

## Exercise 9: Temperature sensor

### Equipment

For this exercise you will need:

- 1 x Arduino Uno
- 1 x TMP 36 GZ *or* LM 35 DZ
- Wires

Messy code? Use **ctrl+T**

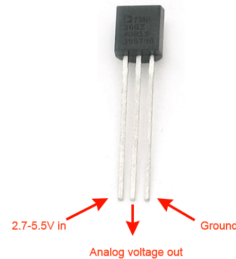


Figure 1: **Pin Layout:** the flat side of the "head" is turned towards you

### Setup

The microcontroller has a circuit inside called an analog-to-digital converter (ADC), you saw in the last exercise how voltage is represented as a 10-bit binary value.

- The pin layout of the two sensors is the same. See fig. 1
- Connect the output of the sensor to the analog input (A0).

### Questions & Exercises

**9a:** Look at the datasheet for your specific sensor (google it). What is the conversion from the A0 input to voltage? Formulate it as a singular expression.

**9b:** What would the output of this code be?

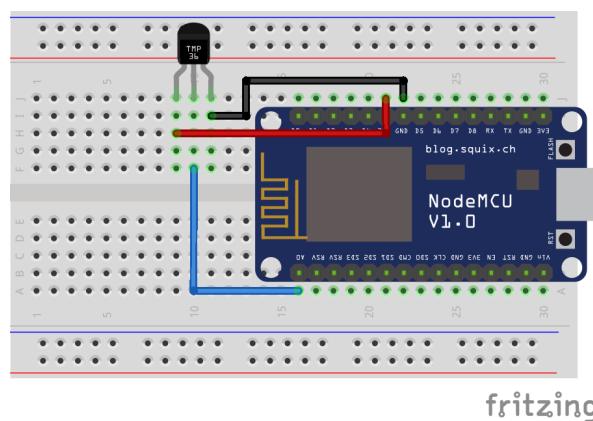
```
char c;
for (int i = 0; i < 4; i++) {
  c = '0' + i*2;
  Serial.print(c);
  Serial.write(176);
}
```

**9c:** What is the difference between `print()` and `write()`

**9d:** Read the voltage on A0.

**9e:** Convert the voltage into  $^{\circ}C$  and print it to the serial monitor. (You have to print the  $^{\circ}$  character, very important! Temperatures are not measured in Coulombs. Maybe [this](#) will help)

**9f:** Try heating and cooling the sensor. Is it working?



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### **Hint**

The conversion will depend on a couple factors; do you need to account for negative values? What is the max voltage input? What is the analog value associated with said input? What is the sensitivity of the sensor?