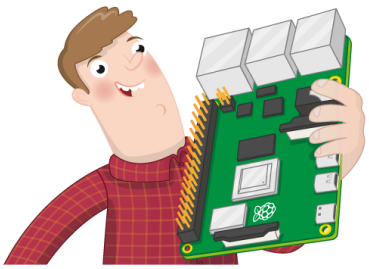
Projects

Setting up your Raspberry Pi

How to set up and start your Raspberry Pi for the first time



Step 1 What you will do

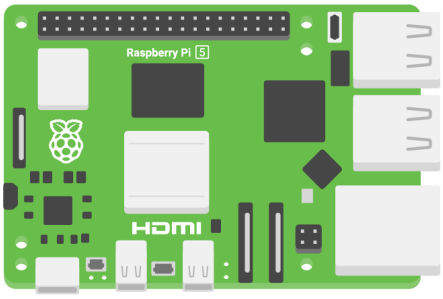
Set up, connect and start up your Raspberry Pi.

If you need to print this project, please use the printer-friendly version (https://projects.raspberrypi.org/en/projects/raspberry-pi-setting-up/print).

Step 2 Which Raspberry Pi?

There are several models of Raspberry Pi (https://www.raspberrypi.org/products/), and for most people Raspberry Pi 5 is the one to choose. It is the newest, fastest, and easiest to use.

Raspberry Pi 5 comes with 2GB, 4GB, 8GB, or 16GB of RAM.



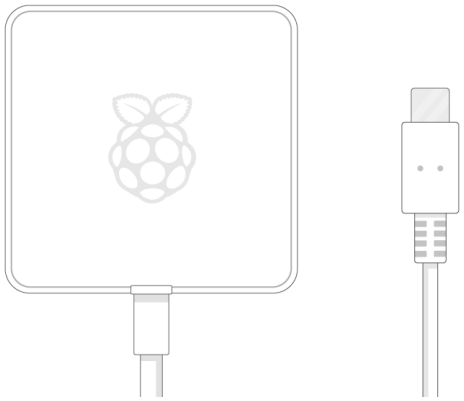
The Raspberry Pi Zero range of computers are smaller and require less power, so they're useful for portable projects such as robots. It's generally easier to start a project with Raspberry Pi 5, and to move to Raspberry Pi Zero when you have a working prototype that a smaller Raspberry Pi would be useful for.

If you want to buy a Raspberry Pi, head to rpf.io/products (https://rpf.io/products).

Step 3 Power and storage

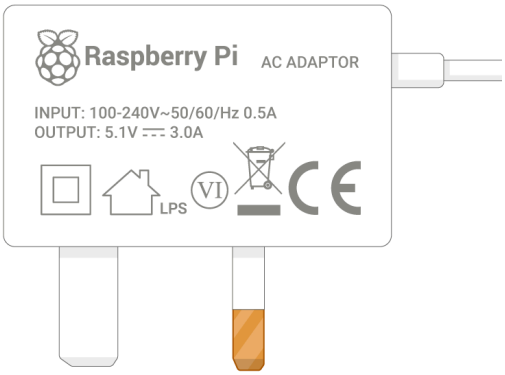
Power

To connect to a power socket, all Raspberry Pi models have a USB port (the same found on many mobile phones): either USB-C for Raspberry Pi 4 and 5, or micro USB for Raspberry Pi 3, 2, and 1.

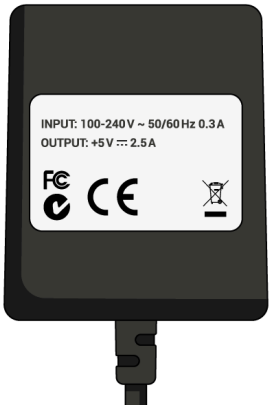


You need a power supply that provides:

- At least 3.0 amps for Raspberry Pi 4 and 5



- At least 2.5 amps for Raspberry Pi 3



We recommend using the official USB-C Power Supply (https://www.raspberrypi.com/products/27w-power-supply/) for Raspberry Pi 4 and 5, or our official Universal Power Supply (https://www.raspberrypi.org/products/raspberry-pi-universal-power-supply/) for Raspberry Pi 3, 2, or 1.

Storage

Your Raspberry Pi needs a microSD card to store the Raspberry Pi OS operating system and any files you create.

Note: Many microSD cards come inside a larger adapter — you can slide the smaller card out using the lip at the bottom.

You need a microSD card with a capacity of **at least 32GB**.

Step 4 Choosing your setup

Before you continue, there a few things to decide.

Do you have access to another computer with an SD card port?

Yes

- Use Raspberry Pi Imager to set up your SD card.

You can then access the Raspberry Pi OS from your other computer using Raspberry Pi Connect. See Running headless (5).

No

- Many sellers supply SD cards (https://www.raspberrypi.com/products/sd-cards/) for Raspberry Pi that are already set up with Raspberry Pi OS and ready to go.

Do you want to connect a screen directly to your Pi?

Yes

- See Running attached (6).

No

- You can access the Raspberry Pi OS from your other computer using Raspberry Pi Connect. See Running headless (5).

Step 5 Set up your SD card

To set up Raspberry Pi OS on your SD card, you need a computer that has an SD card port.

Using the Raspberry Pi Imager

Using the Raspberry Pi Imager is the easiest way to install Raspberry Pi OS on your SD card.

If you want to install a particular operating system, use this guide to installing operating system images (https://www.raspberrypi.org/documentation/installation/installing-images/README.md).

Download and launch the Raspberry Pi Imager

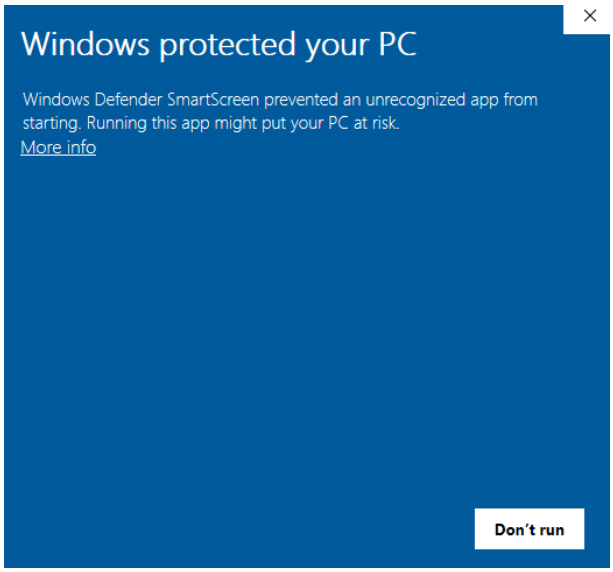
Visit the Raspberry Pi downloads page (https://www.raspberrypi.org/downloads)

Click on the link for the Raspberry Pi Imager that matches your operating system.

When the download finishes, click it to launch the imager.

Anything that's stored on the SD card will be **overwritten** during formatting. If your SD card currently has any files on it, e.g. from an older version of Raspberry Pi OS, you may wish to back up these files first to prevent you from permanently losing them.

When you launch the installer, your operating system may try to block you from running it. For example, on Windows you may receive this following message:



If this pops up, click on `More info` and then `Run anyway`

Follow the instructions to install and run the Raspberry Pi Imager

Insert your SD card into the computer or laptop SD card slot

In the Raspberry Pi Imager, select the Device, Operating System and the Storage (SD card) you would like to install it on and click `NEXT`.

Note: You will need to be connected to the internet the first time for the Raspberry Pi Imager to download the OS that you choose. That OS will then be stored for future offline use. Being online for later uses means that the Raspberry Pi imager will always give you the latest version.

Click `EDIT SETTINGS` to change the default settings for your new operating system.

On the `GENERAL` tab you can:

- Set a hostname. You can use this to connect to your Raspberry Pi with `<hostname>.local`.
- Create the first user and password.
- Add Wi-Fi settings
- Set the time zone and keyboard layout

On the `SERVICES` tab you can add the settings needed to connect remotely to your Raspberry Pi.

If you plan to run a headless Raspberry Pi, check the box next to `Enable SSH`.

- Choose `Use password authentication` to SSH into your Raspberry Pi over the network using the username and password you provided in the `GENERAL` tab.
- Choose `Allow public-key authentication only` to preconfigure your Raspberry Pi for passwordless public-key SSH authentication using a private key from the computer you're currently using. If you already have an RSA key in your SSH configuration, Imager uses that public key. If you don't, you can click Run `ssh-keygen` to generate a public/private key pair. Imager will use the newly-generated public key.

Click the `SAVE` button.

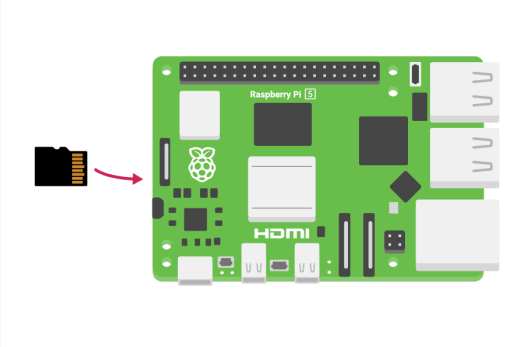
Click `YES` to apply OS customisation settings when you write the SD card.

Finally, respond `YES` to the “Are you sure you want to continue?” popup to begin writing data to the storage device.

Once you get the ‘Write Successful’ message, you can eject your SD card.

Insert the SD card

Insert the SD card you’ve set up with Raspberry Pi OS into the microSD card slot on the underside of your Raspberry Pi.

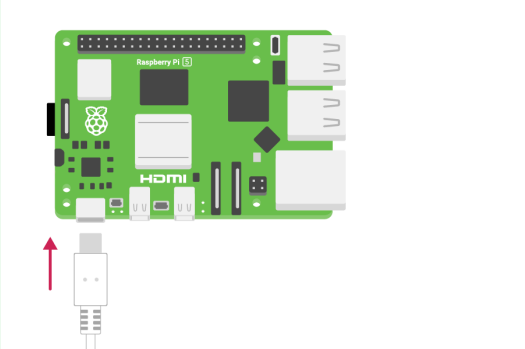


Step 6 Running headless

You can connect to your Raspberry Pi remotely (https://www.raspberrypi.com/documentation/computers/remote-access.html) over a network.

With Raspberry Pi Connect, you can run your Raspberry Pi from a second computer over the Internet.

Plug the power supply into a socket and connect it to your Raspberry Pi's power port.



When your Pi has powered up, open a Terminal window on your other computer and type:

```
ssh <username>@<hostname>.local
```

Start the Raspberry Pi Connect service for your current user:

```
rpi-connect on
```

Sign in:

```
rpi-connect signin
```

You should see something like this:

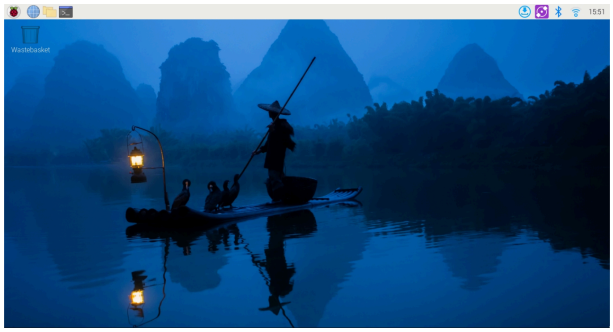
```
Complete sign in by visiting https://connect.raspberrypi.com/verify/XXXX-XXXX
```

Visit the verification URL on any device and sign in with your Raspberry Pi ID to link your device with your Connect account. You will get an email to confirm.

Name your device.

Connect to your Raspberry Pi via `Screen sharing` or `Remote shell` (command line).

If you connect via screen sharing, you will see the Raspberry Pi OS desktop appear.



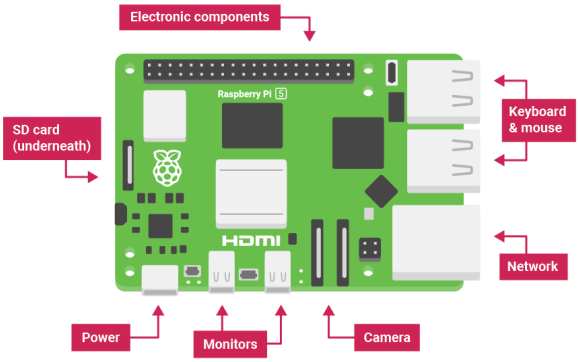
If you connect via remote shell, you will see this prompt:

```
<user>@<hostname>:~ $
```

You may choose to skip the next step.

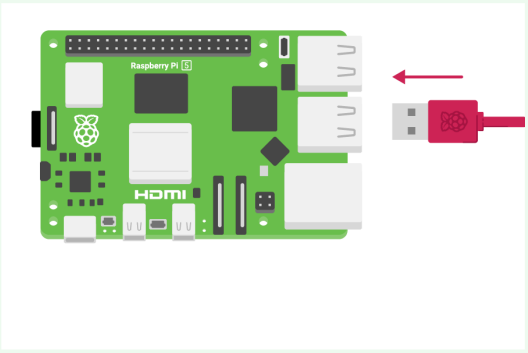
Step 7 Running attached

It's important to connect everything in the right order to your Raspberry Pi.



Keyboard

Connect the keyboard to a USB port (it doesn't matter which one you use).



Mouse

Connect the mouse to a USB port.

Screen

Make sure your screen is plugged into a wall socket and switched on.

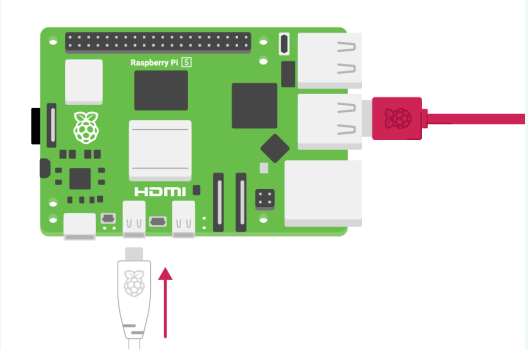
Look at the HDMI port(s) on your Raspberry Pi — notice that they have a flat side on top.

Use a cable to connect the screen to Raspberry Pi's HDMI port — use an adapter if necessary.

Raspberry Pi 4 or 5

Connect your screen to the first of Raspberry Pi's HDMI ports, labelled **HDMI0**.

Note: Make sure you have used **HDMI0** (nearest the USB C power port) rather than **HDMI1**.



Raspberry Pi 1, 2, 3

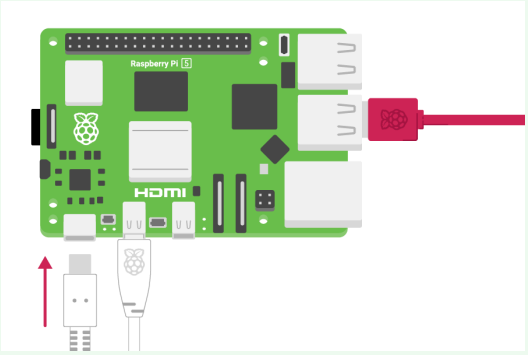
Connect your screen to the single HDMI port.

Note: Nothing will display on the screen, because your Raspberry Pi is not running yet.

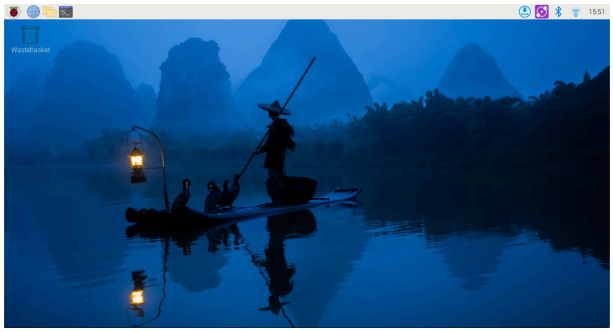
My screen doesn't have an HDMI port.

If the screen you are using has speakers, sound will play through those. Alternatively, connect headphones or speakers to the audio port if you prefer.

Plug your power supply into a socket and connect it to your Raspberry Pi's power port.



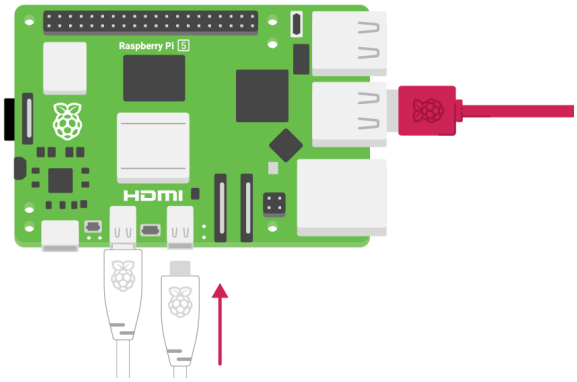
You will see the Raspberry Pi OS desktop appear.



Optional extras

Second screen

You can connect a second screen to the HMDI1 port.



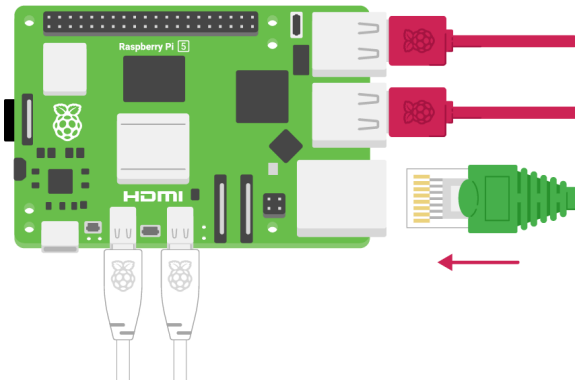
Headphones or speakers

Raspberry Pi 1-4 models (but not Raspberry Pi 5, Zero or Raspberry Pi Zero W) have a standard audio port like the one on a MP3 player. If you want to, you can connect your headphones or speakers so that your Raspberry Pi can play sound. If the screen you're connecting your Raspberry Pi to has built-in speakers, Raspberry Pi can play sound through these.

An Ethernet cable

Raspberry Pi 3-5 and Raspberry Pi Zero W can be wirelessly connected, so you may not need an wired ethernet connection.

The large Raspberry Pi models (but not Raspberry Pi Zero or Raspberry Pi Zero W) have a standard Ethernet port to connect them to a network.



To connect Raspberry Pi Zero to a network, you need a USB to Ethernet adapter.

Case

You may want to put your Raspberry Pi in a case. This is not essential, but it will provide protection for your Raspberry Pi. If you'd like, you can use the official case for Raspberry Pi 4 (https://www.raspberrypi.org/products/raspberry-pi-4-case/{:target="_blank"}) Raspberry Pi 5 (https://www.raspberrypi.com/products/raspberry-pi-5-case/) or Raspberry Pi Zero or Raspberry Pi Zero W (https://www.raspberrypi.org/products/raspberry-pi-zero-case/).

Step 8 Where to find help

If you're having problems with your Raspberry Pi, there are lots of places you can get help and advice:

We have a three-week online course available on the EdX platform (http://rpf.io/get-started-course).

The Raspberry Pi forum (https://www.raspberrypi.org/forums), includes the Beginners (https://www.raspberrypi.org/forums/viewforum.php?f=91) section, if you want to ask questions and get support from the Raspberry Pi community.

- Check out the help section (https://www.raspberrypi.org/help/) and the documentation (https://www.raspberrypi.com/documentation/) on the Raspberry Pi website.
- Submit a question on the Raspberry Pi Stack Exchange (https://raspberrypi.stackexchange.com/).
- You could also attend a free Raspberry Pi community event (https://rpf.io/jam) to talk to people about their experiences and get some first-hand help from fellow Raspberry Pi users.

Step 9 What can you do now?

Well done! You have just completed the first project in the Raspberry Pi for beginners (https://projects.raspberrypi.org/en/pathways/raspberry-pi-beginners) pathway.

Next, try the second project in the pathway, Using your Raspberry Pi (https://projects.raspberrypi.org/en/projects/raspberry-pi-using/).

The complete Raspberry Pi for beginners pathway

- Setting up your Raspberry Pi (https://projects.raspberrypi.org/en/projects/raspberry-pi-setting-up/)
- **Using your Raspberry Pi** (https://projects.raspberrypi.org/en/projects/raspberry-pi-using/)
- Pac-Man treasure hunt on the terminal (https://projects.raspberrypi.org/en/projects/pacman-terminal)
- Create a new command on Raspberry Pi (https://projects.raspberrypi.org/en/projects/raspberry-pi-command/)
- Automate tasks on your Raspberry Pi (https://projects.raspberrypi.org/en/projects/rpi-automate-tasks/).

Other Raspberry Pi projects on the Raspberry Pi website

Take a look at some of our many other Raspberry Pi projects (https://projects.raspberrypi.org/en/projects?hardware%5B%5D=raspberry-pi).

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(https://github.com/RaspberryPiLearning/raspberry-pi-setting-up)