

Week 1 - Monday: Electronics - Your First Circuit (Key)

Name: _____ Date: _____

The ESP32 is a tiny computer - "like an Arduino on steroids" - for about \$5-10.

Today: make an LED blink! Tip from the video: start simple and scale it up.

Part A - From the video

1) What is a microcontroller? (Hint: the ESP32 is one!)

A tiny, low-cost computer on a board that can control lights, motors and sensors.

2) The ESP32 has Wi-Fi AND Bluetooth. Name one thing each one lets it do.

Wi-Fi: connect to the internet / a web page. Bluetooth: talk to a phone or nearby device.

3) Cable gotcha! What kind of micro-USB cable do you need, and why?

A DATA cable, not charge-only. A charge-only cable gives power but can't send your code.

4) Which GPIO pin is the ESP32's onboard blue LED on?

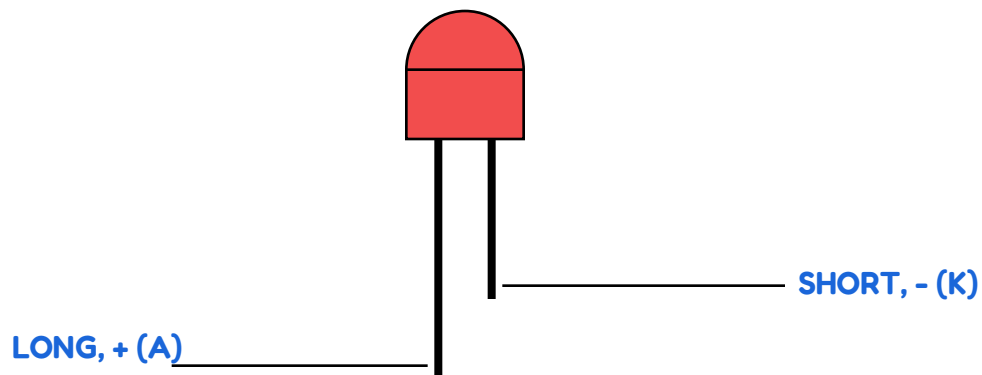
GPIO 2

5) Pick a project idea from the video you would like to build. What would it do?

Any idea, e.g. a weather station that shows temperature, or a plant waterer. Start simple, then scale up!

Part B - Parts and wiring

6) Label the LED legs: write LONG or SHORT, and + or -, on each line.



7) Why do we need the 220 ohm resistor in the circuit?

It limits the current so the LED does not burn out. Here about 5.9 mA flows, which is safe.

8) Number the circuit path in order, 1 to 4 (start at the ESP32 pin).



9) Which LED leg connects to GND: the long leg or the short leg?

The short leg (cathode, K, -).

Part B (continued)

- 10) Draw your circuit! Show the ESP32 pin D2, the resistor, the LED (long and short legs) and GND.**

D2 -> resistor -> LED long leg (+) ... LED short leg (-) -> GND

Part C - The Blink code

- 11) What does `digitalWrite(pin, HIGH)` do to the LED?**

Sends power (3.3 V) out of the pin, so the LED turns ON.

- 12) What does `digitalWrite(pin, LOW)` do to the LED?**

Turns the pin off (0 V), so the LED turns OFF.

- 13) How many milliseconds (ms) are in 1 second?**

1000 ms

Part C (continued)

14) What does delay(500) mean?

Wait 500 ms = half a second before the next step.

15) With delay(500) ON and delay(500) OFF, how many blinks happen each second?

1 blink per second ($500 + 500 = 1000$ ms).

16) Predict: if you change both to delay(100), what happens?

Blinks much faster: $100 + 100 = 200$ ms, so 5 blinks every second.

17) What does the Serial Monitor print while it runs?

LED on, LED off, LED on, LED off ...

Part D - Do it on BenchTwin!

18) Tick each box when you finish the step.

- ☒ 1. Open BenchTwin - Your first circuit
- ☒ 2. Place the ESP32 DevKit V1
- ☒ 3. Add the 5 mm red LED
- ☒ 4. Add the 220 ohm resistor
- ☒ 5. Wire D2 to the resistor
- ☒ 6. Wire the resistor to the LED long leg (A, +)
- ☒ 7. Wire the LED short leg (K, -) to GND
- ☒ 8. Check: about 5.9 mA = safe
- ☒ 9. Load the Blink code
- ☒ 10. Click Run / Upload
- ☒ 11. Watch the LED blink
- ☒ 12. Open the Serial Monitor

19) Challenge: change delay(500) to delay(100) and press Run. What happened?

The LED blinked much faster - 5 times every second.

20) Explain: Explain to a grown-up how your LED circuit works.

The code sets pin D2 HIGH, so electricity flows from D2 through the resistor (which keeps the current safe) into the LED long leg, out the short leg to GND, and the LED lights. LOW turns it off. `delay(500)` waits half a second, so it blinks once a second.