Notes and Handouts

- **Slide 1: Teaching Mathematics for Social Justice (TMfSJ) as a context for CCSS**
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  NCTM/TODOS, 2014 Annual Conference, New Orleans, Louisiana
- **Slide 2:** Agenda
- **Slide 3:** Defining TMfSJ:
  - Charlie Chaplin once came third in Chaplin lookalike contest.
  - The intent of this presentation is not to limit the definition of social justice, but to provoke more questions and to stimulate new discussions about the many meanings of and possibilities for teaching for social justice (North, 2006), and its relationship with teaching mathematics.
- **Slide 4:** Defining TMfSJ: Cont. …
  In TMfSJ, students use mathematics as a tool to analyze injustices affecting marginalized peoples.
  The injustices may come from students' communities, cultures and life experiences.
- **Slide 5:** A good place to start
  - Ask students:
    - What social issues are of interest to you? List the ones you want.
  - What could be some possible examples for your students?
  - poverty, financial literacy, sweat shops, racism, genocide, abuse, hunger, human trafficking, homelessness, profiling, …
  - What are possible challenges to include topics like these if students are interested?
- **Slide 6:** Working with word problems: 1
  - How could traditional problems be turned into culturally and socially relevant problems that still address the mathematical concepts and skills needed, but have "value added" in the sense that they address real issues in our world.
  - **Problem Version 1:** A group of youth aged 14, 15, and 16 go to the store. Candy bars are on sale for 43 cents each. They buy a total of 12 candy bars. How much do they spend, not including tax? (Gutstein & Peterson, 2006, p. 6).
  - How can you make this problem have a social justice approach?
  - **Problem Version 2:** Factory workers aged 14, 15, and 16 in Honduras make McKids™ children's clothing for Walmart. Each worker earns 43 cents an hour and works a 14-hour shift each day. How much does each worker make in one day, excluding any fees deducted by employers? (Gutstein & Peterson, p. 6).
- **Slide 7:** Mathematics as a tool
  - Both of these problems address the same mathematical concept, but one deals with buying candy bars while the other connects directly to a critical global issue.
  - When mathematics and social issues intertwine as they do in the second problem, not only does mathematics become "more lively, accessible, and personally meaningful" to students, but also mathematics becomes a tool "that helps students more clearly understand their lives in relation to their surroundings" (Gutstein & Peterson, 2006, p. 1).
  - In order "to have more than a surface understanding of important social and political issues, mathematics is essential," and without it, "it is impossible to fully understand a government budget, the impact of a war, the meaning of a national debt, or the long-term effects of a proposal such as the privatization of Social Security" (Gutstein & Peterson, 2006, p. 2).
  - REFERENCE
    - Gutstein, E. & Peterson, B. (Eds.). (2006). *Rethinking mathematics: Teaching social justice by the numbers.* Milwaukee, WI: Rethinking Schools.

- **Slide 8:** Working with Word Problems ... : 2
  From Smart Bansho! (2013). Social justice in the math. Classroom: http://smartbansho.weebly.com/2/post/2013/06/social-justice-in-the-math-classroom.html
  - **Problem Version 1: Activity – A Math Problem:** Examine the pizza party task:
    - Our class is having a pizza party. Here are the results of the what students want to eat:
      3/5 want pepperoni, 0.1 want Veggie, 25% want cheese.
  - How many slices of each should we order for a class of 25?
  - What are some challenges/questions/issues related to this problem?
    - Who has food allergies in the class? (Gluten?)
    - Is the cheese halal?
    - Is the peperoni all beef or beef and pork?
    - Would any pizzas be ordered half cheese and half beef? (some won't eat this)
    - Do the pizzas meet TDSB nutritional guidelines for school lunches?
    - Who is going to pay for the pizza? (economy challenges)
  - How can you make this problem have a social justice approach?
- **Slide 9:** Working with Word Problems ... : 2
  - **Problem Version 2:**
    A school collected data about the top languages spoken at home. Here are the results:
    3/5 speak Bengali 0.1 speak English 25% speak Urdu
    How many students speak each language, in this school population of 100 students? How many students speak each language, in a class with 25 students?
  - **Critical Literacy Link:**
    - Why is this data important for a school to know?
    - If the school office only printed newsletters in English, what would be the impact on the community?
- **Slide 10:** TMfSJ as a "sliding signifier":
  - which suggests that defining what teaching for social justice "actually means is struggled over, in the same way that concepts such as democracy are subject to different senses by different groups with sometimes radically different ideological and educational agendas" (Michael W. Apple, as quoted in Bartell 2011, p. 2).
  - "… doing teacher education for social justice is an ongoing, over-the-long-haul kind of process for prospective teachers as well as for teacher education practitioners, researchers, and policy analysts" (Cochran-Smith (2004, p. xviii).
- **Slide 11:** Critical Theory
  "In the most general sense, critical theory maintains sociopolitical critiques on social structures, practices, and ideology that systematically mask one-sided accounts of reality which aim to conceal and legitimate unequal power relations" (Bottomore, 1991)
  - "In the most general sense, critical theory maintains sociopolitical critiques on social structures, practices, and ideology that systematically mask one-sided accounts of reality which aim to conceal and legitimate unequal power relations (Bottomore 1991)" (Stinson & Wager, 2012, pp. 6-7).
  - "In the context of education, critical theory, in the mid-twentieth century and beyond, began to provide different theoretical tools to examine schools and their functions and to explore the persistent inequities and injustices too often found in schools" (Stinson & Wager, 2012, p. 7).
  - "Most critical theory analyses conducted today examine social inequities and injustices within the intersectionality of race, class, and gender as well as sexual orientation, dis/ability, and religion (e.g., Rosenblum & Travis 2008)" (Stinson & Wager, 2012, p. 7).
- **Slide 12:** Critical Pedagogy

As teachers consider how to integrate social justice into our math programs, a question we can ask ourselves is this: ***"How can numbers be used to change the world and make it a better place?"***

- Critical Pedagogy and the Scholarship of Paulo Freire: (Stinson & Wager, 2012, pp. 6-7):
- "Rooted in a democratic project of justice and freedom, critical pedagogy supports pedagogical theories and practices that drive both teachers and students to acknowledge and understand the interconnecting relationships among ideology, power, and culture and the social structures and practices that produce and reproduce knowledge."
- "Rejecting any claim to "objective" universal truths, critical pedagogy motivates new theories and languages of critique and resistance to examine and transform social and pedagogical practices that maintain unjust social codes (Leistyna & Woodrum, 1996)."
- "Critical pedagogy, however, is not a one-size-fits-all pedagogy, but rather a humanizing pedagogy that builds on and values students' and teachers' background knowledge, culture, and lived experiences (Bartolomé, 1996) while using social injustices as a point of departure not only for learning but also for action."
- "In other words, to be critical, pedagogy must be developed in and through students' and teachers' local knowledges and sociopolitical experiences as both students and teachers advance more equitable and just social and political transformations."
- **Quote:** We must never merely discourse on the present situation, must never provide the people with programs which have little or nothing to do with their own preoccupations, doubts, hopes, and fears - programs which at times in fact increase the fears of the oppressed consciousness. It is not our role to speak to the people about our own view of the world, nor to attempt to impose that view on them, but rather to dialogue with the people about their view and ours. We must realize that their view of the world, manifested variously in their action, reflects their situation in the world. Educational and political action which is not critically aware of this situation runs the risk either of "banking" or of preaching in the desert. (Freire, 1970/2003, p. 96)
- **Quote: To read the world and write the world means (Gutstein, 2006):**
  - To use mathematics to understand relations of power, resource inequities, and disparate opportunities between different social groups and to understand explicit discrimination based on race, class, gender, language, and other differences. Further, it means to dissect and deconstruct media and other forms of representation. It means to use mathematics to examine these various phenomena both in one's immediate life and in the broader social world and to identify relationships and make connections between them. (p. 45)

- **Slide 13:** Theoretical and Pedagogical "roots" of TMfSJ: Brief overview of critical theory and critical pedagogy
  - The origin of critical theory is often associated with the Frankfurt School (circa 1920s), which holds a Marxist theoretical perspective: to critique and subvert domination in all its forms (Bottomore, 1991).
  - "As these critiques, originating in the social sciences, evolved they became known collectively as critical theory sometime during the early to mid-twentieth century.
    - Scholars such as Theodor Adorno, Jürgen Habermas, Max Horkheimer, and Herbert Marcuse are key figures in the development of critical theory" (Stinson & Wager, 2012, p. 6).
  - And although the Frankfurt School and the seminal works of Karl Marx (and Friedrich Engels) are foundational in its development, it is important to keep in mind that critical theory is not coextensive with either of these or with both of them together (Crotty 1998).

Defining Teaching Mathematics for Social Justice (TMfSJ)

- Social justice mathematics as one approach to critical mathematics:

        - "Skovsmose (2005), who positions social justice mathematics as just one approach to critical mathematics, continues to re-conceptualize the open and uncertain possibilities of a critical mathematics education.
        - In so doing, he speaks not only about traveling through different philosophical considerations but also physically traveling through different places around the world, experiencing different people, different cultures, different educational contexts—and different possibilities" (Stinson & Wager, 2012, p. 6).
    - "Skovsmose claims that traveling through differences constitutes the turbulent development of critical mathematics, as aspirations and hopes are continuously recontextualized and reformulated, and uncertainties appear (Skovsmose, 2009)" (Stinson & Wager, 2012, p. 6).
    - Wagner (2008): Teaching about, with and for social justice:
    - Teaching mathematics *about social justice refers to the context of lessons that explore* critical (and oftentimes controversial) social issues using mathematics.
    - Teaching mathematics *with social justice refers to the pedagogical practices that encourage a co-created classroom* and provides a classroom culture that encourages opportunities for equal participation and status.
    - And teaching mathematics *for social justice is the underlying belief that mathematics* can and should be taught in a way that supports students in using mathematics to challenge the injustices of the status quo as they learn to read and *rewrite their world (Freire, 1970/2000).*

    - Cochran-Smith (2004) notes that learning to teach for social justice, for teachers and teacher educators alike,
        - "is a long road with 'unlearning' a rugged but unavoidable part of a journey during which people double back, turn around, start and stop, reach dead ends, and yet, sometimes, forge on" (p. xx).
    - Skovsmose (2005) claims that attempts to bring clarification or meaning to a concept such as critical (or social justice) mathematics often takes us in the opposite direction of any fixed meaning in which "clarification of 'something' brings us to consider 'everything'" (p. 216).
    - I hope that you also start or continue to undertake your own journey of making meaning(s) of teaching (mathematics) for social justice, going through your own process of considering everything as you consider something—starting, stopping, and even sometimes doubling back.
    - Undeniably, "TMfSJ is a journey, not a destination" (Stinson, Bidwell, and Powell, 2012).
- **Slide 14:** Theoretical and Pedagogical "roots" of TMfSJ: Cont. …

    Power comes from risking our lives in creation. Paulo Freire
- **Slide 15:** Theoretical and Pedagogical "roots" of TMfSJ: Cont. …

    "Men and women develop their power to perceive critically the way they exist in the world with which and in which they find themselves; they come to see the world not as a static reality but as a reality in the process of transformation" (Freire, 1970/2003, p. 12).
- **Slide 16:** Another Example
    - You have $100 to donate towards hunger relief. To which organization in which country would you give it? Answer this question using any resources you wish. You must explain, justify and evaluate your opinion and resources.
    - If you could live anywhere in the world, where would it be? Use data in your justification.
    - What are the top rated jobs in your country? What required skills do these jobs have in common?

- **Slide 17:** TMfSJ and the NCTM Standards
  - "Critics of teaching mathematics for social justice—or mathematizing our conscious bodies (to use Freire's words)—are often concerned that the emphasis on controversial social issues and contradictory political ideologies during mathematics lessons take precedence over learning "rich," rigorous mathematics (e.g., Ravitch 2005)" (Stinson & Wager, 2012, p. 10).
  - "On the contrary, the foundation of TMfSJ is rooted, in part, in the belief that all children should have access to rich, rigorous mathematics that offers opportunities and self-empowerment for them to understand and use mathematics in their world—in a word, *mathemacy (to use D'Ambrosio's word)"* (Stinson & Wager, 2012, p. 10).
- **Slide 18:** TMfSJ and the NCTM Standards: Cont. …
  - *Principles and Standards for School Mathematics (NCTM 2000), the NCTM signature document, opens with the statement:*
    - "Imagine a classroom, a school, or a school district where all students have access to high quality, engaging mathematics instruction" (p. 3).
  - Many educators "… share this vision for school mathematics and suggest that TMfSJ is a powerful means to achieve these imagined classrooms and schools .
- **Slide 19:** TMfSJ and the NCTM Standards: Cont. …
  - Brief overview of some of the ways in which TMfSJ aligns with and extends (critically) the NCTM Standards:
    - NCTM Standards do not explicitly recommend teaching mathematics for social justice, they certainly are not inconsistent with it.
    - For instance, the *Principles and Standards (2000) explicitly calls for students'* understanding of the use of mathematics in everyday life and the workplace.
      - This call for mathematical competencies that offer access to opportunities is a crucial element of TMfSJ. Critical/social justice mathematics, however, extends this notion to prepare students to take action and use mathematics for social change—to read and rewrite their world into more humanizing possibilities with and through mathematics.
    - Moreover, a core value on which the *Principles and Standards is founded is unequivocally shared by teachers of mathematics for social justice:*
      - the Equity Principle holds that "all students, regardless of their personal characteristics, backgrounds, or physical challenges, must have opportunities to study—and support to learn—mathematics" (p. 12).
- **Slide 20:** TMfSJ and the NCTM Standards: Cont. …
  - To assist in achieving this core value of equity, NCTM for more than two decades has strongly recommended instruction not only in mathematical *content standards but also in* mathematical *process standards (NCTM 1989, 1991, 1995, 2000).*
  - *This blending of content and* process standards throughout mathematics instruction, however, demands the development of a different mathematics classroom—one different from the "traditional" mathematics classroom found in most U.S. schools (see Hiebert 2003).
    - In this different mathematics classroom, students are no longer passive, empty depositories awaiting the teachers's deposits–what Freire (1970/2000) criticized as "the "banking" concept of education–but rather active co-creators of classrooms "where students of varied backgrounds and abilitites work with expert teachers, learning important mathematical ideas with understanding, in environments that are equitable, challenging, supportive, and teachnologically equiped for the 21st century" (NCTM 2000, p. 4).

- The difference is that TMfSJ centers teaching and learning specifically around issues of social political justice and reform. TMfSJ or critical mathematics is understood as a means for student and teacher self-empowerment to organize and reorganize equitable social and political reform
- The suggestion here is "that TMfSJ not only meets many of the broad mathematical goals and objectives of NCTM but also critically extends and enhances them in significantly meaningful and humanizing ways for students teachers alike!" (p. 11).

- **Slide 21: TMfSJ Activities**
  - **The Hidden Grain** (by Stephanie Kempf, 1997, Finding solutions to Hunger, p. 171):
    One billion of the world's people do not get enough to eat, yet half the grain grown in the world is fed to livestock. Why? To fatten the cattle up for sale to people who can afford to buy meat. Chronically hungry people rarely have the money to buy meat.
    Most cattle today do not graze freely on pasture grasses – if they did, their meat would be leaner and healthier. Instead, they are penned up in crowded "feedlots" and given large quantities of grain. The meat from grain-fed cattle is higher in fat.
    For every 16 pounds of grain fed to a cow, we get only one pound back in meat on our plates. Producing that pound of meat requires 2,500 gallons of water. In many areas of the world, people do not have access to even a small amount of clean drinking water and must walk miles a day to get it.
    Do the Math
    If your entire class went to McDonald's and each student ate one Quarter-Pounder, how much grain was used to produce the class's lunch? How much water was used?
    Explain why you think this is or is not a problem. If it is a problem, what are possible solutions?
- **Slide 22:** Grain and Water for Quarter Pounders

Quarter Pounder	Grain (Pounds)	Water (Gallons)
1	4	625
4	16	2,500
24	96	15,000
100	400	62,500
1,000	4,000	625,000

- **Slide 23:** Facts about McDonald's
  - In 1992 when Rutgers professor Benjamin Barber coined the term "McWorld," there were 12,700 McDonald's worldwide. Today there are over 33,000.The relentless spread of McDonald's over the past 61 years is an incredible business success story. In some markets the burger chain is just getting started, with plans to 200 stores in China this year.
  - McDonald's serves 1% of the world's population every day. *Source: Société Générale. About how many people is that?*
  - McDonald's sells more than 75 hamburgers every second. Source: McDonald's Operations and Training Manual via Side Dish.
  - McDonald's' $24 billion in revenue makes it the 90th-largest economy in the world. *Source: Yahoo Finance.*
  - Counting $32 billion in revenue from franchise stores, McDonald's claims the 68th biggest economy, bigger than Ecuador. *Source: 2009 Annual Report.*
  - Americans alone consume one billion pounds of beef at McDonald's in a year -- five and a half million head of cattle. Source: John Hayes, McDonald's senior director of U.S. food and packaging, via Side Dish.

- McDonald's hires around 1 million workers in the US every year. This estimate from Fast Food Nation assumes a 700,000 domestic workforce with 150% turnover rate.

- **Slide 24:** TMfSJ and CCSS Mathematical Standards
  - Mathematical Practices (CCSS, 2012):
    1. Make sense of problems and persevere in solving them.
    2. Reason abstractly and quantitatively.
    3. Construct viable arguments and critique the reasoning of others.
    4. Model with mathematics.
    5. Use appropriate tools strategically.
    6. Attend to precision.
    7. Look for and make use of structure.
    8. Look for and express regularity in repeated reasoning.
- **Slide 25:** Wealth Distribution
- **Slide 26:** Wealth Quiz
- **Slide 27:** Correct Answer
- **Slide 28:** Results from NPR Survey
- **Slide 29:** Reactions to Survey
- **Slide 30:** Wealth Distribution
- **Slide 31:** TMfSJ: Activities: Unequal Distribution of Wealth
- **Slide 32:** TMfSJ: Activities: Unequal Distribution of Wealth: Cont.
  1. First divide the 10 x 10 grid in three regions by coloring each with different colors:
     - 1 square = richest 1%
     - 19 squares = the next richest 19%
     - 80 square = the remaining 80% of families
  2. Next divide the pennies into three piles: 39 for the richest region, 46 pennies for the next region, and 15 pennies for the third region.
- **Slide 33:** TMfSJ: Activities: Unequal Distribution of Wealth: Cont.: Example 1
- **Slide 34:** TMfSJ: Activities: Unequal Distribution of Wealth: Cont.: Example 2
- **Slide 35:** YouTube Video
  - Politizane (November 20, 2012). Wealth Inequality in America. Retrieved May 6, 2013 from
  - http://www.youtube.com/watch?v=QPKKQnijnsM
- **Slide 36:** TMfSJ and CCSS Mathematical Standards: Cont. …
  - Not everybody is in favor of this connection between TMfSJ and CCSS: See the following:
    - ERIC (RICO) GUTSTEIN, COMMENTARY: The Common Core State Standards Initiative: A Critical Response Eric (Rico) Gutstein, *Journal of Urban Mathematics Education, July 2010, Vol. 3, No. 1, pp. 9–18. ©JUME. http://education.gsu.edu/JUME.*

- **Slide 37:** TMfSJ: Activities: Cont.
  Mercator Projection and Peters Projection World Maps Activity (Rethinking Schools, 2001; Gustein, n.d.)
- **Slide 38:** West Wing - Why are we changing maps?
  - http://www.youtube.com/watch?v=eLqC3FNNOaI
  - From season 2 - episode 16 "Somebody's Going to Emergency, Somebody's Going to Jail"
  - Stuart McArthur's Universal Corrective Map
  - http://www.youtube.com/watch?v=QYuV4eOVz38#aid=P8e7HJk4Q3Q
- **Slide 39:** Children's Books
  The Can Man, By Laura E. Williams, Illustrated by Craig Orback

    - http://www.leeandlow.com/books/379/hc/the_can_man
- **Slide 40:** Children's Books: Cont. …
  Uncle Willie and the Soup Kitchen (Reading Ra… (Paperback)
    - http://www.amazon.com/Uncle-Willie-Kitchen-Reading-Rainbow/dp/0688152856/ref=pd_bxgy_b_img_y
- **Slide 41:** Children's Books: Cont. …
  Those Shoes Paperback by Maribeth Boelts (Author), Noah Z. Jones (Illustrator)
    - http://www.amazon.com/Those-Shoes-Maribeth-Boelts/dp/0763642843/ref=pd_bxgy_b_img_z
- **Slide 42:** Questions
    - When students are engaged with rich, big topics like racism, sexism, poverty …, are they distracted from the more overt curriculum goals?
    - If we focus on familiar tools or topics to teach difficult mathematical concepts, are the students any more likely to learn said concepts, and if so, then when DO we teach through Equity and Social Justice?
- **Slide 43:** The Challenge
    - So, the next time you pick up a textbook and consider giving your students a mathematics story problem, ask yourself this question: Is this the context I want my students to explore, or is there a more meaningful way for me to address the mathematics while deepening students' understandings of both the world they live in and the role this subject plays in it?

Handouts: Teaching Mathematics for Social Justice (TMfSJ) as a context for CCSS

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NCTM/TODOS, 2014 Annual Conference, New Orleans, Louisiana

Wealth Distribution

TOP 20%	2nd 20%	3rd 20%	4th 20%	BOTTOM 20%

In terms of wealth, divide the 1st rectangle (representing 100% of the wealth in U.S.) into five groups representing the current wealth distribution (see example below on the left side):

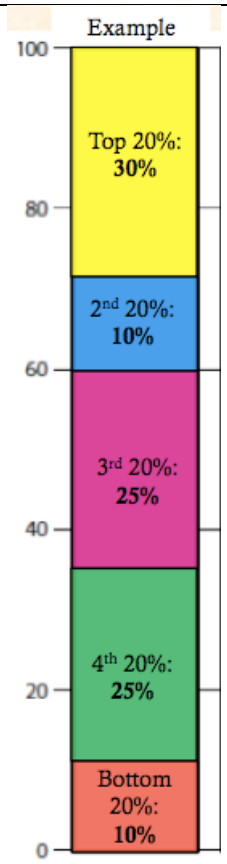
- from wealthiest fifth (top 20%): yellow;
- next wealthiest (second 20%): blue;
- next wealthiest (third 20%): purple;
- next wealthiest (4th 20%): green;
- down to poorest fifth (bottom 20%): orange.

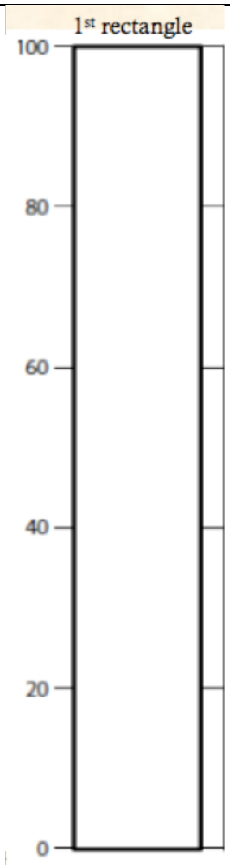
This will be your estimate of the current wealth distribution for each group.

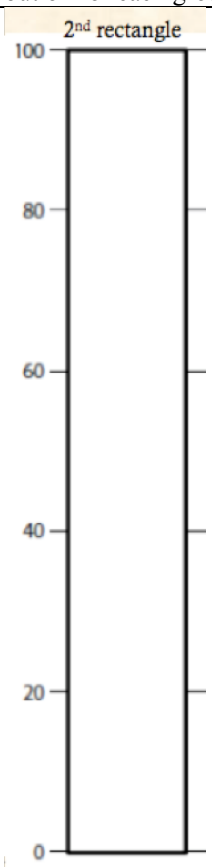
Similarly, in the 2nd rectangle, estimate what you think should be the ideal wealth distribution in the U.S.

- from wealthiest fifth (top 20%): yellow;
- next wealthiest (second 20%): blue;
- next wealthiest (third 20%): purple;
- next wealthiest (4th 20%): green;
- down to poorest fifth (bottom 20%): orange.

This will be your estimate of the ideal wealth distribution for each group.







- How do the two charts you made compare? _____
  _____
- Compare your charts with the charts of another person. How do they compare? _____
  _____
- Would you make any changes? Explain. _____
  _____

ACTIVITY BOX

THE HIDDEN GRAIN IN MEAT

BY STEPHANIE KEMPF

One billion of the world's people do not get enough to eat, yet half the grain grown in the world is fed to livestock. Why? To fatten the cattle up for sale to people who can afford to buy meat. Chronically hungry people rarely have the money to buy meat.

Most cattle today do not graze freely on pasture grasses — if they did, their meat would be leaner and healthier. Instead, they are penned up in crowded "feedlots" and given large quantities of grain. The meat from grain-fed cattle is higher in fat.

For every 16 pounds of grain fed to a cow, we get only one pound back in meat on our plates. Producing that pound of meat requires 2,500 gallons of water. In many areas of the world, people do not have access to even a small amount of clean drinking water and must walk miles a day to get it.

DO THE MATH

If your entire class went to McDonald's and each student ate one Quarter-Pounder, how much grain was used to produce the class's lunch? How much water was used?

Explain why you think this is or is not a problem. If it is a problem, what are possible solutions?

From *Finding Solutions to Hunger: Kids Can Make a Difference.* See Resources, page 171.

UNEQUAL DISTRIBUTION OF WEALTH IN THE UNITED STATES

RECOGNIZING INEQUALITY, PART TWO

BY MICHAEL LANGYEL

Display the graphic "U.S. Households and Wealth" (at right). Explain to students that there is a difference between income and wealth. Economist Edward Wolff, author of *Top Heavy: A Study of the Increasing Inequality of Wealth in America* argues that to analyze economic inequalities, one must go beyond the annual income of a person or family and look at their wealth, which is defined as the dollar value of assets, minus any debts or liabilities, held by a household at any one time. (Income, by comparison, refers to the flow of dollars over a period of time, usually a year.)

Ask the students what the house graphics represent and what the money-bag graphics represent. Ask: "What do these data show us?"

Tell students that they are to represent this data in three-dimensional form using 100 pennies (or chips) and a chart of 100 squares.

Have the students draw out a 10 x 10 chart with squares large enough that a penny can fit entirely inside a single square. (For a downloadable PDF of a chart like this, see www.rethinkingschools.org/math.)

Tell the students that each square represents one percent of the households in the United States, and each penny represents one percent of the country's wealth.

Have the students work individually or in groups of two or three to construct their three-dimensional graph – stacking pennies or chips on squares to represent the distribution of wealth among different segments of the U.S. population.

ADDITIONAL PROCEDURE

For students needing more explicit instructions, suggest the following:

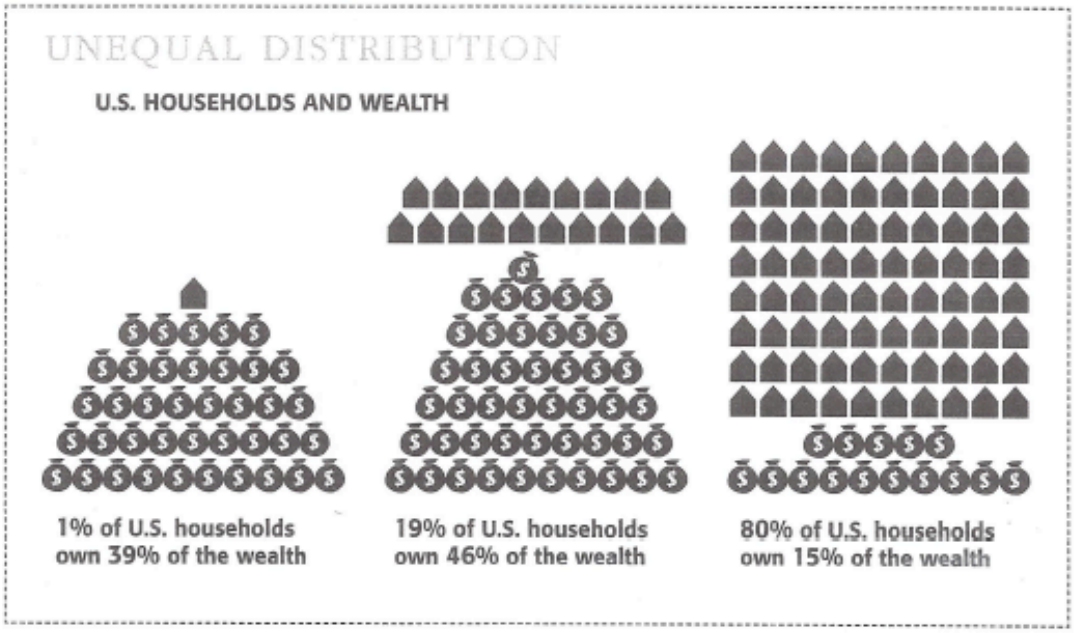
1. First divide the 10 x 10 grid in three regions by coloring each with different colors:
   - 1 square = richest 1%
   - 19 squares = the next richest 19%
   - 80 squares: the remaining 80% of the families.
2. Next divide the pennies into three piles: 39 pennies for the richest square, 46 pennies for the next region, and 15 pennies for the third region.

Note: Some students may have difficulty stacking 39 pennies on the richest square. Also some will struggle to divide 15 pennies among the 80 squares in the largest region.

QUESTIONS

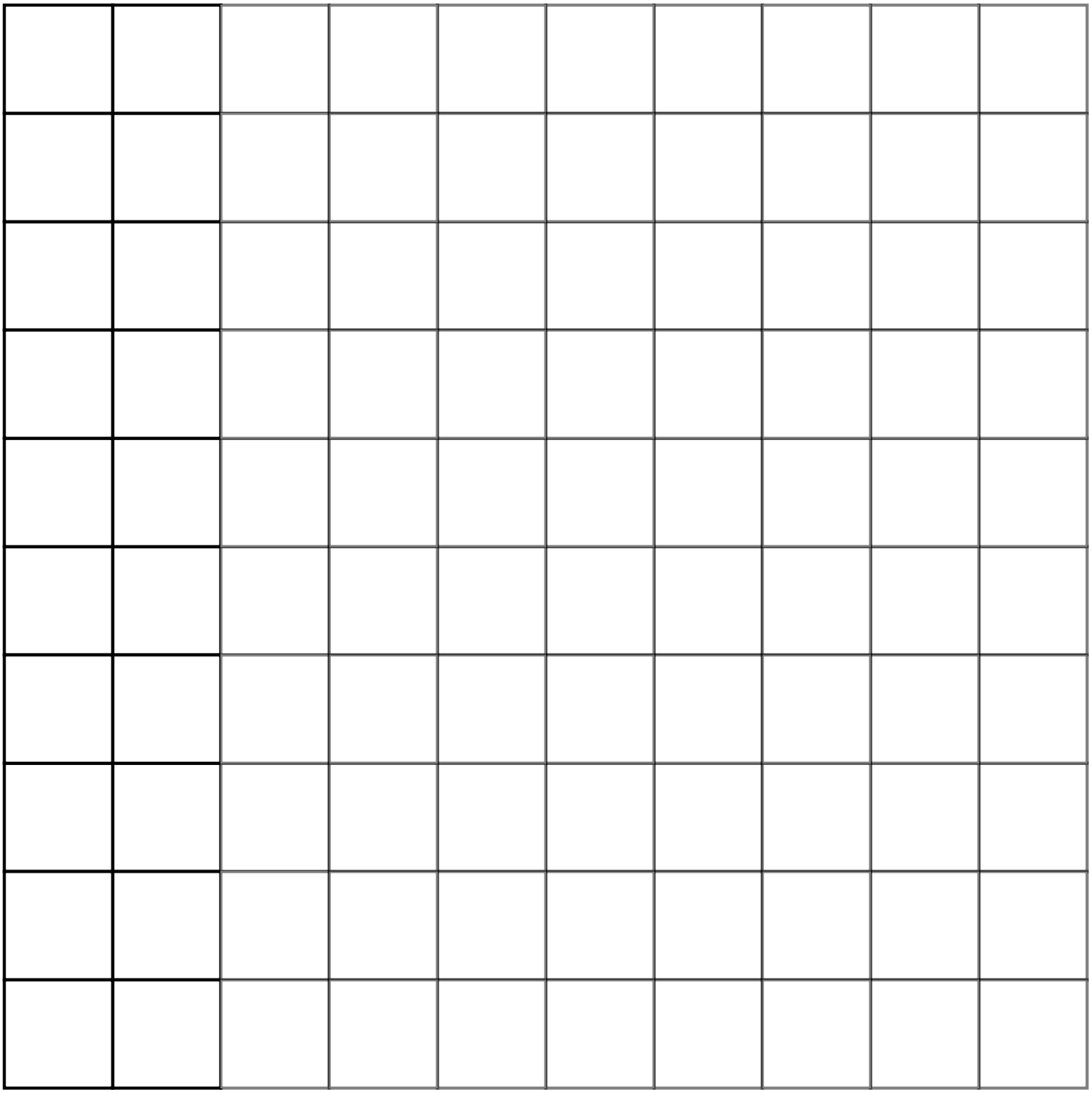
Have students reflect in writing or in discussion on these questions:

1. What do these data tell us about the distribution of wealth in the United States?
2. Why do you think wealth is distributed this way?
3. What is the relationship between wealth and poverty?
4. What government policies on spending and taxes do you think the three different groups might support or oppose? What other data might be useful to more deeply understand the distribution of wealth in the United States? ■

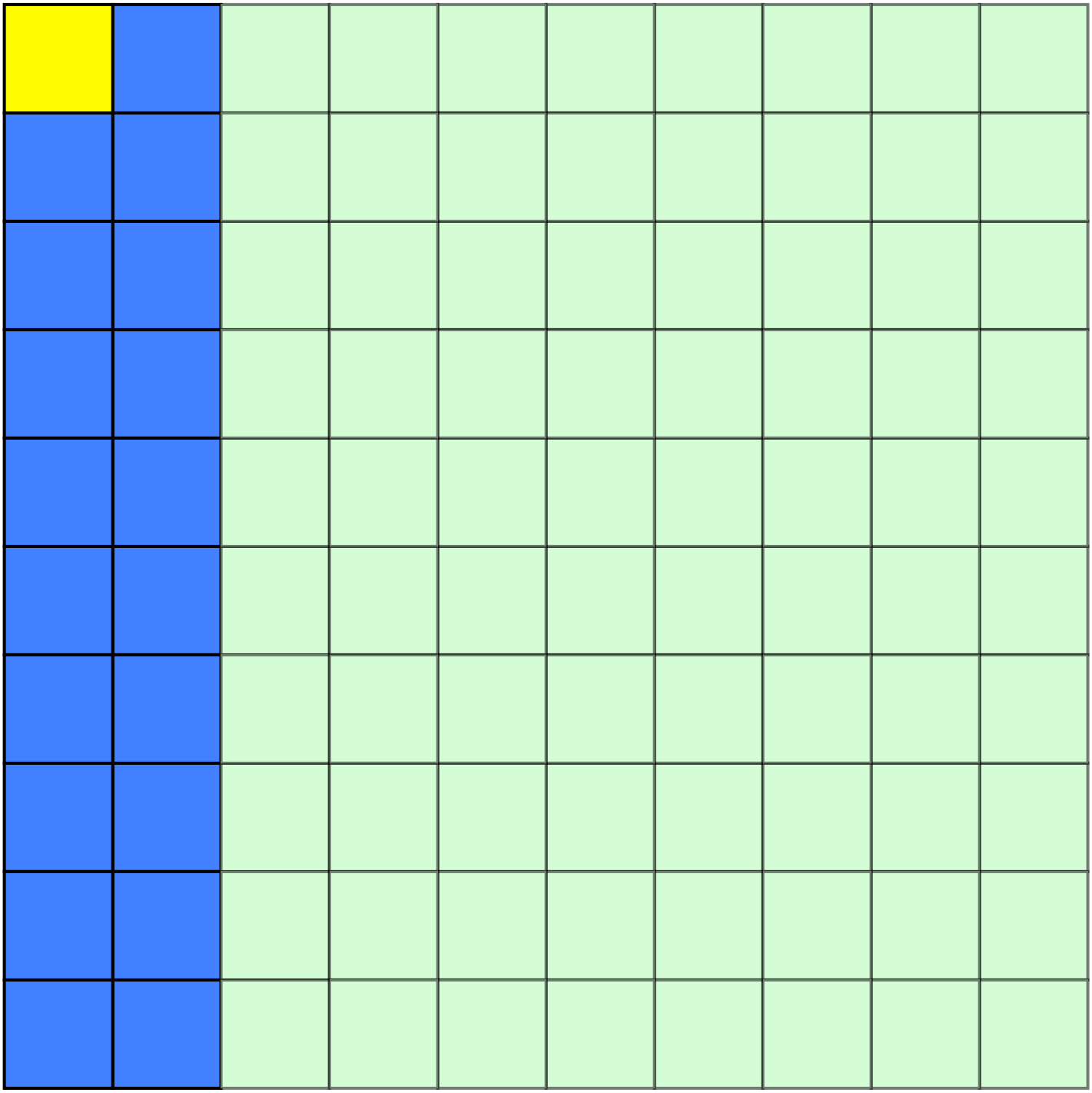


Unequal Distribution of Wealth in US

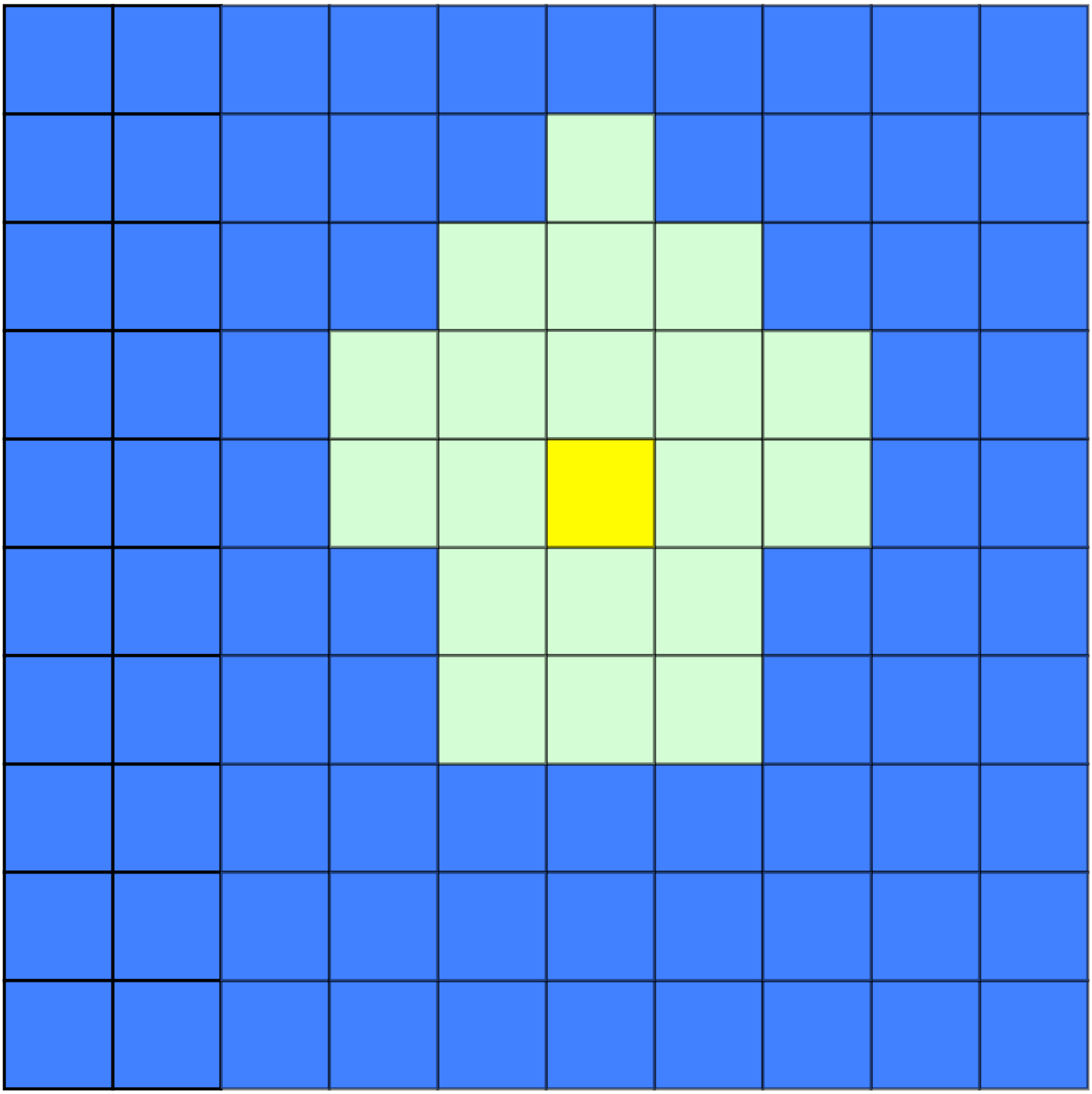
First divide the 10 x 10 greed into three regions by coloring each with different colors:



Unequal Distribution of Wealth in US
Example 1:



Unequal Distribution of Wealth in US
Example 2:



Mercator Projection and Peters Projection World Maps Activity

Because the world is round (or three dimensional), it is very hard to make it into a flat map (two dimensional) with accurate measures. It is like peeling the skin of an orange in one piece, and making it look flat. Maps can be made utilizing two main manners: keeping land mass as accurate as possible, but distorting the distances between and positions of land, and keeping the position the same, but distorting the size of the land. The world map below is based on a Mercator projection (around 1569, Germany), which is the map you are probably more familiar with. It was originally intended for nautical navigation purposes. It distorts the area or geographical size, but tries to keep mass as accurate as possible. This was the best approach for navigation, but is not considered a good representation of the size of countries. Explain how you found your answers to the questions below:

1. Can you find anywhere in the map where the sizes of countries are particularly distorted?
2. Using Mexico as your standard unit of measure, compare Mexico to other countries by saying "how many Mexicos fit into it (Mexico is 760,000 square miles)?" Make sure you compare specific pairs of places.
3. Write down your estimates of the size of each of the following regions:
   a. Mexico & Alaska b. Greenland & Africa c. India & Scandinavia (Sweden, Norway, Finland).

The world map below is based on Peters Projection (around 1974, Germany). This map shows a more accurate actual size of countries.

4. Compare the two maps. Which countries are biggest and which countries are the most powerful and wealthy?
5. How does Mexico and Alaska, and Greenland and Africa compare in size? Using estimation, answer if the Peters Map accurately shows the sizes of the countries/regions.
6. What did you learn in this project, about using math, about maps, about understanding the world?
7. Knowing we were all raised on the Mercator Map, how does that make you feel?
8. Why do you think we (including teachers) were always given the Mercator maps?
9. What questions does this raise in your mind and what more do you want to know?
10. In your opinion, is this in any way connected to anything else we've studied over the last two years?


ARCTIC OCEAN
ARCTIC OCEAN
NORTH PACIFIC OCEAN
NORTH ATLANTIC OCEAN
NORTH PACIFIC OCEAN
SOUTH PACIFIC OCEAN
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
SOUTHERN OCEAN
ANTARCTICA


MAP OF THE WORLD
PACIFIC
ATLANTIC
OCEAN
INDIAN
AUSTRALIA

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