You are planning a birthday party for your niece and need to make at least 4 gallons of Kool-Aid, which you would like to cool down to 32 ^{o}F (0 ^{o}C) before the party begins. Unfortunately, your refrigerator is already so full of treats that you know there will be no room for the Kool-Aid. So, with a sudden flash of insight, you decide to start with 4 gallons of the coldest tap water you can get, which you determine is 50 ^{o}F (10 ^{o}C), and then cool it down with a 1-quart chunk of ice you already have in your freezer. The owner's manual for your refrigerator states that when the freezer setting is on high, the temperature is -20 ^{o}C. *(To solve this you may need to consult your text or discussion group leader for some additional basic quantities once you identify them).*

a) will your plan work?

b) if not, what is the final temperature achieved?