Questions:

1. What is a pullup resistor? Why might you want to wire up a pullup resistor to an input pin?

2. What does it mean to debounce a button? Why is it useful and how can it be implemented?

3. If a circuit has 2 resistors in series each with a resistance of 5 ohms what is the resistance of the circuit?

A. 2.5 ohms
B. 1.25 ohms
C. 10 ohms
D. 5 ohms
E. 1 ohm

4. Which of the following pin(s) on the Arduino Nano are directly responsible for serial communication?

a) A2
b) RX
c) 4
d) VCC
e) TX

5. In a voltage divider circuit, the Vin is 10 volts, R1 is 20 ohms and R2 is 5 ohms, given this what is the Vout?

a) 1 volt
b) 2 volts
c) 5 volts
d) 10 volts
e) 15 volts

6. In a circuit if you want to reduce voltage from 9v to 5v what component would you use?

1) Capacitor
2) Transistor
3) Switch
4) Voltage Regulator
5) Switch

7. Which of the following components are polarized?
    f) Electrolytic capacitor
    g) Resistor
    h) Push button
    i) LED
    j) Push button

Answers:

1. A pullup resistor is a circuit that is connected to an input pin and switch where when the switch is open the input pin is driven high and when the switch is closed the pin is driven low. This ensures that there's a stable voltage level on the signal line when no active device is driving it.

   Wiring a pullup resistor to an input pin is beneficial because it prevents the input pin from being in an undefined floating state.This is significant because this can lead to unpredictable and false readings from the pin.

   Overall, pullup resistors maintain the integrity of the signal and prevent electrical noise in the circuit.

2. Debouncing a button is the process of filtering out the electrical noise that occurs when a button is pressed and/or released. When a button is pressed, it bounces back and forth rapidly due to the internal springs. This causes the circuit to open and close in rapid succession leading to oscillations in the electrical signal.

   By debouncing a button you can reliably determine when a button has been pressed and released despite the electrical noise. You can achieve this by implementing a delay between reads to filter the bounces.

3. 2.5 ohms
4. RX and TX
5. 2 Volts
6. Voltage Regulator
7. Electrolytic Capacitor and LED