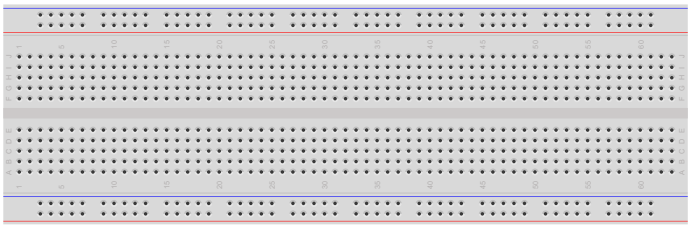
Exercise 1: Breadboarding

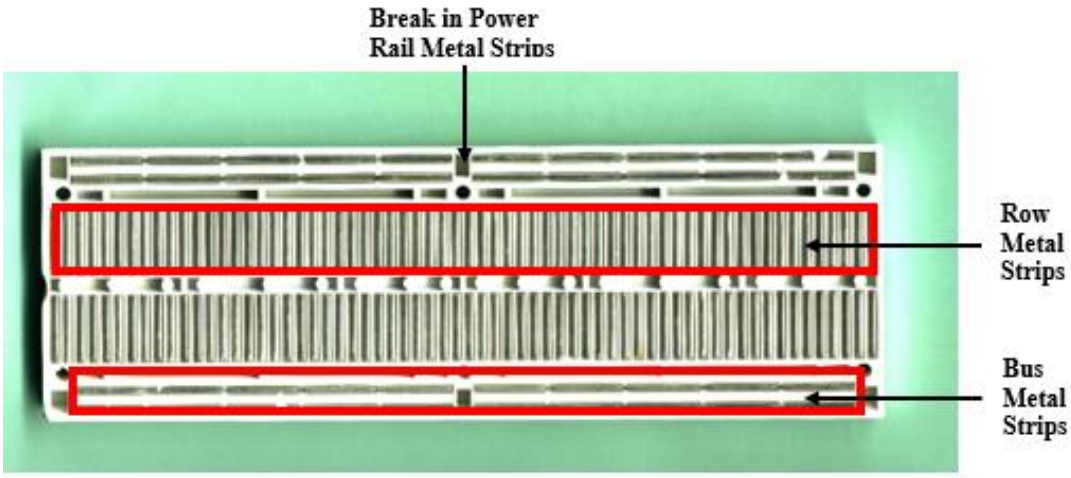
Purpose: Configure a breadboard.

Description

- A breadboard is an electronic circuit **prototyping** tool.
- It has a grid of holes that allows **components** to be **connected together**.
  Instead of wiring components together, we can stick them in the board.



- The board is divided into **conductive strips**.
  These strips act like wires that connect components.
  - The two rows at the top and bottom are connected horizontally.
    This is the "power rail", and it is separated in the middle vertically.
  - The middle holes are connected as columns.
    These columns are separated in the middle horizontally across the board.



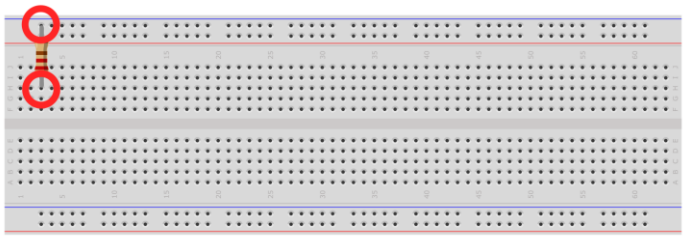
- Simple components typically have **two ends**.
  One end gets pushed into one hole, and the other into a different hole.

- A singular component **CANNOT** be connected on the same strip.
  The ends of a component must be on different strips, otherwise it is "connected to itself".
- The strips are used to **connect** components **together!**

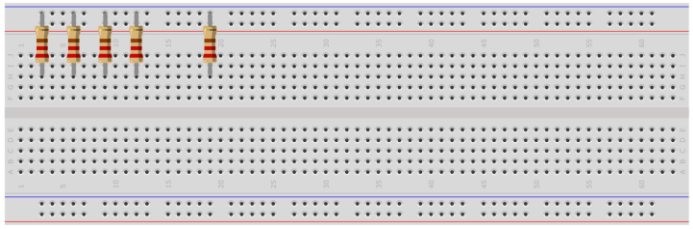
Exercise 1: Breadboarding

Instructions

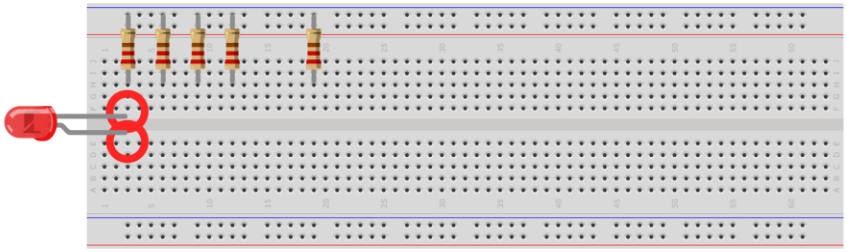
1. Place **one** end of a resistor in the *ground* top rail and the other in a column pin.
   Ground is sometimes abbreviated as GND, which is the top-most row.



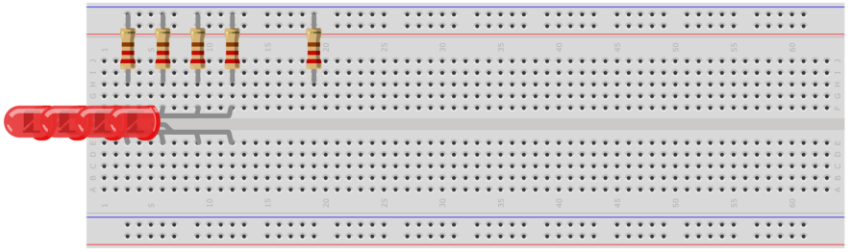
2. Do this for all **five** resistors – keep the **last one** separated out a little further.
   Keep the first four about **two holes apart**, and the last one about **six holes**.



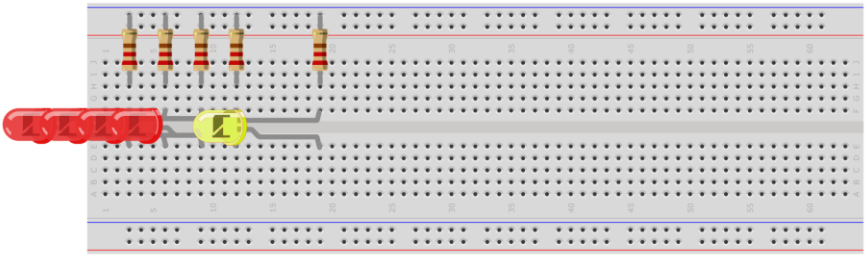
3. Connect the **short** end of a **red** LED below the resistor in the **same column**.
   Connect the **long** end across the gap into **another** column.
   Remember, components cannot be connected to themselves in the same column.



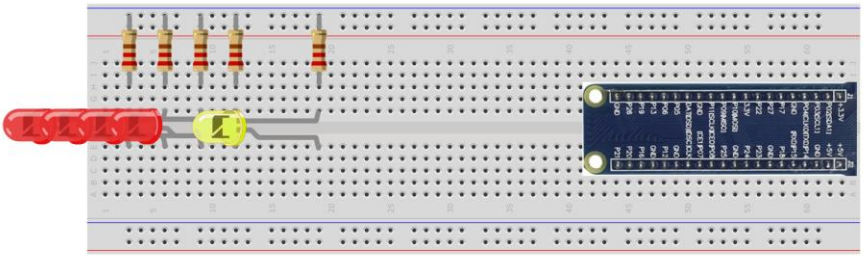
4. Do this for the other three **red** LEDs.



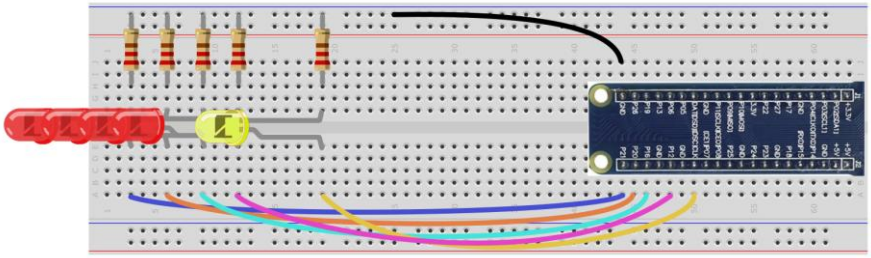
5. Connect a **different coloured** LED to the **last resistor**.



6. Connect your extension header adapter to the board by pushing in the pins.



7. Use your jumper wires to connect everything together:



   a. **GND** to the top ground rail.

   b. **GPIO 21, 20, 16, 12, 1** to the LEDs in the lower column.

   Colours don't matter, but order and connection does.

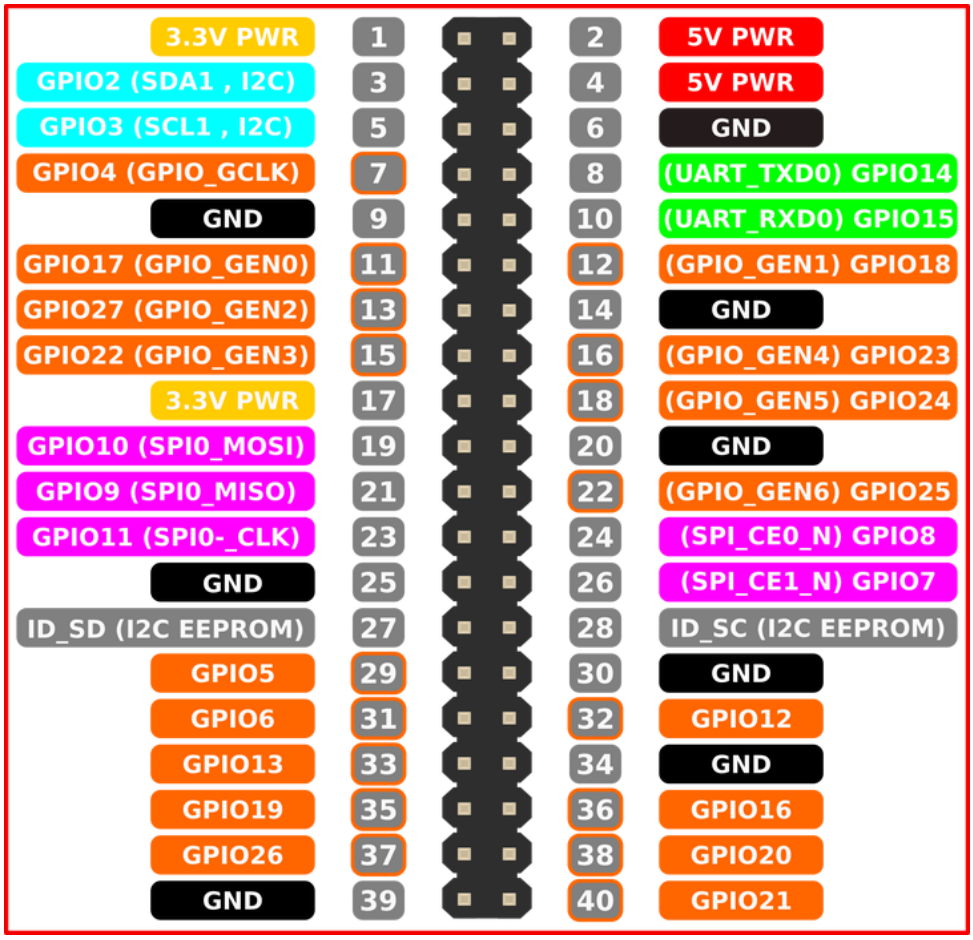
```
  3V3  (1) (2)  5V
GPIO2  (3) (4)  5V
GPIO3  (5) (6)  GND
GPIO4  (7) (8)  GPIO14
  GND  (9) (10) GPIO15
GPIO17 (11) (12) GPIO18
GPIO27 (13) (14) GND
GPIO22 (15) (16) GPIO23
   3V3 (17) (18) GPIO24
GPIO10 (19) (20) GND
 GPIO9 (21) (22) GPIO25
GPIO11 (23) (24) GPIO8
   GND (25) (26) GPIO7
 GPIO0 (27) (28) GPIO1
 GPIO5 (29) (30) GND
 GPIO6 (31) (32) GPIO12
GPIO13 (33) (34) GND
GPIO19 (35) (36) GPIO16
GPIO26 (37) (38) GPIO20
   GND (39) (40) GPIO21
```

8. Test the connection by running 1_Test.py.

   All LEDs should blink in a left to right chasing pattern.
   If they do not chase left-to-right, the connection is incorrect.

Safety

1. **DO NOT** connect GND and VCC directly without a load.
   This is called a short circuit!
2. **DO NOT** touch any metal part of the board with your hands.
   Handle the board using the edges of the acrylic.
3. Be **MINDFUL** of conventional safety.
   e.g., Sharp surfaces, etc.



https://www.instructables.com/Raspberry-Pi-GPIO/