The MagPi
ESSENTIALS

[CHAPTER TWO]
CONTROLLING
BLOCKS

Learn how to control blocks
in Minecraft: Pi Edition
using the Python API

You will now write a program to turn Steve into Ice Man; he will leave trails of snow wherever he walks, and be able to turn any block into ice with a touch of his sword. A house of ice will also appear automatically, giving Steve somewhere cold to live.

The Minecraft: Pi Edition API lets you can turn any block in the world into any other block: dirt into diamond, water into lava or stone into air!

By combining functions that get the player's position with those that change blocks, you can make the world change around the player without them doing anything.

Changing blocks

You will use the API to make the block which the player is standing on turn to snow; by using a loop you can make this run forever then as the player moves, the blocks underneath him will keep turning to snow:

01. Open IDLE by clicking Menu > Programming > Python 3.

02. Use File > New Window to create a new program and save it as '**iceman.py**'.

03. At the top of your program import the **minecraft** and **block** modules to use the API:
```
import mcpi.minecraft as minecraft
import mcpi.block as block
```

04. Create a connection from your program to Minecraft and call it **mc**:
```
mc = minecraft.Minecraft.create()
```

05. Get the player's 'tile' position (the block Steve is standing on), and store it in a variable called **p**:
```
p = mc.player.getTilePos()
```

06. Use the **setBlock** function to change this block to snow:
```
mc.setBlock(p.x, p.y, p.z, block.SNOW)
```

07. Run your program by clicking Run > Run Module.

Go back to Minecraft and look down: the block you're standing on will now be covered in snow. Make sure you're standing on the ground and not flying, as you can't put snow in the air!

Next, change the program so that it loops forever, always getting the player's position and turning that block to snow; that way, Steve will create snow wherever he walks:

Below Modify Minecraft so that Steve leaves snow wherever he walks
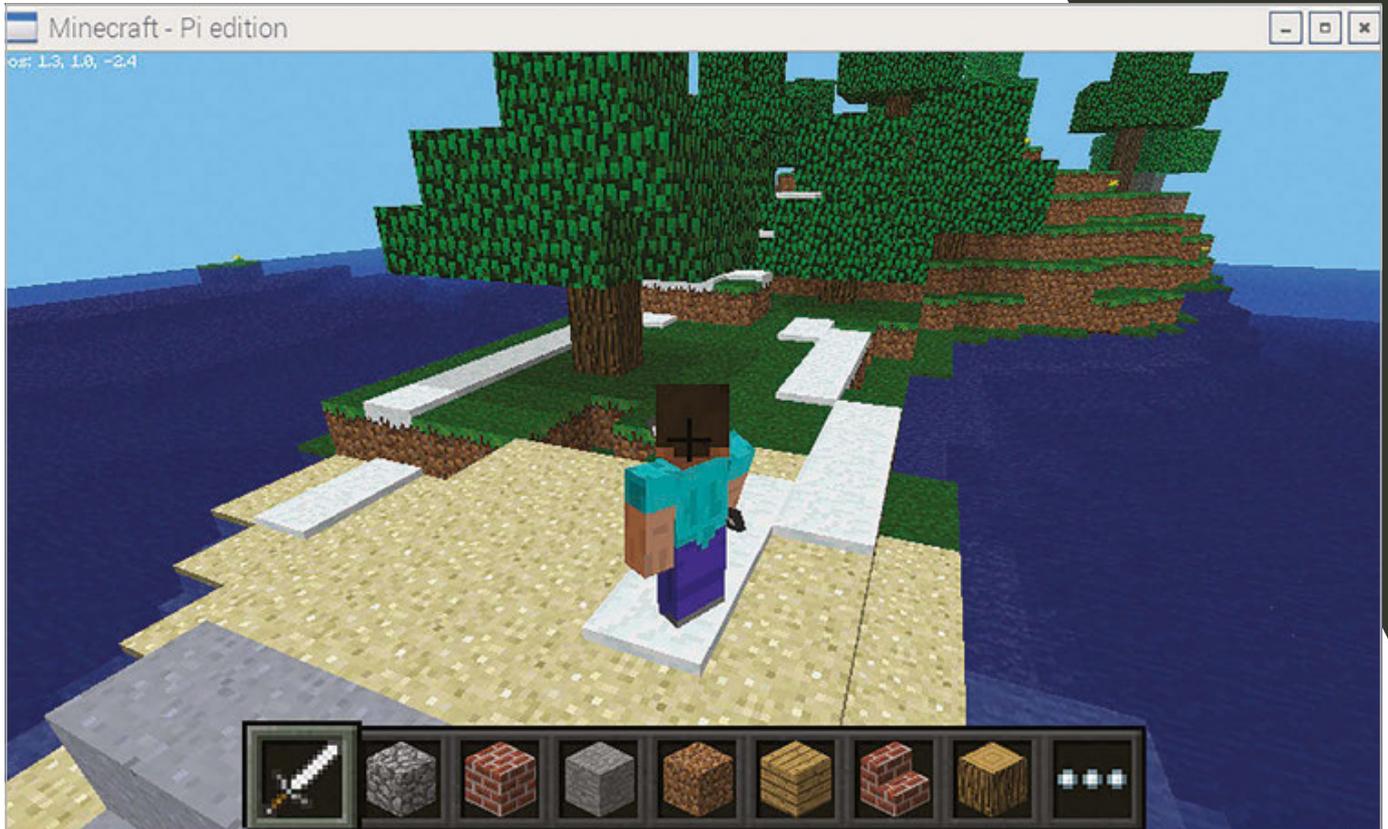
01. Go back to Python and modify your `iceman.py` program.

02. Add a `while` loop to the bottom of your program. This loop will continue forever:

```
while True:
```

03. The rest of your program will be indented under the `while` loop. If IDLE doesn't indent the next line for you, press Tab. Add the code to find the player's position and create the snow block:

```
while True:
 p = mc.player.getTilePos()
 mc.setBlock(p.x, p.y, p.z, block.SNOW)
```

04. Run your program by clicking Run > Run Module.

Now snow will automatically cover the blocks wherever Steve walks.

Try changing `block.SNOW` to use different blocks and see what happens: you can find a complete list of blocks at **magpi.cc/294zAfk.**

Hitting blocks

When a block is hit with a sword by right-clicking, you can use the API to change those blocks. You're going to change your program so that when Steve hits a block it will instantly turn to ice.

Modify your **iceman.py** program so that it uses the **events. pollBlockHits()** function to get any blocks which have been hit and turn them to ice:

01. At the end of your program, indented under the **while** loop, add the code to get the blocks which have been hit:

```
while True:
    for hit in mc.events.pollBlockHits():
```

02. Indented under the **for** loop created above, add the code to turn the block which has been hit to ice.

```
mc.setBlock(hit.pos.x, hit.pos.y, hit.pos.z, block.ICE)
```

03. Run your program by clicking Run > Run Module.

Snow should continue to cover the ground wherever Steve walks, but now when you hit a block (right-clicking while holding a sword), it will turn to ice.

Right Turn any block to ice by hitting it with your sword

[HITTING BLOCKS]

If blocks don't turn to ice, check that you're right-clicking and holding a sword.

Creating lots of blocks

When you want to create lots of blocks you can use the function **setBlocks()** which, when passed two positions, will fill the gap in between with any block you want. The quickest and easiest way to create buildings in Minecraft is by creating a cube and then hollowing it out by creating a cube of air in the middle.

Create a new program which will build an ice house:

01. Open IDLE by clicking Menu > Programming > Python 3.

02. Use File > New Window to create a new program and save it as **icehouse.py**.

03. Import the **minecraft** and **block** modules.
```
import mcpi.minecraft as minecraft
import mcpi.block as block
```

04. Create a connection from your program to Minecraft and call it **mc**.
```
mc = minecraft.Minecraft.create().
```

05. Get the player's position:
```
p = mc.player.getTilePos()
```

06. Use the **setBlocks()** function to create a cube of ice next to Steve of size 11 x 5 x 11:
```
mc.setBlocks(p.x + 1, p.y, p.z + 1,
        p.x + 10, p.y + 5, p.z + 10,
        block.ICE)
```

**07.** Create a cube of air inside the ice, making it hollow:
```
mc.setBlocks(p.x + 2, p.y + 1, p.z + 2,
        p.x + 9, p.y + 4, p.z + 9,
        block.AIR)
```

**08.** Run your program by clicking Run > Run Module.

A large cube of ice will appear next to Steve; if you break some of the ice blocks, you'll see that it's hollow and you can walk inside.

The ice house is still pretty basic and at the moment there's no way to get in, so modify your program to create a door and put some carpet on the floor:

**Below** Use code, not building, to create an ice house



**01.** Add the code to your program to make a gap in the front of the ice cube for a door:

```
mc.setBlocks(p.x + 5, p.y + 1, p.z + 1,
        p.x + 6, p.y + 3, p.z + 1,
        block.AIR)
```

02. Use **setBlocks** again to change the blocks on the floor to be made of red wool:

```
mc.setBlocks(p.x + 2, p.y, p.z + 2,
        p.x + 9, p.y, p.z + 9,
        block.WOOL.id, 14)
```

03. Run your program by clicking Run > Run Module.
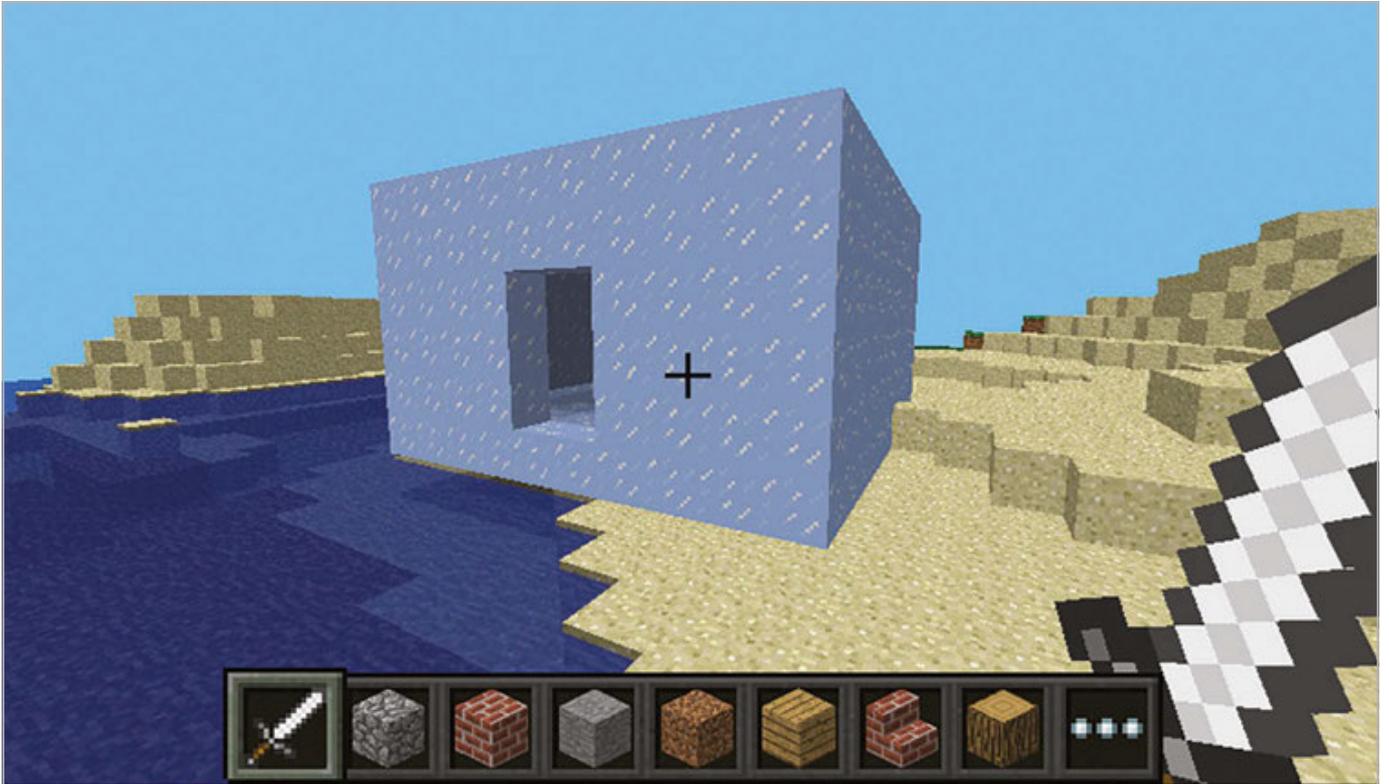
[USING DIFFERENT BLOCKS]

You will find a complete list of blocks and their data at: **magpi.cc/ 294zAfk**

A door will now appear in the ice house and a red wool carpet will be on the floor.

The number 14 on the line **block.WOOL.id, 14** makes the wool red. Try changing it to a different number between 0 – 15 and running the program again, until you find a colour you like.

iceman.py

```python
from mcpi.minecraft import Minecraft
from mcpi import block

mc = Minecraft.create()

while True:
    p = mc.player.getTilePos()
    mc.setBlock(p.x, p.y, p.z, block.SNOW)

    for hit in mc.events.pollBlockHits():
        mc.setBlock(hit.pos.x, hit.pos.y, hit.pos.z, block.ICE)
```

icehouse.py

```python
from mcpi.minecraft import Minecraft
from mcpi import block

mc = Minecraft.create()

p = mc.player.getTilePos()

mc.setBlocks(p.x + 1, p.y, p.z + 1,
             p.x + 10, p.y + 5, p.z + 10,
             block.ICE)

mc.setBlocks(p.x + 2, p.y + 1, p.z + 2,
             p.x + 9, p.y + 4, p.z + 9,
             block.AIR)

mc.setBlocks(p.x + 5, p.y + 1, p.z + 1,
             p.x + 6, p.y + 3, p.z + 1,
             block.AIR)

mc.setBlocks(p.x + 2, p.y, p.z + 2,
             p.x + 9, p.y, p.z + 9,
             block.WOOL.id, 14)
```