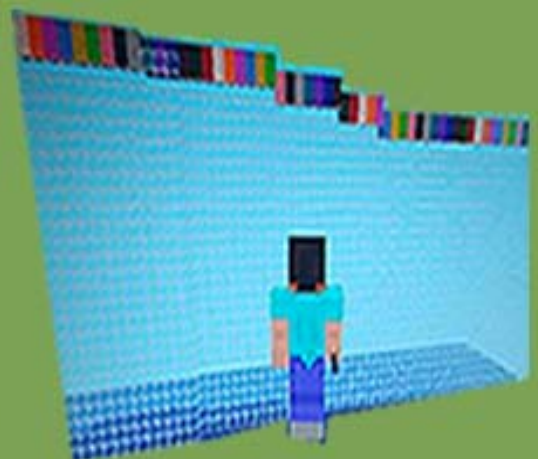


MINECRAFT COMPETITIONS MODDING CREATIVE

Hack pack Volume 1



Hello and welcome to the first edition of the Minecraft Comps hack pack. This has been created by teachers who use / experiment with Minecraft Pi at school to help kids learn about computing / computational thinking. Included in this first edition are worksheets / ideas that you could use to help introduce Pi at school or as part of a jam / lunch club after school club. We hope you find these ideas helpful and make coding with Minecraft Pi a bit less daunting. Contributors include: Chris Penn, Dan Aldred and Ben Davies.

List of hacks / coding ideas with Minecraft Pi and Python:

1. Hide a Diamond, Find a Diamond (Dan Aldred) **pages 3-4**
2. The Midas Touch (Dan Aldred) **pages 5-6**
3. The Sand Drop (Dan Aldred) **pages 7-8**
4. Walking on Ice 2.0 (@ncscomputing) **pages 9-11**
5. Walking Disco floor Steve (@ncscomputing) **pages 12-13**
6. Visualising/graphing live data with Astro Pi/ sense hat and Minecraft Pi (@ncscomputing) **pages 14-15**
7. Creating a basic interactive world in Minecraft Pi (@ncscomputing) **pages 16-17**
8. Exploding Wall (@b3ndavi3s) **pages 18-19**
9. Lava Shower (@b3ndavi3s) **pages 20-21**
10. Lava Shower with triggers (@b3ndavi3s) **pages 22-23**
11. What Lies Beneath (@b3ndavi3s) **pages 24-25**
12. **@crazysqeak's python buildings link to be added**

Hack 1 Hide a Diamond, Find a Diamond

This hack hides a diamond in the Minecraft world, it then uses the 'set camera' code to show you a bird's eye view of the location of the diamond. Then it is your quest to seek out and find the treasure.

```
from mcpi import minecraft
from time import sleep

mc = minecraft.Minecraft.create()

mc.postToChat("Here is the diamond block I have hidden.")

mc.setBlock(100, 25, 100, 57)

mc.camera.setFixed()

mc.camera.setPos(100, 30, 100)

sleep(10)

mc.postToChat("Go find it!")
mc.camera.setNormal()
```

Questions to answer about what you have coded and reflect on what you have learned:

Code concepts used?

What role do they perform in the script?

Errors encountered and solutions?

How could you extend this script?

The Midas Touch

Be careful what you wish for, everything you touch turns to gold.

```
from mcpi import minecraft
import time
mc = minecraft.Minecraft.create()

gold = 41
water = 9
air = 0
while True:
    pos = mc.player.getTilePos()
    blockBelow = mc.getBlock(pos.x, pos.y - 1, pos.z)

    if blockBelow != air and blockBelow != water:
        mc.setBlock(pos.x, pos.y - 1, pos.z, gold)
    time.sleep(0.1)
```

Questions to answer about what you have coded and reflect on what you have learned:

Code concepts used?

What role do they perform in the script?

Errors encountered and solutions?

How could you extend this script?

The Sand Drop

Watch out, in the Minecraft World there are some strange goings on, random blocks of sand falling from the sky, watch out they don't hit you or it's game over!.

```
from mcpi import minecraft
from time import sleep
mc = minecraft.Minecraft.create()

pos = mc.player.getTilePos()

while mc.getBlock(pos.x, pos.y, pos.z) != 13:
    mc.setBlock(pos.x, pos.y + 25, pos.z, 13)
    sleep(1)
    pos = mc.player.getTilePos()
mc.postToChat("Got you!")
```

Questions to answer about what you have coded and reflect on what you have learned:

Code concepts used?

What role do they perform in the script?

Errors encountered and solutions?

How could you extend this script?

Walking on Ice 2.0 based on idea from

<https://arghbox.wordpress.com/> then modified 

This modding challenge is built on from the original walking on Ice modd by Craig Richardson, who in turn may have got it from elsewhere (I have no idea). In the original if you are walking on water then the block is then turned into ice. I have adapted this to follow the following logic:

Generate a list of all block types ids

While true loop / do stuff

Wait a short time

Lay a block of ice directly beneath Steve

Place another random block directly beneath the Ice block (i.e. 2 below Steve)

If block 2 beneath Steve is tnt

Activate the tnt block

Change block 1 below Steve from ice to lava

Here is the code I created for this basic mod:

```
from mcpi import minecraft
import mcpi.block as block
import time
import random
mc = minecraft.Minecraft.create()

#generate a list of all known block types ids for mcpi
blockTypeList= [46,0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,15,16,17,18,20,21,22,24]

while True:#do stuff
    time.sleep(0.4)
    pos = mc.player.getPos()
    x = pos.x
    y = pos.y
    z = pos.z

    mc.setBlock(x,y-1,z,79)#place down an ice block directly underneath steve
    mc.setBlock(x,y-2,z,random.choice(blockTypeList))#place a random block under

    #check the block two below steve
    blockTwoBelow = mc.getBlock(x,y-2,z)

    #if it is tnt then activate it
    if blockTwoBelow == 46:#activate tnt
        mc.setBlock(x,y-2,z,46,1)
        mc.setBlock(x,y-1,z,10)#Lava = very small boom, I think
```

Here is a screen grab of it in action:



Questions to answer about what you have coded and reflect on what you have learned:

Code concepts used?

What role do they perform in the script?

Errors encountered and solutions?

How could you extend this script?

What happens if you make changes?

Walking Disco floor

Code in python 2.7 (edited and hacked code of Ben Davies for Minecraft comps hack pack May 2015 edition)

Code

```
import mcpi.minecraft as minecraft
import mcpi.block as block
import random
import time

def SetDiscoFloor(index):
    pos = mc.player.getPos()
    mc.setBlocks(pos.x, pos.y-1, pos.z,
    pos.x + 35, pos.y-1, pos.z + 35,block.WOOL.id,index)#changes the colour of w

def SetDiscoFloorTNT():
    mc.setBlocks(pos.x-3, pos.x-2, pos.x-1, pos.x, pos.x+1, pos.x+2,46)

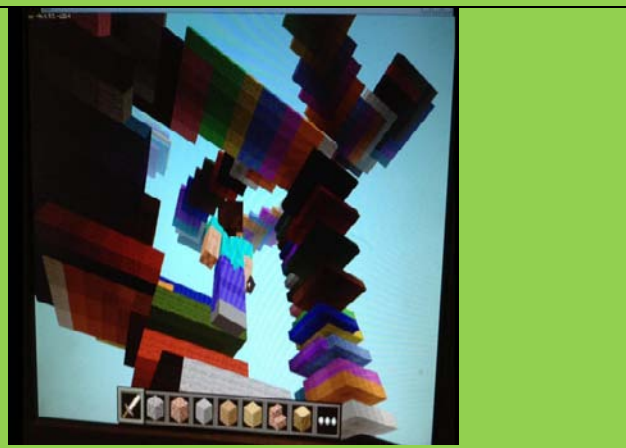
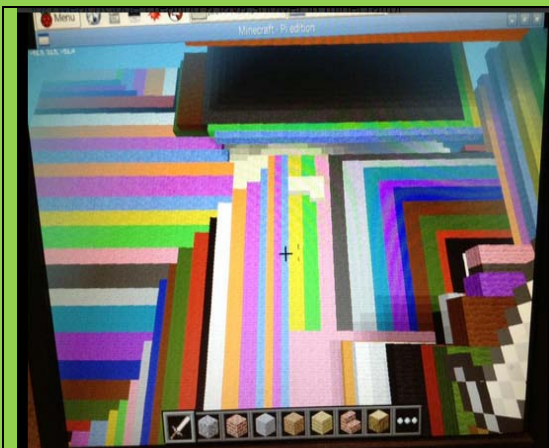
mc.postToChat("Watch Out for disco blocks")

Count = 0

while True:

    SetDiscoFloor(Count)
    time.sleep(0.2)
    if Count == 25:
        SetDiscoFloorTNT()
    if Count == 35:
        Count = 0
    Count = Count +1
```

This is what it creates the following:



Questions to answer about what you have coded and reflect on what you have learned:

Code concepts used?

What role do they perform in the script?

Errors encountered and solutions?

How could you extend this script?

What happens if you make changes?

Graphing Live Data from the Astro Pi/ sense hat using Minecraft Pi

Coded using python 2.7 (Written by @ncscomputing for Minecraft comps hack pack June 2015 edition)

Code

```
File Edit Format Run Options Windows Help
from astro_pi import AstroPi
import time
import mcpi.minecraft as minecraft
import mcpi.block as block
import random

ap = AstroPi()

mc = minecraft.Minecraft.create()

mc.postToChat("Start Graph")

Templist=[]

DataStreamCount=0
woolCount = 0

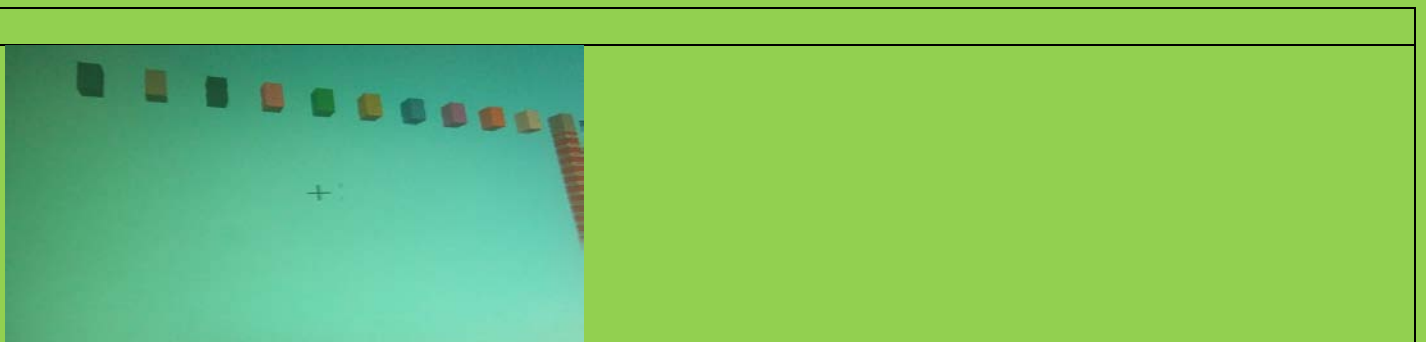
def setGraphLine(temperature,woolCount):
    pos = mc.player.getPos()
    x,y,z = mc.player.getPos()
    mc.player.setPos(pos.x+3,y,z)
    mc.setBlocks(pos.x,pos.y,pos.z,pos.x,pos.y+int(temperature-1),pos.z,0)#set air
    mc.setBlocks(pos.x,pos.y+int(temperature-1),pos.z,pos.x,pos.y+int(temperature),pos.z,35,woolCount)#set tip of graph

pos = mc.player.getPos()

while True:
    temperature = ap.get_temperature()
    print("temp",int(temperature))
    time.sleep(2)
    Templist.append(temperature)
    print(Templist[DataStreamCount])
    setGraphLine(temperature,woolCount)
    woolCount = woolCount+1

    if woolCount == 16:#reset wool count when max is reached
        woolCount = 0
```

This is what it creates the following:



Questions to answer about what you have coded and reflect on what you have learned:

Code concepts used?

What role do they perform in the script?

Errors encountered and solutions?

How could you extend this script?

What happens if you make changes?

Creating a basic interactive world in Minecraft Pi

Coded using python 2.7 (Written by @ncscomputing for Minecraft comps hack pack June 2015 edition)

Code

```
import mcpi.minecraft as minecraft
import mcpi.block as block

mc = minecraft.Minecraft.create()

mc.postToChat("Welcome to my Interactive world:")

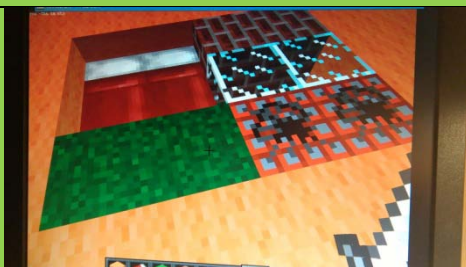
while True:

    evs = mc.events.pollBlockHits()
    for e in evs:
        pos = e.pos

        b=mc.getBlock(pos.x,pos.y,pos.z)

        if b == 46:
            mc.postToChat("Tnt")
        elif b == 20:
            mc.postToChat("Glass")
        elif b == 45:
            mc.postToChat("Brick")
        elif b == 26:
            mc.postToChat("Bed")
        elif b == 2:
            mc.postToChat("Grass")
        else:
            mc.postToChat("Other")
```

This is what it creates the following:



Right click and whack the block/ bed and messages appear in the chat

window

Questions to answer about what you have coded and reflect on what you have learned:

Code concepts used?

What role do they perform in the script?

Errors encountered and solutions?

How could you extend this script?

What happens if you make changes?

Exploding Wall

In this activity you will write a program that creates a TNT wall that you can detonate with your sword.



In your program you will need to

- get the player's position
- create a cuboid of active TNT
- post messages
- create loops
- use delays to sequence the events

Open Minecraft Pi (menu - games- minecraft pi) and select Start Game
Select an existing world or Create a New World
Use the tab key to release the cursor from minecraft

Open Python 2 (menu - programming - python 2)
Open a new file (file - new)
Save the new file as exploding wall (file - save as)

What are you trying to do?	Your pseudo-code

```
import mcpi.minecraft as minecraft
import mcpi.block as block
mc = minecraft.Minecraft.create()
mc.postToChat("exploding wall")
```

```
pos = mc.player.getPos()
mc.setBlocks(pos.x-3, pos.y-1, pos.z+3,
             pos.x+3, pos.y+3, pos.z+5,
             block.TNT.id,1)
mc.postToChat("Hit a block & stand
back")
```

#now press ctrl+s to save your program
then F5 to run it.

Import modules from minecraft and python to use in
your program
Connects the python program to the minecraft game
Print the message inside "" to the screen

Gets the player's current position as the coordinates
Sets the coordinates for the cuboid

Sets the block to be used (TNT.id,1 is exploding
TNT)

Challenges

- replace the the block with TNT.id and see what happens
- increase the size of the wall by changing the coordinates. The larger the wall, the longer it will take for the graphics to render

```
mc.setBlocks(pos.x-3, pos.y-1, pos.z+3,
             pos.x+3, pos.y+3, pos.z+5,
             block.TNT.id,1)
```

Lava Shower

In this activity you will write a program that creates a lava shower that starts above you in the sky.



In your program you will need to

- get the player's position
- create a cuboid of flowing lava
- post messages
- create loops
- use delays to sequence the events

Open Minecraft Pi (menu - games- minecraft pi) and select Start Game
Select an existing world or Create a New World
Use the tab key to release the cursor from minecraft

Open Python 2 (menu - programming - python 2)
Open a new file (file - new)
Save the new file as lava shower (file - save as)

What are you trying to do?	Your pseudo-code

In your new file type the following code

```
import mcpi.minecraft as minecraft
import mcpi.block as block
import time
mc = minecraft.Minecraft.create()
while True:
    mc.postToChat("Look up!")
    pos = mc.player.getPos()
    mc.setBlocks(pos.x-5, pos.y+10, pos.z-5,
                pos.x+3, pos.y+15, pos.z+5,
                block.LAVA_FLOWING.id)
    mc.postToChat("Lava Shower!")
    time.sleep(2)
    x=0
    while x<5:
        x=x+1
        mc.postToChat("RUN!!!")
        time.sleep(1)
    mc.postToChat("Phew!")
    time.sleep(5)

#now press ctrl+s to save your program then
F5 to run it.
```

Import modules from minecraft and python to use in your program

Connects the python program to the minecraft game

Creates a forever loop

Gets the player's current position as coordinates
Gives the coordinates for the lava

Sets the blocks to flowing lava

Creates a variable called x with a value of 0
Creates a loop for 5 occasions
Increase the variable x by 1
The double indent showing it's a loop within a loops

Challenge

Can you change the type of shower?

Can you alter the amount of time before another lava shower starts?

Can you make the lava shower higher/lower?

Can you change the number of times the message run appears on the screen?

Explain how you modified the code

Lava Shower with Triggers

In this activity you will modify your lava shower to start if certain blocks are stood on



In your program you will need to

- check the block the player is standing on
- create if and else statements

Open Minecraft Pi (menu - games- minecraft pi) and select Start Game
Select an existing world or Create a New World
Use the tab key to release the cursor from minecraft

Open Python 2 (menu - programming - python 2)
Open a recent file (lava shower)
Save the new file as lava shower trigger (file - save as)

What are you trying to do?	Your pseudo-code

Use a trigger (selection statement) to start the lava shower.

In the example below the lava shower starts when the character stands on block of sand.

Add the bold lines to your program

```
import mcpi.minecraft as minecraft
import mcpi.block as block
import time
mc = minecraft.Minecraft.create()
while True:
    pos = mc.player.getPos()
    blockBelow = mc.getBlock (pos.x, pos.y-1, pos.z+1)
    if blockBelow == block.SAND.id
        mc.postToChat("Look up!")
        mc.setBlocks(pos.x-5, pos.y+10, pos.z-5,
                    pos.x+3, pos.y+15, pos.z+5,
                    block.LAVA_FLOWING.id)
        mc.postToChat("Lava Shower!")
        time.sleep(2)
        x=0
        while x<5:
            x=x+1
            mc.postToChat("RUN!!!")
            time.sleep(1)
        mc.postToChat("Phew!")
        time.sleep(5)
```

#now press ctrl+s to save your program then F5 to run it.

check the block you are standing on and if that blocks is sand then start the lava shower sequence

Gets the block the player is standing on
Conditional statement - the program below will only run if this condition is met (stands on a block of sand)

== is used for equals, as = sets variables

Challenge

Can you change the trigger to another block?

Can you make the trigger a block above or in front of the character?

Explain how you modified the code

What Lies Beneath

In this activity you will write a game in which you have to avoid the randomly selected block of air



In your program you will need to

- get the player's position
- create a surface area for the game
- create lists
- use random selection
- create loops
- use delays
- use selection statements

Open Minecraft Pi (menu - games- minecraft pi) and select Start Game
 Select an existing world or Create a New World
 Use the tab key to release the cursor from minecraft

Open Python 2 (menu - programming - python 2)
 Open a new file (file - new)
 Save the new file as what lies beneath (file - save as)

What are you trying to do?	Your pseudo-code

Challenges

- change the scoring system
- remove more blocks
- make a shorter countdown timer


```

import mcpi.minecraft as minecraft
import mcpi.block as block
import random
import time
mc = minecraft.Minecraft.create()
pos = mc.player.getPos()
posxlist= (pos.x-3, pos.x-2, pos.x-1, pos.x, pos.x+1,
pos.x+2)
poszlist= (pos.z+3, pos.z+4, pos.z+5, pos.z+6, pos.z+7,
pos.z+8)
mc.setBlocks(pos.x - 3, pos.y-1, pos.z +3,
              pos.x + 2, pos.y -1, pos.z+8,
              block.WOOL.id,3)
time.sleep(2)
mc.postToChat("Pick a Block")
n = 0
life = 1
while life == 1:
    x = 10
    while x>0:
        mc.postToChat(x)
        x = x-1
        time.sleep(1)
    mc.postToChat("Watch Out")
    randxPos = random.choice(posxlist)
    randzPos = random.choice(poszlist)
    mc.setBlocks(randxPos, pos.y-1, randzPos,
                 randxPos+1, pos.y-500, randzPos+1,
                 block.AIR.id)
    pos = mc.player.getPos()
    blockBelow = mc.getBlock(pos.x, pos.y - 1, pos.z
+ 1)
    if blockBelow == block.AIR.id:
        mc.postToChat("NO!!! Game Over")
        time.sleep(1)
        mc.postToChat("You scored")
        mc.postToChat(n)
        life = 0
    else:
        mc.postToChat("Phew. Now pick another
block")
        n = n + 100
#now press ctrl+s to save your program then F5 to run it.

```

Import modules from minecraft and python to use in your program

Connects the python program to the minecraft game

Gets your current position

Creates lists of x and z values

Creates a cuboid of wool

Creates variable n (this will be your score)

Creates variable life

If you are alive run the following code

creates a countdown timer

creates a random column of air use the lists created earlier

Checks to see if you are now standing on a block of air: if you are game over and posts your score; if not you get 100 points and play again.