state? Explain

Supplemental video: Trouble With the Electoral College
https://www.youtube.com/watch?v=7wC42HgLA4k&t=2s

EVALUATE : (5 minutes)

1. Students will respond to the prompt: if you were able to decide how the president of the United States was elected, would you keep our system the way it is or make changes to make it a better system? Explain what you would change and justify why you would make that change.

Closure Statement:

Today's lesson objectives were to explore methods of voting and determining whether the US system is fair and representative of the will of the people.
Thank you for allowing us to teach you and learn with you today! :)