QUIZ: THERMAL EXPANSION

Answer each of the following questions using your clicker. You must use your clicker; papers will not be graded by hand. Please do not mark this quiz paper. Each question is worth three points.

Food Item	Food Mass (g)	Water Mass m_W (g)	Initial Temp T_i (°C)	Final Temp T_f (°C)	Specific Heat c_W (cal/g·°C)
1	0.8	100	18	37	1
2	1.0	100	20	41	1

Food item #1 comes from a package with a nutrition label indicating 110 calories per 28-gram serving.

1. Calculate the amount of heat transferred (calories) to the water by burning food item #1.
   A) 1.52 cal B) 1.90 cal C) 2.38 cal D) 19 cal E) 1900 cal
2. Calculate the total number of food calories (kCal, or Calories) added to the water by burning food item #1.
   A) 1.52 cal B) 1.90 cal C) 2.38 cal D) 19 cal E) 1900 cal
3. Calculate the number of food calories per gram (Cal/g) in food item #1.
   A) 1.52 cal B) 1.90 cal C) 2.38 cal D) 19 cal E) 1900 cal
4. Using the nutrition information, find the food calories/gram (Cal/g) actually contained in item #1.
   A) 1.10 Cal/g B) 3.92 Cal/g C) 28 Cal/g D) 110 Cal/g E) 3080 Cal/g
5. Find the % error in the experimental value of the Cal/g of item #1.
   A) 0% B) 39% C) 51% D) 61% E) 65%
6. True or false: The data above resemble the data taken in the lab, but the food used above was probably not cheese puffs.
7. True or false: Item #1 is a very high−fat food.
8. Compare the number of food calories per gram contained by food item #2 to item #1.
   A) Item #1 has slightly fewer Cal/g than item #2, so they cannot both be the same type of food.
   B) Item #2 has slightly fewer Cal/g than item #1, so they cannot both be the same type of food.
   C) Item #1 has slightly fewer Cal/g than item #2, but they are probably both the same type of food.
   D) Item #2 has slightly fewer Cal/g than item #1, but they are probably both the same type of food.
9. True or false: A food Calorie is a larger unit of energy than a calorie of heat.
10. True or false: If you had skewered and burned a chunk of broccoli, it would heat the water in the can more than if you had skewered and burned a chunk of cheddar cheese having the same mass (talk about stinky and messy!)
11. True or false: The value you calculated for the Cal/g of your cheese puffs is lower than the package data because the experimental procedure did not adequately control the transfer of heat: energy was lost to the can and surrounding air.
12. True or false: The value you calculated for the Cal/g of your cheese puffs is lower than the package data because the cheese puffs did not burn completely: some energy was retained by the puff (and dripped oil did not burn, either), not transferred to the water.
13. True or false: The value that you calculated for the Cal/g of your cheese puffs is lower than the package data because the food industry makes a routine practice of over−reporting the Calorie content of processed snack food items.