Controlling RGB LED with PWM and Arduino Uno

Objective:
Mix red, green, and blue light to create different colors by adjusting the brightness of each LED using PWM (Pulse Width Modulation).

Components Required:

- Arduino Uno

- 1 Common Cathode RGB LED

- 3 Resistors (220Ω–330Ω, one for each color pin)

- Jumper wires & breadboard

Circuit Overview:

- An RGB LED has **4 pins**:

    - **Common Cathode (GND)**

    - **Red Anode** → PWM pin (e.g., D9) through resistor

    - **Green Anode** → PWM pin (e.g., D10) through resistor

    - **Blue Anode** → PWM pin (e.g., D11) through resistor

Working Principle:

- **PWM (Pulse Width Modulation)** allows the Arduino to simulate analog output by rapidly switching the digital pin on/off.

- By varying the duty cycle of each PWM pin, we can control the brightness of red, green, and blue LEDs.

- Mixing different brightness levels of RGB produces a wide range of colors (e.g., red + green = yellow).

Use Cases:

- Mood lighting

- Color mixing experiments

- Visual indicators and displays