# Pac-Man Game Design

Your Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Tutor Group:\_\_\_\_\_\_\_\_\_\_\_

**Objectives: This work sheet has 3 main sections: Easy, Medium and Hard. Each section contains tasks and extensions. All student pathways should work their way through the Easy section creating the basics for the game. Secure pathway students should attempt the Medium section, Confident and Exceptional should complete all of it. Confident and Exceptional should attempt the Hard section.**

**Tick off each task here as you complete it. Work through in this order:**

## Easy:

|  |  |
| --- | --- |
| 1. Animate Pac-Man |  |
| 1. Control Pac-Man |  |
| 1. Make the Ghost move |  |
| 1. Redesign Maze |  |
| 1. Extension 1 |  |
| 1. Extension 2 |  |
| 1. Extension 3 |  |

## Medium:

|  |  |
| --- | --- |
| 1. Score for each pill eaten |  |
| 1. Making the ghost dangerous! |  |
| 1. Extension 1 |  |
| 1. Extension 2 |  |

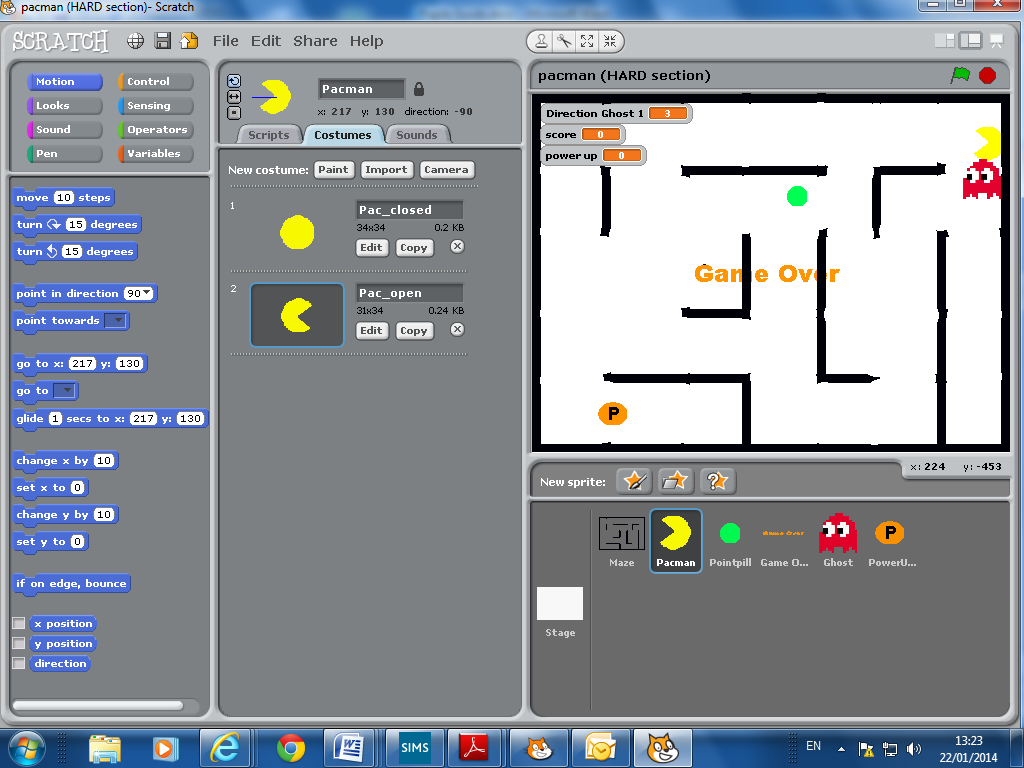
## Hard:

|  |  |
| --- | --- |
| 1. Power ups and eating a ghost |  |
| 1. Next level |  |
| 1. Extension 1a |  |
| 1. Extension 1b |  |
| 1. Extension 2 |  |
| 1. Extension 3 |  |

**Start by loading up ‘Pac-Man Start Point’ in Scratch.** This contains various sprites you can use to get going.

## Easy

### Animate Pac-Man

You start with two costumes for Pac-Man; a closed mouth and an open one.



To animate it you need to make Pac-Man switch between the two costumes by making the following script for the ‘Pac-Man’ sprite:

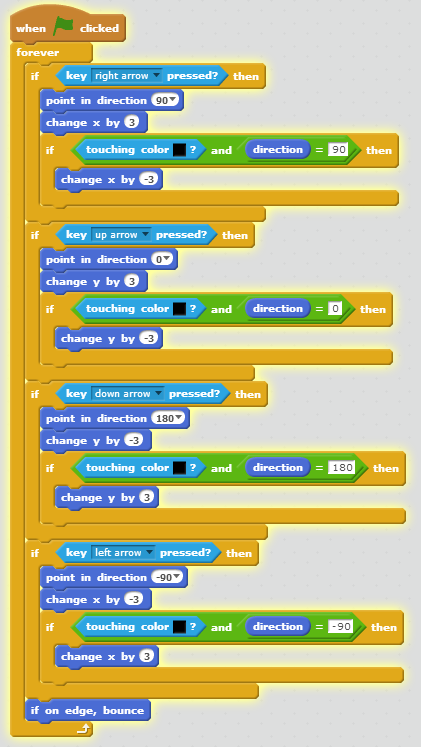
***Easy extension 1: Make the movement look more fluid by making more costumes for Pac-Man with more or less of his mouth open.***

### Control Pac-Man

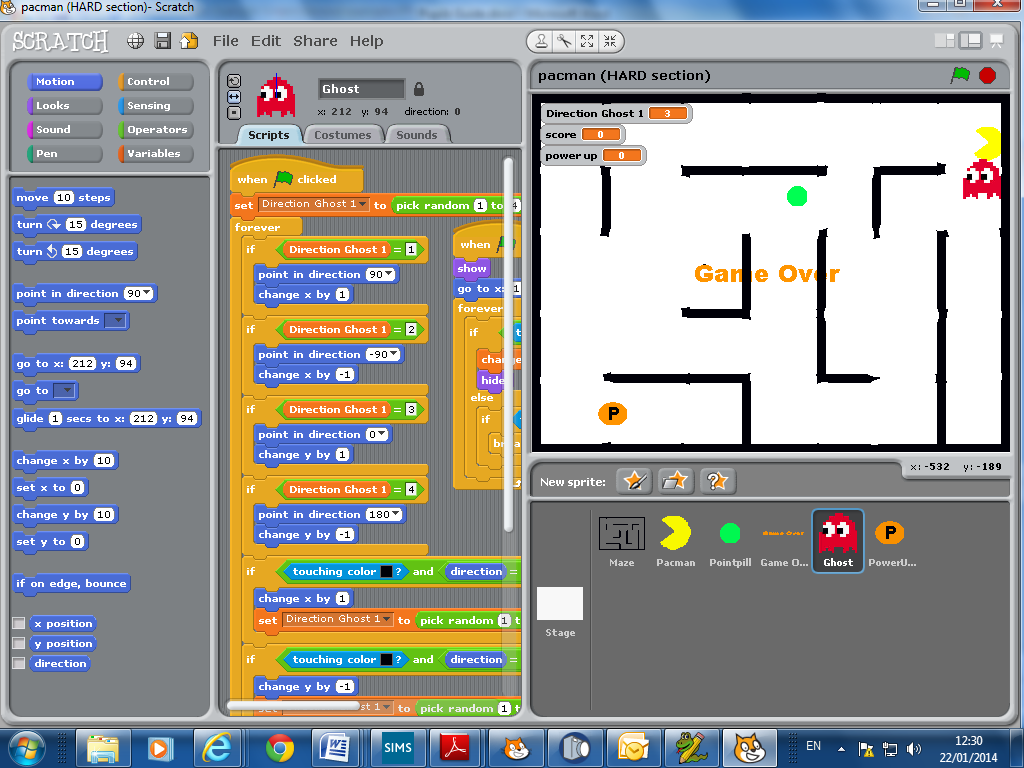
Next we need to sort out some controls. To do this we shall use the arrow keys to make him move in the correct direction.

If you look at the example below you can see that the script points the sprite in the correct direction, moves it by a small amount and then checks to see IF it is touching a black wall (the colour of the maze walls) AND if it is facing that way. IF it is then it changes the position by a few steps to move Pac-Man away from the wall.

***Easy extension 2: Is Pac-man moving too quickly? Try changing the values of ‘change x by …’ and ‘change y by …’ to alter Pac-Man’s speed.***



### Make the Ghost move

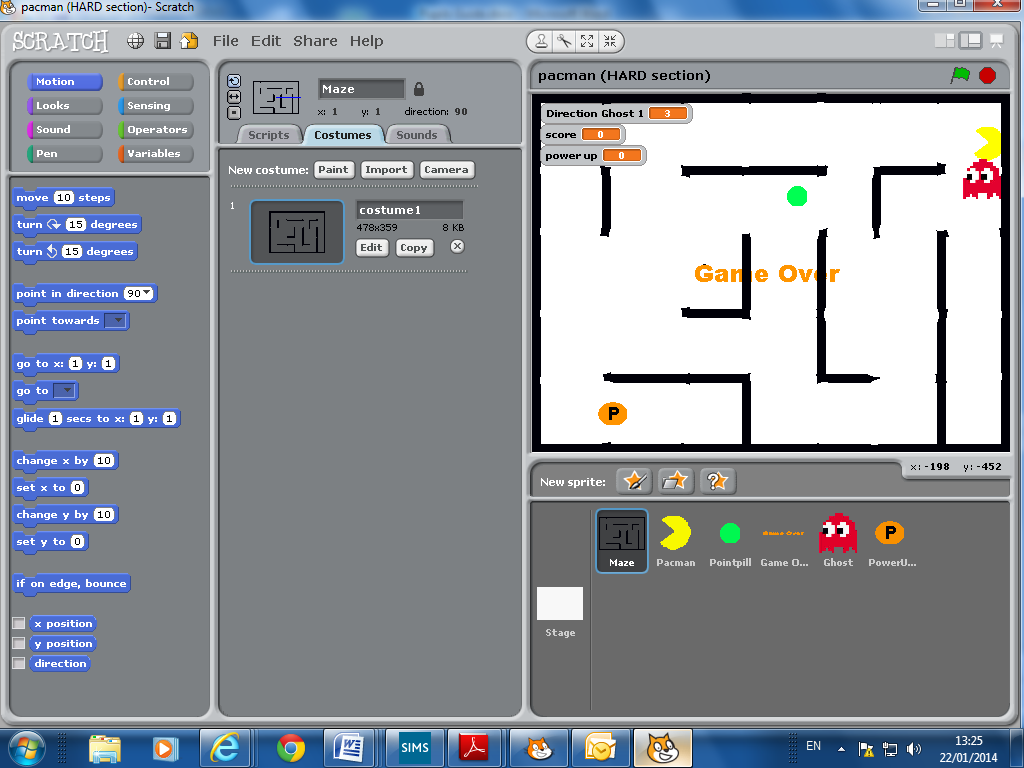
The ghost is the enemy of Pac-Man, and if you hit him you should lose the game (more on that later). To make it challenging the Ghost needs to move on its own. For now we will make the ghost move randomly rather than chasing Pac-Man.

Looking at the example you can see that we are using a variable, called ‘Red\_Ghost\_Dir’, and making the code pick a random number between 1 and 4 to store in it. The number allows us to represent directions: 1 is right, 2 is left, 3 is up and 4 is down. Below that you can see the code checking the random number and then moving the ghost in a direction depending on what the number is.

Finally, the code does the same thing that we made Pac-Man do by checking if the ghost is touching a wall and if so, changes the direction to move away from it.

***Easy extension 3: if the ghost is having problems or you want it to move faster try changing the ‘change x by …’ and ‘change y by …’ blocks***

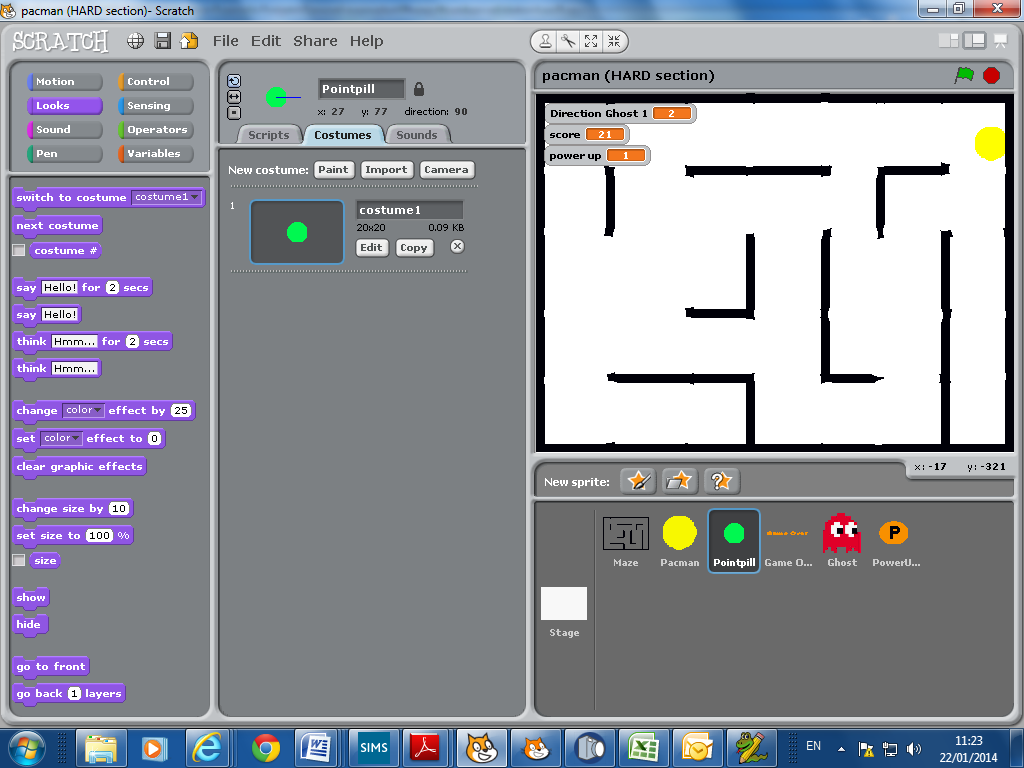
### Redesign/change the Maze (Optional – or you can leave this to later!)

The current maze is a pretty basic one – so, you could have a go at making your own later (or editing this one) in Scratch. **Alternatively there is a better maze sprite available in the Pacman folder, just drag it in.**

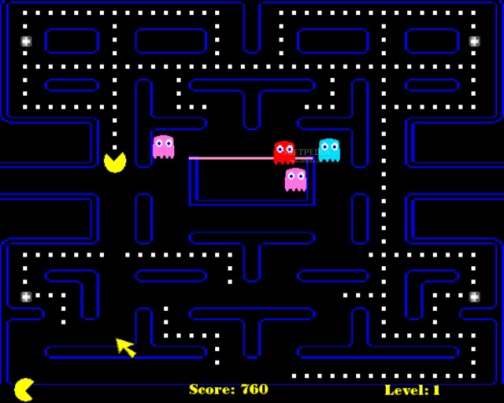
If you do edit the maze, remember to use black for any walls otherwise your scripts for Pac-Man will not work and he will move right through them! Also, make sure the gaps are big enough for Pac-Man to move through (or make Pacman and the ghosts smaller). Having only one path will make it impossible to avoid the ghost, so make sure there are no dead ends or single routes.

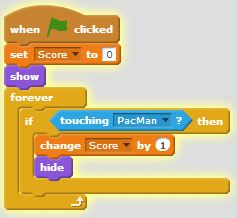
## Medium:

### 1. Score for each PointPill eaten

When playing a game earning points makes you keep playing, so let’s get some points! In Pac-Man pointpills can be eaten for points (these are the tiny dots on the maze).

Go to Variables in the script menus and click ‘Make Variable’ and name it ‘Score’, making sure you select ‘For all sprites’.

Now go to ‘PointPill’ sprite and make the following code:

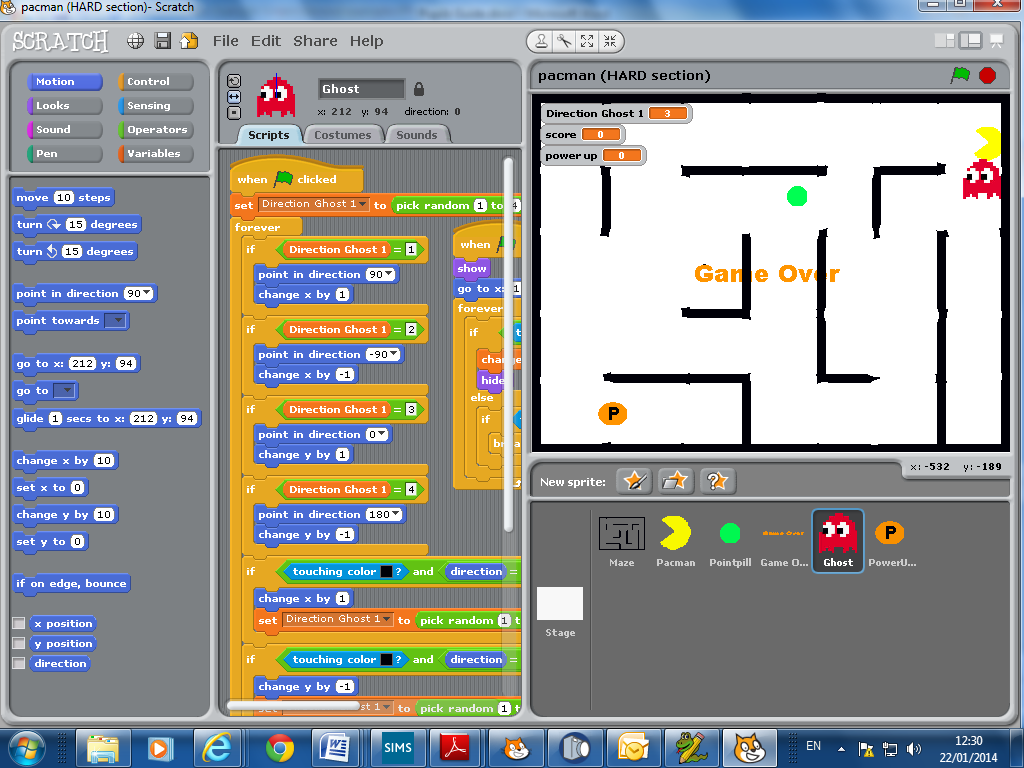


And that is the PointPill complete and working!

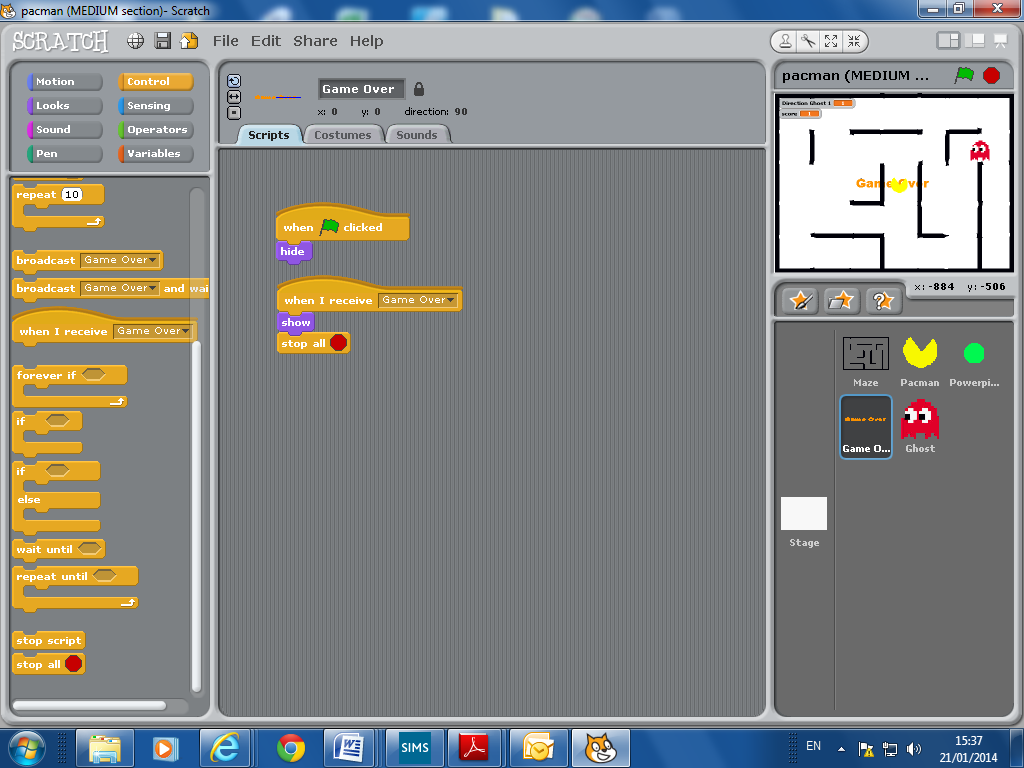
***Medium extension 1: In the real Pac-Man, PointPills fill the available maze area (see picture above). In fact, you have to eat them all in order to go to the next level. Feel free to make as many PointPills as you like, the more the better!***

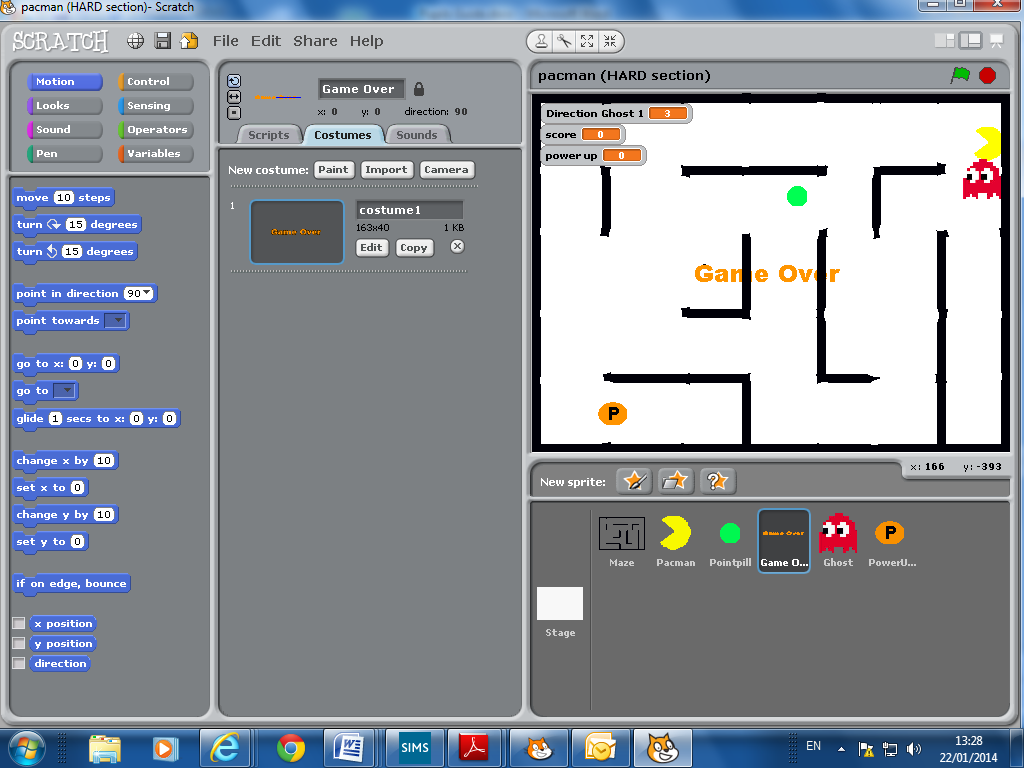
***Think about making each one automatically start in a certain location by using a ‘go to…’ block when the green flag is clicked at the start.***

### 2. Making the ghost dangerous

The Ghost isn’t supposed to just stagger about - it needs to be a threat! Let’s make the Ghost have some impact on the game by making it end the game.

For the Ghost’s script make the following:

This makes it so that IF the Ghost touches Pac-Man at any time it broadcasts a message. You will need to make a new broadcast message called ‘Game Over!’ when you set up the broadcast block. That message will be used to end the game, which we will set up now.



In the ‘GameOver’ sprite you also need the following code:

This hides the message when the game starts first.

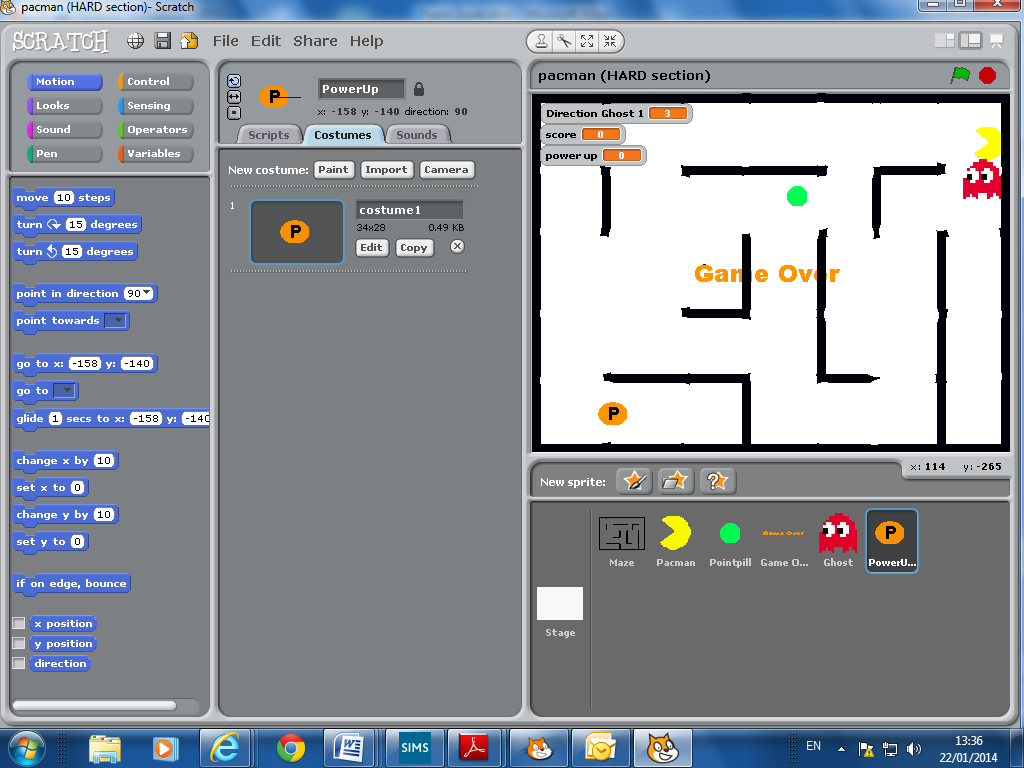
It then shows the ‘Game Over!’ sprite when the Ghost broadcasts the ‘Game Over!’ message.

There is a problem however – when the game restarts you have to move all the pieces around otherwise it will end immediately! For the Ghost and Pac-Man add a ‘go to…’ block at the start and put in some coordinates away from each other.

***Medium Extension 2: Add 3 more ghosts by copying and pasting the Ghost sprite! Rename them. Edit them to be different colours. Also make them start at a specific place in the maze by using a ‘go to…’ block when the green flag is clicked at the start.***

## Hard

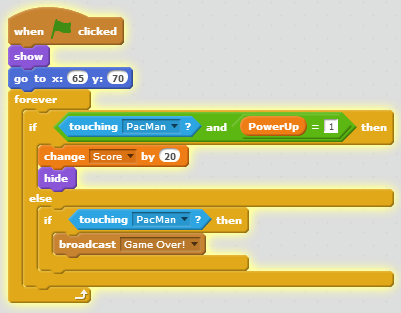
### 1. Power ups and eating a ghost.

In the real Pac-Man you can eat power-ups which let you kill ghosts!

As we did before with the ‘Game Over!’ message, we need to do the same thing again with the power-ups, so your blocks should look like this:

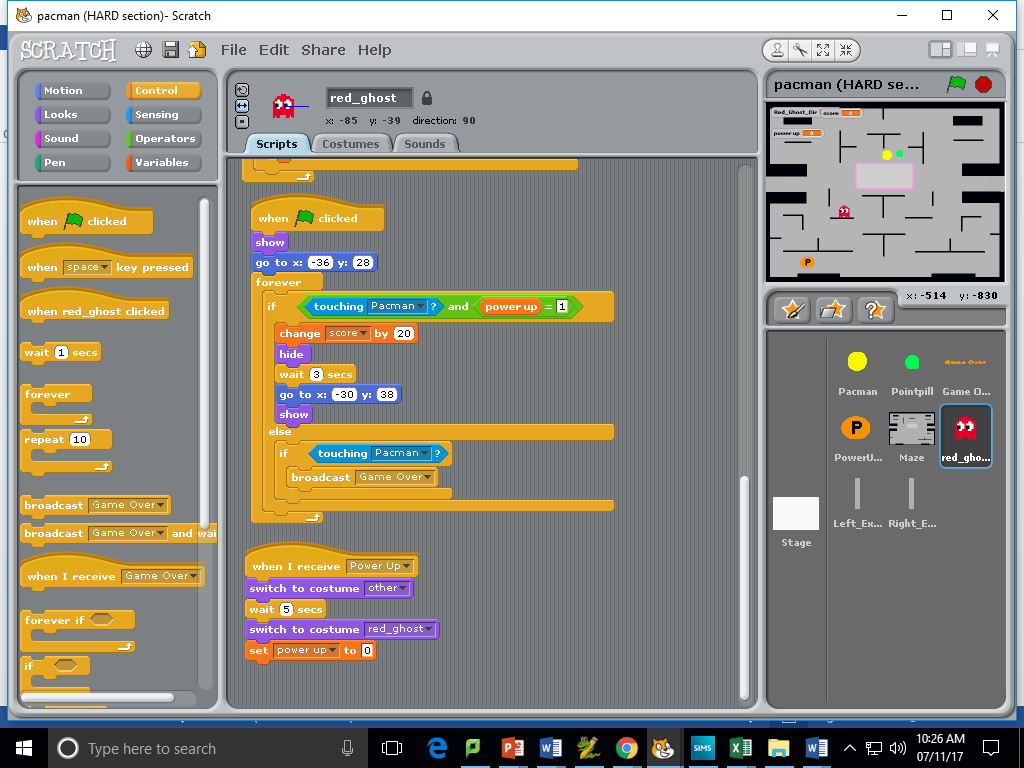
Notice we have made a new message called ‘PowerUp!’ and we have a new variable called ‘PowerUp’. The PowerUp variable is used to let us know if a PowerUp is active or not. At the start of the game we set the variable to 0 – meaning inactive. If the Pac-Man eats a PowerUp the variable gets set to 1 - active! The PowerUp should only be active for about 5 seconds before the Ghosts become dangerous again – PowerUp gets set back to 0.

**The blocks below go with the Ghost sprite** and allow you eat a ghost and score points when the PowerUp is active.



If Pacman eats a ghost when PowerUp is active, he scores 20 points and the ghost disappears. But what happens next?

Hint: the ghost should reappear again after a few seconds at a position that you choose.



***Extension: When the Power-up is eaten the broadcast message should also do other things:***

1. ***the ghost’s (and maybe Pac-Man’s) costume should change to show that the ghosts can now be eaten***
2. ***the Power-up should only last for a few seconds before the ghosts are dangerous again. (change the PowerUp variable back to 0 when time is up)***

***Here is an algorithm that shows what the ghost should do when it receives the Power-up message:***

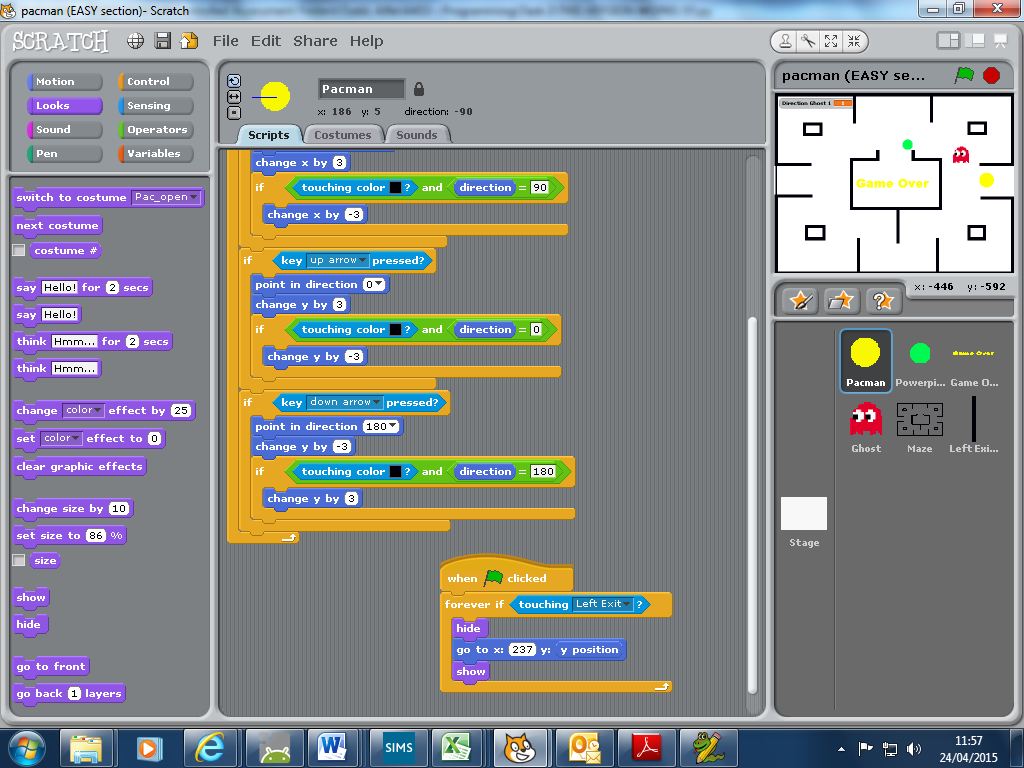
1. Change costume (to Other)
2. Wait 5 seconds
3. Change costume (back to normal)
4. Set PowerUp variable back to 0

### 2. Maze exits (left and right)

### *Hard extension 2: In the real game, Pacman and the ghosts can exit the maze through the gaps on the left side and right side. If they leave from the left side they should re-appear from the right side, and vice-versa.*

Create two new sprites which are just vertical lines. Name them “left exit” and “right exit”. Position them across the gaps in the maze.

Then code the ghosts and Pacman so that when they touch one of these sprites they disappear and then re-appear from the other side. E.g.



### 3. Sound

### *Hard extension 3: Use the sound files from the original Pac-man game (in the folder O:\ICT\Scratch\Sounds) in your game. Import them first.*

### 3. Next level

***Hard extension 3: The next level could be reached when all the PointPills are eaten. The Maze would need to change to a different costume and the sprites for Pac-Man, Ghosts, PowerUps and PointPills would need to move to different starting locations.***