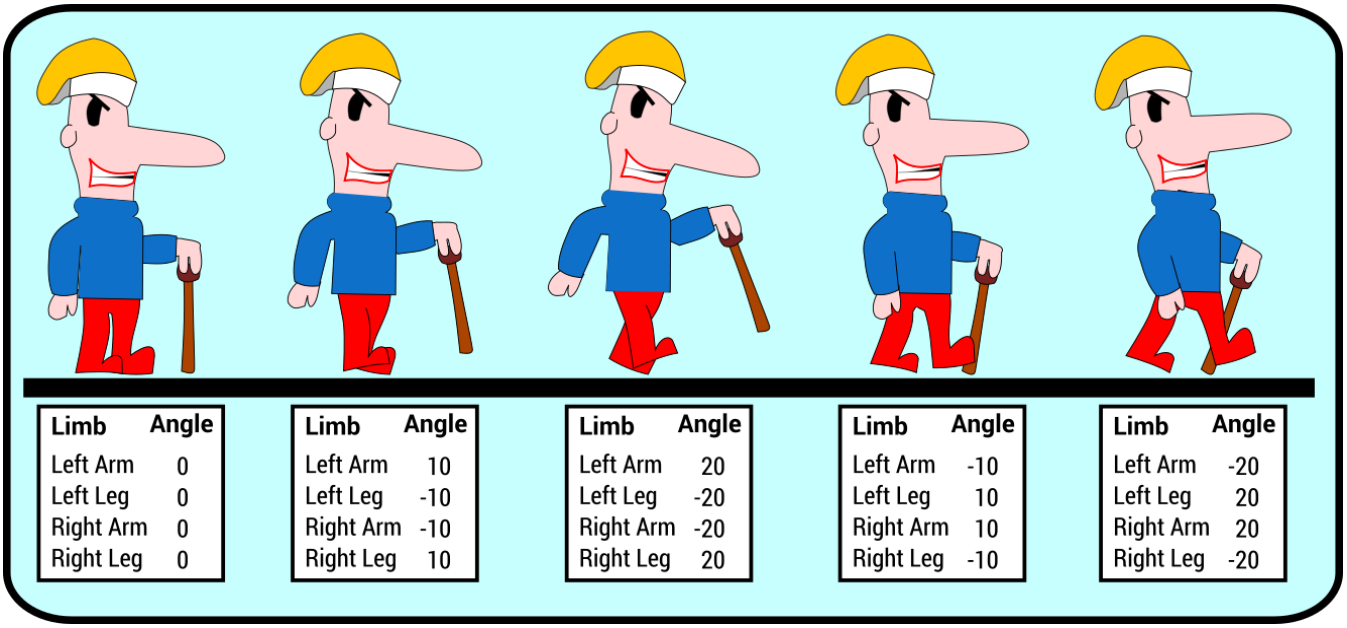

Limb	Angle
Left Arm	0
Left Leg	0
Right Arm	0
Right Leg	0

Limb	Angle
Left Arm	10
Left Leg	-10
Right Arm	-10
Right Leg	10

Limb	Angle
Left Arm	20
Left Leg	-20
Right Arm	-20
Right Leg	20

Limb	Angle
Left Arm	-10
Left Leg	10
Right Arm	10
Right Leg	-10

Limb	Angle
Left Arm	-20
Left Leg	20
Right Arm	20
Right Leg	-20

Bring your *doodles* to life

(creating and animating your character's poses)

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In this step you will learn how to rotate the arms and legs to create 5 different poses, as shown in the image above, and export these poses to files. When these poses are imported into Scratch and played in sequence it creates the illusion of movement, very much like a flip book animation.

Adjust the centres of rotation for your character's limbs

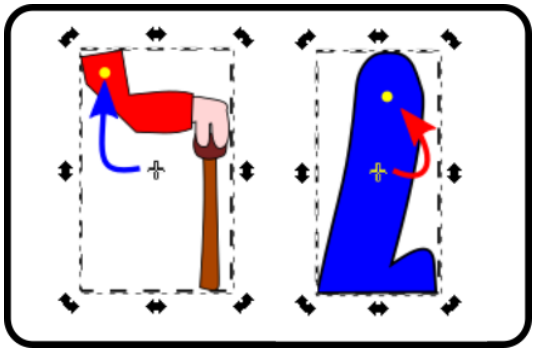
In Inkscape, objects rotate around the central point by default. Our limbs don't do that - they rotate around their upper extremities (shoulders or hips). Let's adjust the centre of rotation of our character's limbs. Choose a limb (arm or leg) and do the following:

1. Click on the limb twice

The arrows will change to indicate that you are in *rotation* mode (as shown below) and a cross will appear in the centre of that limb - this is the *centre of rotation*.

2. Move the centre of rotation

Click and drag the cross marking the centre of rotation to where your character's hips or shoulders are, as shown in the diagram below.



3. Test the new centre of rotation

To see how the limb will rotate around its joint, click on and drag the corner arrow furthest from the new centre of rotation. The limb should swing like a pendulum around the new centre of rotation as you drag the corner left and right.

Press **CONTROL + Z** to **undo** your last action and revert back to the original limb position once you've finished playing with the rotation.

Did the limb movement seem natural to you? If not, adjust the centre of rotation and re-do the above rotation test.

4. Repeat Steps 1-3 for all 4 limbs

Export the first character pose

Before we start to adjust the limb positions to create poses, let's export this one.

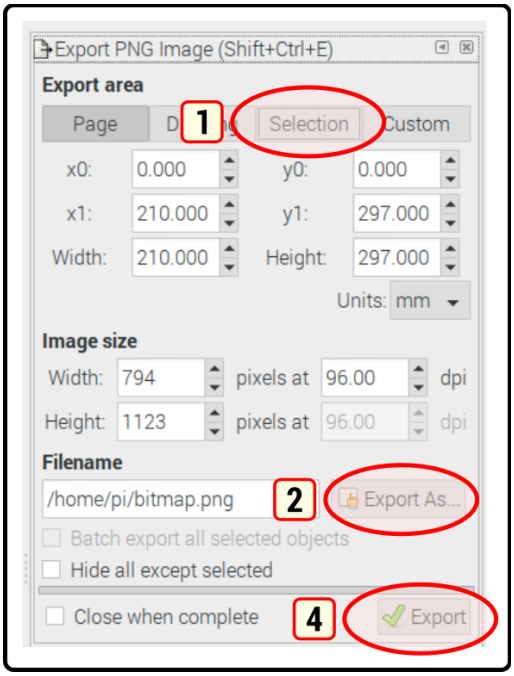
5. Select all parts of your character

Click on the screen somewhere above the top left of the character and drag the mouse to somewhere below the bottom left of your character. This creates a selection box with all your character parts inside it.

6. Export the character to a file

Select **File >> Export PNG Image** from the Inkscape menu (or press **SHIFT+CONTROL+E**). An Export Tool window will appear. In this window, do the following:

1. Click on **Selection** (this exports all selected objects)
2. Click on **Export As...**
3. Browse to the Desktop and name this file *Character-01.png* and click on **Save**.
4. Back in the **Export Tool**, click on **Export** to Export your character graphic.



Create & Export Additional Poses

When we walk, the direction of rotation of our arms is opposite to those of our legs. So, when the right arm swings forward, the right leg swings back. Similarly, the left and right limbs do opposite things. We have already created a “standing at rest” pose. Let’s now rotate the limbs to create an additional 4 walking poses.

7. Open the rotate tool

a. Select the **Object >> Transform** menu item to bring up the **Transform Tool**.
b. Click on the **Rotate** tab to select the *Rotate Tool*.

8. Rotate the left leg clockwise by 10 degrees

c. Click on the left leg of your character to select it
d. Type **-10** into the **Angle** box of the **Rotate Tool** and click on **Apply**.

9. Rotate the left arm anti-clockwise by 10 degrees

e. Click on the left arm of your character to select it
f. While pressing the **SHIFT** key, click on the left hand and the walking stick to select them also.
g. Type **Control + G** on the keyboard to group the arm, hand and walking stick together. This allows you to treat them as if they were a single item.
h. Type **10** into the **Angle** box of the **Transform Tool** and click on **Apply**.

10. Rotate the right leg anti-clockwise by 10 degrees

i. Click on the right leg of your character to select it.
j. Type **10** into the **Angle** box of the **Rotate Tool** and click on **Apply**.

11. Rotate the right arm clockwise by 10 degrees

k. Click on the right arm of your character to select it.
l. While pressing the **SHIFT** key, click on the right hand to select it also.
m. Type **Control + G** on the keyboard to group the arm and hand together. This allows you to treat them as if they were a single item.
n. Type -**10** into the **Angle** box of the **Transform Tool** and click on **Apply**.

12. Export the character pose

o. Repeat steps 5 & 6 above to export your new pose, calling it *Character-02.png*

You've just created the second pose from the left shown in the diagram at the top of this document. The numbers below that pose should match the numbers we have just used above.

Let's now create and export the remaining poses

13. Revert your character back to the standing pose

All the limb rotation values in the image at the top of this guide are relative to the standing position. Let's reverse our most recent the limb rotations in the **Transform Tool** to return the character back to this position, ready to create the next pose. You can do this in one of two ways:

1. Using the **Rotate Tool**, rotate all the limbs by the same amount in the opposing direction.
2. hit **Control + Z** (*Undo*) 4 times to roll back the last four limb rotation actions.

14. Create and export the remaining poses

1. Repeat steps 8-11 above for each of the remaining 3 poses, using the rotation angles specified under each pose in the diagram.
2. Repeat step 12 to export the pose to a file on the desktop, choosing an appropriate file name (we suggest *Character-N.png*, where N is the pose number).
3. Repeat step 13 to revert to the standing position ready to create the next pose.

You should now have a set of 5 character poses that you can import into Scratch as sprite costumes.

Import Your Character Poses Into Scratch & Animate

15. Open Scratch 2

On a Raspberry Pi or Raspbian OS laptop you can find Scratch 2 in the menu system under **Start (Raspberry) >> Programming**.

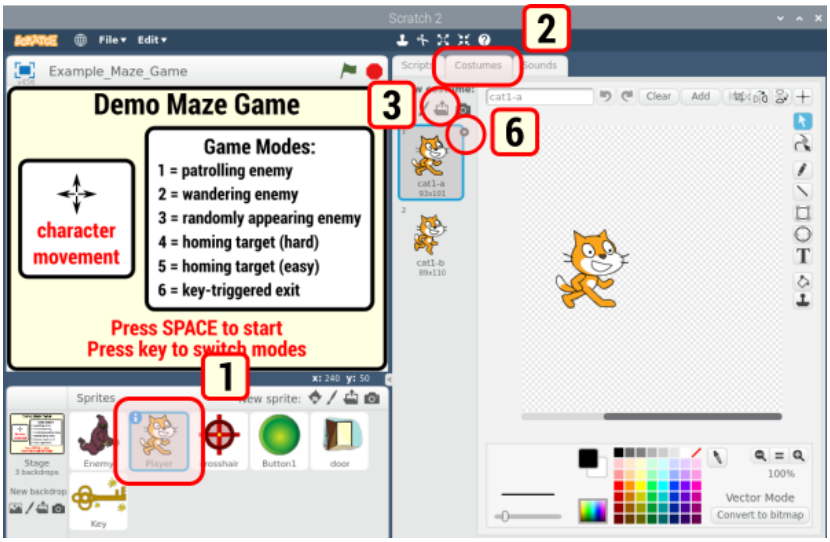
16. Load Your Game

If you have a game within which you would like to replace a game character with your own, load that game into Scratch. If you don't have a game, we've provided one for you. It's in a file called ***Example_Maze_Game.sb2***. Within Scratch2, select **File >> Load Project** from the Scratch2 menu and browse to your chosen Scratch2 (.sb2) project file and click on **Open**.

16. Replace Your Chosen Sprite's Costumes

Let's replace the costumes of your chosen sprite with our character poses. In the example game we have provided, you will want to change the costumes of the sprite called **Player**.

1. Click on your chosen sprite
2. Select on the Costumes tab
3. Click on the File icon to load a new costume
4. Browse to *Character-N.png* on the desktop and click on open
5. Repeat the prior step for the following sequence of poses: 1, 2, 3, 2, 1, 4, 5, 4. This represents a full walking cycle. Note that there are repeated poses in there.
6. Click on the [X] in the top right corner of the cat costumes to delete them.



16. (If Necessary) Adjust The Sprite's Size

Your new sprite might be a bit big or small for the game. You may need to adjust its size by using the reduce/enlarge tools as necessary until the sprite size is just right.

16. Run Your Game, Using Your New Sprite

Now it's time to see how the game plays with your new animated sprite. Click on teh green flag and enjoy your newly personalised game.