Estimation Challenge- Estimating Steps
Grade 5, HOT Lesson #2
Problem Solving: Open-ended (CMT strand 25)

Pre-requisites
Basic arithmetic operations, developing measurement skills, map reading skills, basic
proportional reasoning, unit conversion

Lesson Objectives
Students will be able to:
- use estimation when finding an exact answer is impossible or unnecessary
- use estimation to predict results and to recognize when an answer is or is not reasonable
- develop strategies for estimating distances using mileage scales

Language Objectives
Students will be able to:
- use problem-specific vocabulary such as "destination"
- use academic language such as the terms exact, estimate, about, at least, and reasonable

Materials
Yard sticks, inch rulers
Maps – U.S. states
Assignment card
Recorder/resource manager role cards
Think cards
Calculators

Procedure
1. Post and read objectives aloud with students. Introduce activity.
2. Assign students pair roles – working with the partner sitting next to them is fine
3. (Model this first) Guide pairs to work together to measure length of each others steps –
   have each student walk three natural steps and plant their feet – partners should measure
   and record the distance for 1 step while they plant and hold – students should then round
   to the nearest foot
4. Whole-class:
   a. How many steps will it take them to walk one mile, or twice around the building?
      (get strategies first, then solve together w/ or w/out calculators)
   b. Is this something that we could count if we wanted to?
   c. What if they wanted to walk home? Would that be more or fewer steps and why?
      Is this something that they could count/measure if we wanted to?
   d. Pull up US map – have a student come up and show where North Carolina is.
   e. Do you think you could count your steps if you walked all the way to North
      Carolina? (explain scale so they can make an informed decision)
   f. Explain that if we cannot always count, we can make an estimate.
   g. Introduce/teach terms: reasonable, about, estimate

       h.   Work together to determine the distance to the capital of NC – draw a "walking" line + measure – use the scale to help

       i.   Explain remaining directions for their task

5. Resource managers come to get a map for their pair.
6. Each pair should choose and record a location on the map that is at least _____ miles away.
7. The pair should determine the number of miles to that destination, counting as though they were walking there (not as the crow flies)
8. Next, students should estimate the number of steps it will take to reach that destination:
9. Students will answer questions in pairs as follows:
   a. Explain how you estimated the number of footsteps to your destination?
   b. Do you think it is reasonable to measure in steps to California? Why or why not? What other measurements could you use to investigate that might be more realistic?
10. Whole class discussion of these questions
11. Reflection Questions (on worksheet)

Enrichment questions/future MapMath game
1. I flew to Sacramento, CA then walked to Helena, MT. About how many steps did I take to reach my destination?
2. I headed NW from Hartford, CT and walked 792,000 steps. Where might I have ended up? (Augusta, ME)
3. I flew to Denver, CO and walked SE 1,544,400 steps. Where might I be now? (OK City)

Other good ideas
A friend suggested that each time they do a lap in gym, they put a straw/paperclip, etc. in a bucket. At the end of each week, we count these up and figure out the distance this represents. Then plot this on a map to see how long it takes us to "cross the country." This sounds like fun!