

Instructions (shown before students start the test)

Select the answer from the options chosen. Some questions may ask for more than one answer, in which case you can choose multiple responses.

Introduction (shown after students start the test)

This is a sample test, just to get used to what a real one is like. The real test will likely have more questions, but in similar areas (LEDs, sensors, calibration, micro-computers and programming).

1. (1.00 pts) The color a basic (single color) LED emits is caused by:

- A) The color of the semiconductors used in construction
- B) The amount of voltage applied
- C) The type of semiconductor used in construction
- D) The color of the outer shell of the LED

2. (1.00 pts) 1. Which of the following is NOT true of LED's:

- A) They only emit visible light
- B) They can be turned on and off very quickly
- C) Material components are cheap
- D) They have a long service life

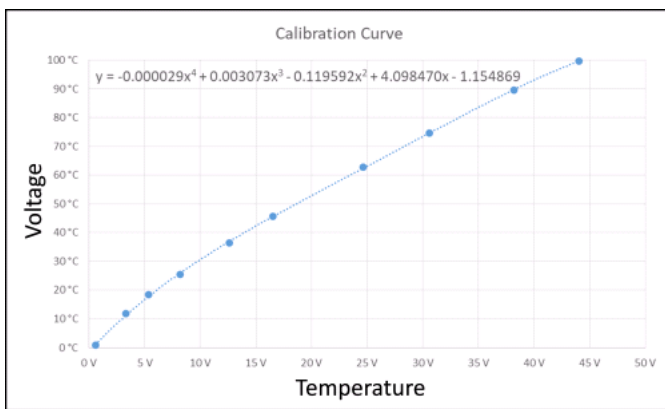
3. (1.00 pts) 1. Modern typical remote controls use LEDs that emit light in the Ultraviolet range

- True
- False

4. (1.00 pts) An LED takes 20 mA of current and the voltage drop across the LED is 2 V. How much resistance does the LED provide?

- A) a. 200 ohms
- B) b. 100 ohms
- C) c. 40 ohms
- D) d. 10 ohms

5. (1.00 pts) In the calibration curve below, are the axes labeled correctly?



- A) YES
- B) NO

6. (1.00 pts) The single line of code shown below is supposed to convert from voltage to temperature using the equation shown in the question above. What's wrong?

Temp = -0.000029*Volt^4 + 0.003073^Volt^3 - 0.119592*Volt^2 + 4.09847*Volt - 1.154869

- A) One of the coefficients is wrong
- B) Too many coefficients
- C) Uses a power operator (^) instead of multiply operator (*)
- D) Doesn't have a zero intercept
- E) Nothing's wrong – it's fine

7. (1.00 pts) What is the slope of the calibration curve if only the following two points are used?

Voltage: 5 V Temperature: 20° C

Voltage: 8 V Temperature: 41° C

- A) 3 °C/V
- B) 21 °C/V
- C) 7 °C/V
- D) 3 V/°C

8. (3.00 pts) Which of the following devices can you use for measuring temperature in this competition? (Note: May be more than one)

(Mark ALL correct answers)

- A) Mercury thermometer
- B) Thermistor
- C) Digital Thermometer
- D) Thermocouple
- E) Integrated Circuit (IC) Temperature Sensor

9. (1.00 pts) When using a thermocouple to measure water temperature, as the water temperature increases, the magnitude of the measured voltage always increases as we

- True False

10. (1.00 pts) A thermocouple device can identify temperatures because of:

- A) A voltage difference caused by dissimilar metals in a circuit
- B) A change in the resistance of the substance being measured
- C) The varying speed of the current flow
- D) The changing magnetic field

11. (1.00 pts) The ability to light up different LEDs based on temperature / voltage is driven by:

- A) Hardware switches
- B) Software programming
- C) Dissimilar metals
- D) All of the above

12. (1.00 pts)

Your thermocouple uses a room temperature reference junction, but the temperature in the room goes up while you're measuring the temperature of a hot water bath. What happens to the voltage produced by the thermocouple?

- A) It becomes larger in magnitude
- B) It doesn't change
- C) It becomes zero
- D) It becomes smaller in magnitude

13. (1.00 pts) Which device works on resistance changes with temperature?

- A) Thermocouple
- B) IC Temperature Sensor
- C) Mercury Thermometer
- D) None of the above

14. (1.00 pts) If an LED is set to operate with an applied voltage of 5 V, what is likely to happen if it is hooked up with 500 volts?

- A) It will glow steadily brighter
- B) It will glow steadily with a different color
- C) It will burn out
- D) It will glow steadily with the same color

15. (1.00 pts) What does PTC stand for?

- A) Parametric Temperature Change
- B) Positive Temperature Coefficient
- C) Positive Thermo-Couple
- D) Pre-Temperature Correction

DON'T WORRY ABOUT YOUR SCORE!!! Like I said, it's just a practice test. Focus on getting the project right, and learning a bit about LEDs, thermocouples, thermistors, IC temperature sensors, calibration curves, Arduino's or Pi's, and programming.