2000 Calories

Source: Robert Kaplinky

Goal: Understand rational equations and inequalities involved in calorie counting

Standards: 6.EE.B.7, 6.EE.B.8

Set up: Bring a couple of food packaging labels (with nutrition info listed). Also, have a list of several (10 or more?) foods as well as how many of the item are needed to achieve 2000 calories. For example, a snickers bar has 245 calories which we will round to 250, so 8 snickers bars gives 2000 calories.

In class: Start by showing the students the food packaging labels, highlighting to part of the label indicating the "standard" number of calories is 2000 per day. I don't know what 6th graders know about calories, but you may need to explain to them that a calorie is a measure of the energy in food. If you consume too many calories for your needs, the body stores the excess as fat. If you don't consume enough calories for your needs, the body uses the fat reserves.

After they seem convinced that 2000 is indeed standard, break the students into small groups and assign each group a particular food. Each group should be provided information about their specific food like "The total amount of calories in 8 snickers bars is 2000".

(Note that 8 is a factor of 2000, so the total calorie count for a snickers bar will work out to be an integer. The complete factor list for 2000 is 1,2,4,5, 8,10, 16, 20, 25, 40, 50, 80, 100, 125, 200, 250, 400, 500, 1000, 2000 so any of these numbers makes the calories count per item an integer. You could, for example, give a more advanced group a non-factor. Something like "the total amount of calories in 22 apples is 2000.")

Questions you can now ask:

Question 1. How many calories are in one of your item? (2000/8 = 250)

Question 2: How many calories are in three snickers bars? (250\*3 = 750)

Question 3: If you only wanted to eat 1750 calories today, how many snickers bars could you have? (1750 = 250x, so x = 1750/250 = 7).

Question 4: If you only wanted to eat 1400 calories today, what is the largest number of whole snicker bars you could have? (1400 = 250x, so x = 1400/250 = 28/5 = 5 and 3/5, so you could have 5 whole snicker bars)

Question 5: If you wanted to have at most 1000 calories come from snickers bars, how many could you eat? (250 x <=1000, so x <= 1000/250, so x <=4. Note that x >=0 automatically.

Question 6: Suppose I want to have 1000 calories in snickers bars and I have already eaten 1. How many more should I eat? (1000 = 250(x+1), so 4 = x+1, so 3 = x)

Now, have your groups trade foods, preferably with a group whose food requires a different number of items to make 2000 calories. For purposes of this plan, I am going to assume the other food is hot dogs, with 20 hotdogs making up 2000 calories.

Question 7: Suppose you have already eaten a snickers bar for lunch and you want to eat at most 1000 calories for lunch. How many whole hot dogs can you have? (First, each hotdog is 2000/20 = 100 calories. Then 250(1) + x\*100 <= 1000, so x\*100 <= 750 so x <= 7.5. So you can have any number of hot dogs between 0 and 7.)

Question 8: How does the answer to question 7 change if we don't require the hotdogs be whole?

All along this exercise, you can be asking leading questions. Several prolific math ed bloggers recommend questions like "What is an answer you know is too large? What is one which you know is too small? What's your best guess?". According to them, these more open ended questions are better at encourage student responses.

You can also be asking question like "How do you know your answer to question 6 is right?" (with a potential answer being "If have already eaten one, I have already consumed 250 calories. If I eat three more, that will be 750 more calories. Since 250 + 750 = 1000, 3 must be correct.)