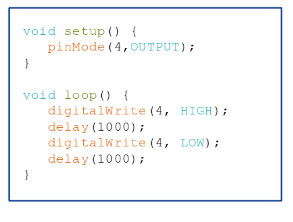
**Section 10 Questions**

1. A \_\_\_\_\_\_\_\_\_\_\_ is a semiconductor device that can be used as an “electrical switch” or as an amplifier.
   1. Resistor
   2. Transistor
   3. LED
   4. Relay
   5. Capacitor
   6. Inductors
2. A transistor will get very hot if connected incorrectly.
   1. True
   2. False
3. What do the three prongs on a transistor correspond do?
   1. Input, output, ground
   2. Analog, digital, ground
   3. 3V, 5V, ground
   4. Collector, base, emitter
   5. Input, base, output
   6. Collector, base, output
4. A transistor is a semiconductor device that can be used as an “electrical switch” or as an amplifier.
   1. True
   2. False
5. An LED is a semiconductor that can be used as an “electrical switch” or as an amplifier.
   1. True
   2. False
6. What is the transistor doing in the following sketch?



1. Switching an LED on
2. Switching an LED off
3. Switching an LED on and off
4. Nothing, there is an error in the code.

7. Transistors can be used to have a small current toggle a larger one.

1. True
2. False

8. Capacitors can be used to have a small current toggle a larger one.

1. True
2. False

9. Transistors can be found in most electronic devices.

1. True
2. False
3. Which of the following is an advantage of using transistors over mechanical switches?
4. Large
5. Works slowly
6. Expensive
7. Can be controlled electrically
8. Rare
9. None of the above

11. Transistors can be found in devices such as your phone and multimeter.

1. True
2. False
3. \_\_\_\_\_\_\_\_\_\_\_\_ are materials that can either be a conductor or an insulator depending on the conditions.
4. Electromagnets
5. Relays
6. Switches
7. Resistors
8. LEDs
9. Semiconductors

13. What is the most common semiconductor material?

1. Carbon
2. Phosphorus
3. Magnesium
4. Silicon
5. Barium
6. Manganese

14. Silicon can be easily bonded with other atoms to make it conduct or insulate when desired using a process called:

1. Soldering
2. Tinning
3. Doping
4. Magnetizing
5. Shearing
6. Braking

15. When silicon is doped with phosphorus it yields an extra electron which encourages conduction. This makes the bond more negative and is called \_\_\_\_\_\_\_ doping.

1. A-Type
2. D-Type
3. K-Type
4. N-Type
5. P-Type
6. Y-Type

16. When silicon is doped with boron it yields a hole or missing electron which encourages conduction. This makes the bond more positive and is called \_\_\_\_\_\_\_\_\_ doping.

1. A-Type
2. D-Type
3. K-Type
4. N-Type
5. P-Type
6. Y-Type

17. Transistors use both N-Type and P-Type as semiconductors.

1. True
2. False
3. \_\_\_\_\_\_\_\_\_\_\_\_ are switches that are turned on and off using electricity.
   1. Transistors
   2. Resistors
   3. Capacitors
   4. Relays
   5. Inductors
   6. LEDs
4. Relays are switches that are turned on and off using electricity.
   1. True
   2. False
5. Transistors are switches that are turned on and off using electricity.
   1. True
   2. False
6. Relays can be used in many different ways such as in an automobile or refrigerator.
   1. True
   2. False
7. \_\_\_\_\_\_\_\_\_\_\_\_ are temporary magnets created by sending current through metal that is coiled around iron to induce a magnetic field.
   1. Semiconductors
   2. Transistors
   3. Relays
   4. Electromagnets
   5. Resistors
   6. LEDs
8. Voltage that must be applied across the coil leads to open or close the contacts is called the:
   1. Coil voltage
   2. Coil current
   3. Coil transfer
   4. Coil coefficient
   5. Coil charge
   6. Coil output
9. \_\_\_\_\_\_\_\_\_ is the amount of current drawn by the coil; this much current is required to close the contacts.
   1. Coil voltage
   2. Coil current
   3. Coil transfer
   4. Coil coefficient
   5. Coil charge
   6. Coil output
10. The amount of current that can pass through the contact leads without damaging the relay is called the:
    1. Contact voltage
    2. Coil voltage
    3. Contact current
    4. Coil current
    5. Contact output
    6. Contact coefficient
11. A relay can either be open or closed by default.
    1. True
    2. False
12. In a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ relay, the contacts are open when no current is passed through the coil and passing a current through the coil causes the contacts to close.
    1. Normally open
    2. Normally closed
    3. Consistently open
    4. Consistently closed
    5. Mainly open
    6. Mainly closed
13. In a \_\_\_\_\_\_\_\_\_\_\_\_\_ relay, the contacts are closed when no current is passed through the coil and passing a current through the coil causes the contacts to open.
    1. Normally open
    2. Normally closed
    3. Consistently open
    4. Consistently closed
    5. Mainly open
    6. Mainly closed
14. Using \_\_\_\_\_\_\_\_\_ electronically switches on and off the current that passes through a relay which switches off a larger current passing through a device.
    1. LEDs
    2. Diodes
    3. Capacitors
    4. Transistors
    5. Resistors
    6. Momentary switches
15. When setting up your Sous Vide circuit, why did you need both a transistor and a relay?
    1. So a large power source could be used.
    2. To have a more sophisticated circuit.
    3. So the heater could be controlled electronically.
    4. So the LED would not burn out.
    5. Both a and c
    6. All of the above
16. Diodes allow current to flow in \_\_\_\_\_\_\_\_\_ direction(s).
    1. Two
    2. Three
    3. Only one
    4. When activated in one
    5. When activated two directions
    6. When activated three directions
17. Why are flyback diodes used in a circuit?
    1. To go back through the circuit to create a larger current.
    2. To stop the flow of electrons to fix an issue in the circuitry.
    3. Relays will not work without them.
    4. To help protect circuit elements.
    5. Both b and c
    6. None of the above
18. Diodes have a specific direction.
    1. True
    2. False
19. Diodes do not have a specific direction.
    1. True
    2. False
20. Diodes allow current to flow in only one direction.
    1. True
    2. False
21. Diodes allow current to flow in multiple directions.
    1. True
    2. False
22. The silver stripe on a diode should be pointed towards:
    1. Positive
    2. Negative
23. The offset leg on your SPST relay should be connected to:
    1. Positive
    2. Negative
24. What is a Potentiometer?
    1. An electrical component with set resistance
    2. An electrical component that stores charge of varying amounts
    3. An electrical component used to vary resistance
    4. An electrical component that produces light
    5. A manual relay
    6. None of the above
25. Potentiometers are electrical components that are used to vary \_\_\_\_\_\_\_\_\_\_.
    1. Capacitance
    2. Power
    3. Current
    4. Voltage
    5. Resistance
    6. Efficiency
26. What component on the potentiometer is used to adjust the resistance setting?
    1. Terminal
    2. Dial
    3. Semiconductor
    4. Relay
    5. Diode
    6. Resistor
27. How many terminals does the potentiometer have?
    1. 2
    2. 3
    3. 4
    4. 6
    5. 8
    6. None of the above
28. What is the middle terminal on the potentiometer called?
    1. Wiper
    2. Sweeper
    3. Breaker
    4. Jumper
    5. Typer
    6. None of the above
29. Resistance of a potentiometer is measured with respect to the \_\_\_\_\_\_\_\_\_ and either one of the \_\_\_\_\_\_\_\_ terminals.
    1. Sweeper, end
    2. Sweeper, start
    3. Sweeper, final
    4. Wiper, start
    5. Wiper, final
    6. None of the above
30. To connect the potentiometer as a variable resistor, connect the wiper to only one end.
    1. True
    2. False
31. To connect the potentiometer as a variable resistor, connect the wiper to both ends.
    1. True
    2. False
32. The closer the wiper is to the end terminal it is wired with, on a potentiometer, the \_\_\_\_\_\_\_\_ resistance.
    1. Greater
    2. Less
    3. Faster
    4. The resistance is equivalent
    5. All of the above
    6. None of the above
33. What is the maximum resistance of the potentiometer?
    1. 1Ω
    2. 10Ω
    3. 100Ω
    4. 1kΩ
    5. 10kΩ
    6. 100kΩ
34. What is the minimum resistance for the potentiometer?
    1. 1Ω
    2. 10Ω
    3. 100Ω
    4. 1kΩ
    5. 10kΩ
    6. None of the above
35. What electronic component is represented by the symbolic representation below?



* 1. Resistor
  2. LED
  3. Capacitor
  4. Potentiometer
  5. transistor
  6. Diode

1. What is a voltage divider circuit?
   1. Uses three resistors in series to divide the larger input voltage into smaller voltages
   2. Uses two resistors in series to divide the larger input voltage into smaller voltages
   3. Uses three resistors in parallel to divide the larger input voltage into smaller voltages
   4. Uses three resistors in parallel to divide the larger input voltage into smaller voltages
   5. Uses three resistors in series and parallel to divide the larger input voltage into smaller voltages
   6. None of the above
2. What type of values are read in from the potentiometer?
   1. Decimal
   2. Large
   3. Small
   4. Analog
   5. Digital
   6. Degrees
3. The range of values the potentiometer can read are from:
   1. 0 to 5
   2. 0 to 5000
   3. 5 to 1023
   4. 0 to 1023
   5. 5 to 50000
   6. 1023 to 5000
4. How can you relate the analog values of a potentiometer to temperature values?

Use an inverted calibration equation like:

Temperature = 0.2063 \* Analog Value - 26.428

1. What is an offset?
   1. How far away the dial of a potentiometer is from the setpoint.
   2. A constant value that shifts the starting point of a given system.
   3. The distance from the old setpoint to the new setpoint.
   4. A constant value that shifts the end point of a given system.
   5. All of the above
   6. None of the above
2. How can you make the dial value of a potentiometer smaller?
   1. Dividing it by a fractional constant
   2. Subtracting it by a constant
   3. Subtracting it by a fractional constant
   4. Multiplying it by a constant
   5. Multiplying it by a fractional constant
   6. All of the above
3. What is Gain? (circle all that apply)
   1. The constant value multiplied by the dial value.
   2. A proportionality constant that scales the output value of a system.
   3. The constant value divided by the dial value.
   4. The additional amount needed to reach the setpoint range.
   5. A proportionality constant that scales the input value of a system.
   6. The distance you passed the setpoint range by.
4. The constant value multiplied by the dial value is called \_\_\_\_\_.
   1. Offset
   2. Setpoint
   3. Growth
   4. Oversit
   5. Gain
   6. Dial
5. \_\_\_\_\_\_ is a proportionality constant that scales the input value of a system.
   1. Oversit
   2. Dial
   3. Gain
   4. Setpoint
   5. Growth
   6. Offset
6. The constant value multiplied by the dial value is called gain.
   1. True
   2. False
7. The constant value divided by the dial value is called gain.
   1. True
   2. False
8. Gain is a proportionality constant that scales the input value of a system.
   1. True
   2. False
9. Main is a proportionality constant that scales the input value of a system.
   1. True
   2. False
10. Growth is proportionality constant that scales the input value of a system.
    1. True
    2. False
11. Gain is a proportionality constant that scales the output value of a system.
    1. True
    2. False

1. The dial of your potentiometer is at 600. If you have a setpoint Range of 350 to 500 and an offset value of 150, which of the values below must be your gain to be within the setpoint?
   1. .1 setpoint = Gain \* Dial + Offset = 210
   2. .15 =240
   3. .2 =270
   4. .25 =300
   5. .3 =330
   6. .4 =390
   7. .6 =510
2. The dial of your potentiometer is at 775. If you have a setpoint Range of 550 to 650 and an offset value of 230, which of the values below must be your gain to be within the setpoint?
   1. .15 setpoint = 346.25
   2. .25 setpoint = 423.75
   3. .35 setpoint = 501.25
   4. .45 setpoint = 578.75
   5. .55 setpoint = 656.25
   6. .65 setpoint = 733.75