LAB QUIZ: RADIANT HEATING

The data shown on the table were collected using the same methods as you used in lab. The heat lamp was left on for 20 minutes, then switched off for the remainder of the time.

TIME (MIN)	TEMPERATURE (°C)			TIME (MIN)	TEMPERATURE (°C)		
	BLACK	WHITE	SILVER		BLACK	WHITE	SILVER
0	26.9	26.9	26.9	20	38.0	36.0	31.1
5	29.6	29.0	27.9	25	37.5	35.8	31.2
10	32.7	31.6	29.0	30	36.5	35.0	30.9
15	35.5	33.9	30.1	35	35.4	34.5	30.7

1. Examine the data and predict which line will have the **greatest** (steepest) slope when you plot T vs t for each bottle.
   A) Black bottle. B) White bottle. C) Silver bottle.

2. When you graph the above data for the **white bottle**, the slope of this line is closest to which value? (Remember that slope = rise/run, or $\Delta T/\Delta t$)
   A) 0.555 °C/min
   B) 0.455 °C/min
   C) 0.210 °C/min
   D) No slope can be calculated, since the data won't be a line.
   E) The data *will* be a line, but the slope still cannot be determined with just a calculator.

3. According to *this* data, which can will take the greatest amount of time to increase its temperature by 5°C?
   A) Black bottle. B) White bottle. C) Silver bottle.

For each can, compare the temperature at t = 20 min to the temperature at t = 35 min.

4. True or false: The bottle with the lowest temperature at t = 35 min experienced the greatest decrease in temperature.
5. True or false: The can with the lowest temperature at t = 35 min lost the most heat.
6. For the silver bottle, the temperature rose from 26.9° to 31.1°, or 4.2°C in 20 minutes. When the lamp is switched off, how long will it take for the bottle to return to its initial temperature of 26.9°C?
   A) Zero. When the lamp is switched off, the bottle will instantly return to its original temperature.
   B) Less than 20 minutes. The bottles will release heat much more quickly than they absorbed it.
   C) Exactly 20 minutes. However long it spent heating up, it will spend that much time cooling back down.
   D) More than 20 minutes. The rate of cooling for the bottles is much slower than the rate of heat absorption.
   E) Infinity (and beyond). The bottle will never quite return to its original temperature, no matter how long it sits.
7. For this data, compare the cooling rates in general to the rates at which the bottles absorbed energy.
   A) The slopes of the cooling curves are always less than the slopes of the absorption curves.
   B) The slopes of the cooling curves are always greater than the slopes of the absorption curves.
   C) The slope is the same, regardless of whether the bottle is heating up or cooling back down.
8. Examine the data for the **black bottle**, and predict the temperature at time **t = 40 min**.
   A) 36.4°C
   B) 35.4°C
   C) 34.4°C
   D) 33.4°C
   E) 32.4°C

9. To stay cool as you mow the lawn on a sunny day, you should select
   A) a white t-shirt.
   B) a gray t-shirt.
   C) a black t-shirt.
   D) any color. Doesn't matter.

10. You are designing an energy efficient "green home." To minimize the cost of air conditioning in the summer, what would be your best design choice?
    A) Dark black asphalt roofing shingles.
    B) Dark gray metal roof.
    C) Light tan cedar roofing shakes.
    D) Whole-house glass ceiling!