To create a weather station using the materials you have, follow these steps:

### Components Used:

1. \*\*Arduino Nano\*\*: Main controller for the weather station.

2. \*\*DHT22 Temperature and Humidity Sensor\*\*: Measures temperature and humidity.

3. \*\*1.8 TFT LCD Display Module\*\*: Displays temperature, humidity, and other readings.

4. \*\*SD Card Module\*\*: Stores data logs.

5. \*\*Real-Time Clock (RTC) Module\*\*: Keeps track of the time for data logging.

6. \*\*Jumper Wires and Breadboard\*\*: For making connections.

7. \*\*Resistors\*\*: As needed for the circuit.

8. \*\*External Power Supply or Battery Pack\*\*: Powers the entire setup.

### Additional Components (Optional):

- \*\*Solar Panel\*\*: Powers the station using solar energy.

- \*\*Water Sensor\*\*: Measures rain or detects water presence.

- \*\*MQ-5 Sensor\*\*: Detects gas levels (not typically used in a basic weather station but can be included for air quality monitoring).

- \*\*Speaker\*\*: Can be used for alarms or notifications.

- \*\*Photo Electric Barrier\*\*: Could be used for additional sensing, such as detecting if an object passes through.

- \*\*Motor\*\*: Not typically required for a weather station.

### Wiring and Assembly:

1. \*\*DHT22 Sensor\*\*:

- Connect VCC to 5V on Arduino.

- Connect GND to GND on Arduino.

- Connect DATA to a digital pin (e.g., D2).

2. \*\*RTC Module\*\*:

- Connect VCC to 5V.

- Connect GND to GND.

- Connect SDA to A4.

- Connect SCL to A5.

3. \*\*1.8 TFT LCD Display\*\*:

- Connect VCC to 3.3V (check the datasheet for exact voltage requirements).

- Connect GND to GND.

- Connect SCL to D13.

- Connect SDA to D11.

- Connect RES to D8.

- Connect DC to D9.

- Connect CS to D10.

4. \*\*SD Card Module\*\*:

- Connect VCC to 3.3V.

- Connect GND to GND.

- Connect MISO to D12.

- Connect MOSI to D11.

- Connect SCK to D13.

- Connect CS to D4.

### Code:

```cpp

#include <DHT.h>

#include <SPI.h>

#include <SD.h>

#include <Wire.h>

#include <RTClib.h>

#include <Adafruit\_GFX.h>

#include <Adafruit\_ST7735.h>

// Pins for TFT display

#define TFT\_CS 10

#define TFT\_RST 8

#define TFT\_DC 9

Adafruit\_ST7735 tft = Adafruit\_ST7735(TFT\_CS, TFT\_DC, TFT\_RST);

// DHT22

#define DHTPIN 2

#define DHTTYPE DHT22

DHT dht(DHTPIN, DHTTYPE);

// RTC

RTC\_DS1307 rtc;

// SD Card

const int chipSelect = 4;

void setup() {

// Initialize serial communication

Serial.begin(9600);

// Initialize DHT22 sensor

dht.begin();

// Initialize TFT display

tft.initR(INITR\_BLACKTAB);

tft.setRotation(1);

tft.fillScreen(ST7735\_BLACK);

// Initialize RTC

if (!rtc.begin()) {

Serial.println("Couldn't find RTC");

while (1);

}

if (!rtc.isrunning()) {

Serial.println("RTC is NOT running!");

// Following line sets the RTC to the date & time this sketch was compiled

rtc.adjust(DateTime(F(\_\_DATE\_\_), F(\_\_TIME\_\_)));

}

// Initialize SD card

if (!SD.begin(chipSelect)) {

Serial.println("Card failed, or not present");

while (1);

}

Serial.println("card initialized.");

}

void loop() {

// Read temperature and humidity

float h = dht.readHumidity();

float t = dht.readTemperature();

// Get time from RTC

DateTime now = rtc.now();

// Display on TFT

tft.fillScreen(ST7735\_BLACK);

tft.setCursor(0, 0);

tft.setTextColor(ST7735\_WHITE);

tft.setTextSize(1);

tft.print("Time: ");

tft.print(now.hour(), DEC);

tft.print(':');

tft.print(now.minute(), DEC);

tft.print(':');

tft.print(now.second(), DEC);

tft.print(" Date: ");

tft.print(now.day(), DEC);

tft.print('/');

tft.print(now.month(), DEC);

tft.print('/');

tft.print(now.year(), DEC);

tft.setCursor(0, 30);

tft.print("Temp: ");

tft.print(t);

tft.print(" \*C");

tft.setCursor(0, 50);

tft.print("Hum: ");

tft.print(h);

tft.print(" %");

// Log data to SD card

File dataFile = SD.open("datalog.txt", FILE\_WRITE);

if (dataFile) {

dataFile.print(now.timestamp(DateTime::TIMESTAMP\_FULL));

dataFile.print(", ");

dataFile.print(t);

dataFile.print(" \*C, ");

dataFile.print(h);

dataFile.println(" %");

dataFile.close();

} else {

Serial.println("error opening datalog.txt");

}

delay(2000);

}

```

### Steps to Follow:

1. \*\*Setup Hardware\*\*: Assemble the components on a breadboard using jumper wires as per the connections mentioned.

2. \*\*Install Libraries\*\*: Ensure you have the necessary libraries installed in the Arduino IDE (`DHT`, `Adafruit\_GFX`, `Adafruit\_ST7735`, `RTClib`, and `SD`).

3. \*\*Upload Code\*\*: Upload the provided code to your Arduino Nano.

4. \*\*Power Up\*\*: Use an external power supply or battery pack to power the Arduino Nano and the components.

This setup will give you a basic weather station that measures and displays temperature and humidity, logs the data with timestamps to an SD card, and displays the information on an LCD screen. Optional components like the water sensor, MQ-5 sensor, and speaker can be integrated into the system for additional functionality as needed.