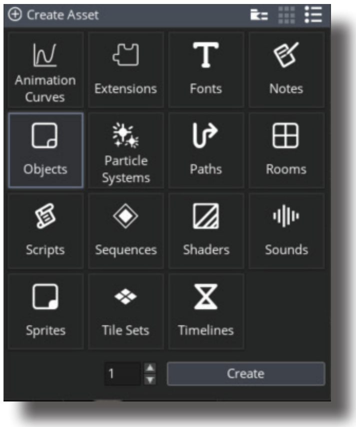
Creating Breakout - Beta

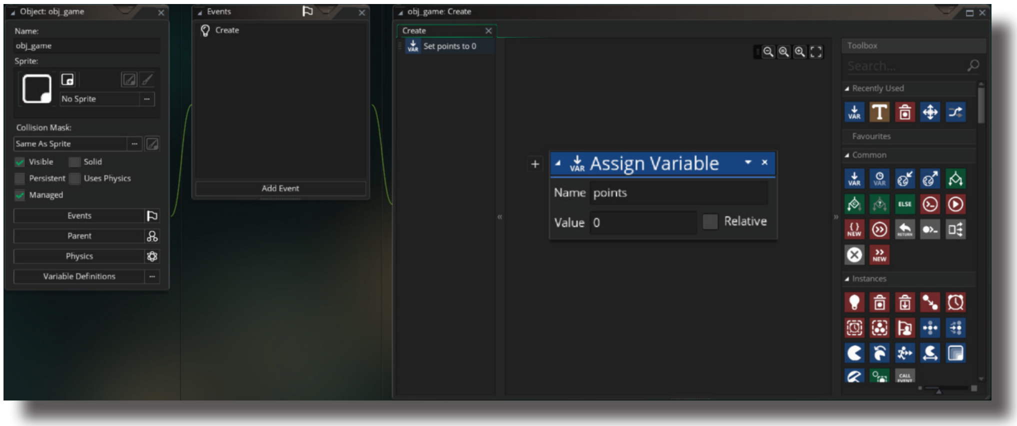
Adapted from Basic Projects: Game Maker by David Waller

So the program is made. It's rough, but the basic parameters of the game are there. It's not yet a game though. There isn't yet a victory condition, win loss message or a score. It doesn't have a splash screen to introduce the game. There are no sounds. It plays rather slowly too. There is a lot left to do to make this program a decent game and this packet will explain how to make all of this happen.

1. Launch GameMaker Studio and open the game. Choose File>Save As and rename the game with Beta somewhere in the title. If anything goes drastically wrong with the new version, the old alpha still exists as a fall back or roll back point.

2. In the Asset Browser, click the circle with the plus inside of it, then choose object, 1 and press Create. A new object has been created and is open in the Workspace. Name this obj_game. Its visibility or whether it is solid or not does not matter as it will not have a sprite to be visible. It will just be an object with programming that runs but does not show up visibly or interact with other items in the game. Next click Add Event>Create. From the Common Section, drag Assign Variable into the actions area. Name the variable points and change the value to 0. This will set the points to zero when the game begins.



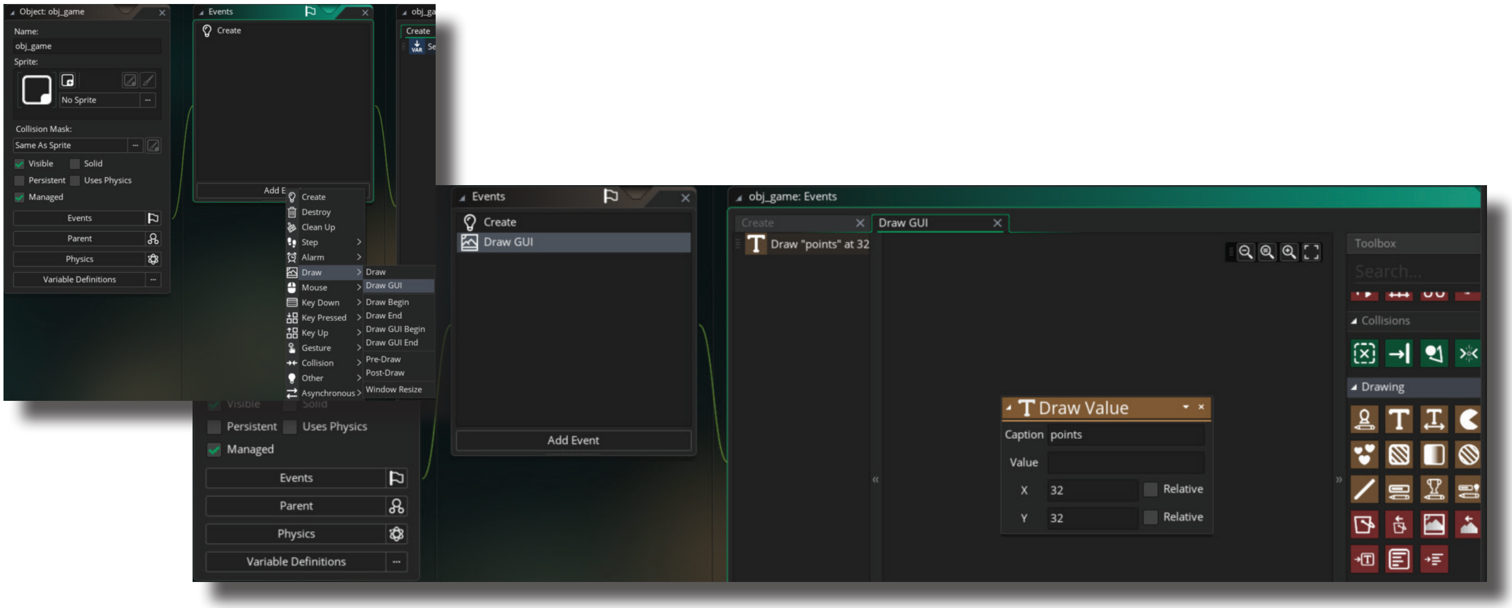


Name: obj_game
Sprite: No Sprite
Collision Mask: Same As Sprite

Set points to 0

Assign Variable
Name points
Value 0 □ Relative

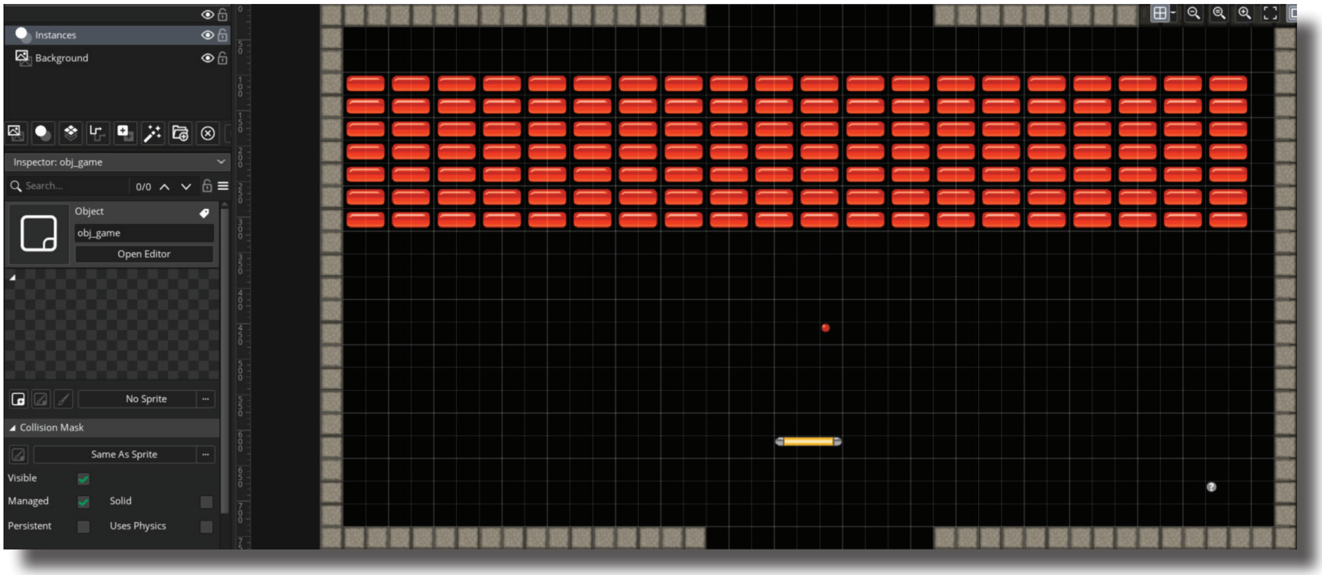
3. Staying with obj_game, press the Add Event button and choose Draw GUI. GUI means Graphics User Interface. In this case the GUI will create the score. To make this happen, from the Drawing Section, drag Draw Value to the actions area. Change the caption to points (capitalization and spelling are critical and must match the way that it was entered in the last step) and x and y both to 32. Close obj_game.



Draw GUI
Draw "points" at 32

Draw Value
Caption points
Value
X 32 □ Relative
Y 32 □ Relative

4. Open Room1 and add obj_game to the room. Since it wasn't assigned a sprite, it will appear as a question mark in a gray circle. Now close Room1 and save the progress.



Inspector: obj_game

Object: obj_game

No Sprite

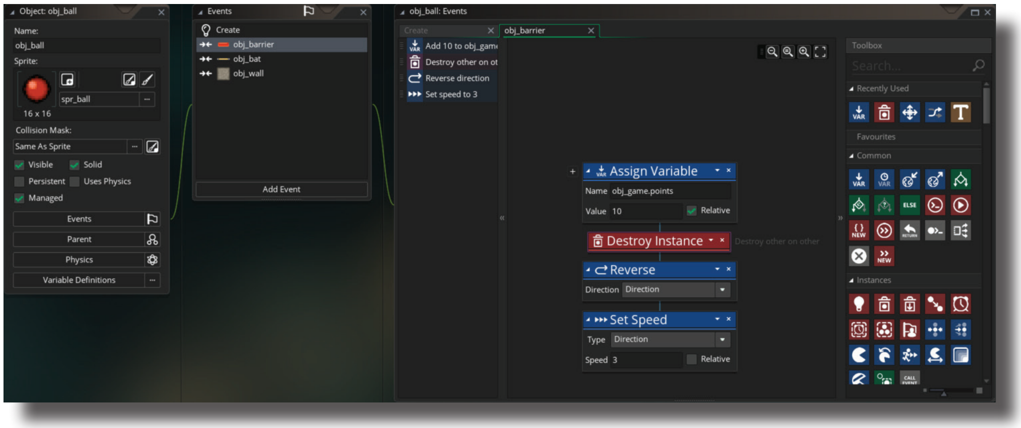
Collision Mask: Same As Sprite

Visible ☑ Solid □

Managed ☑ Uses Physics □

Persistent □

5. With the starting score set and visible in the top left corner of the room, the player needs a way to collect points. This will occur when a barrier is broken. So open obj_ball and choose the collision event with the barrier. Blocks of code already exist to destroy the barrier, reserve the balls path and set the speed; just one more block will be needed to add to the score. From the Common Section, find and drag the Assign Variable action in and place it above the Destroy Instance block. Change the Name to obj_game.points so that it links back to the Variable that was made for the point is the game object. Next change the Value to 10 relative. This means that each barrier's destruction will add points to the existing score. Not checking relative would set the score to 10 each time and not add to the score. Close obj_ball, save the game and test the new programming. The score should be displayed and each barrier's destruction should add 10 points to it.



Object: obj_ball

Name: obj_ball

Sprite: spr_ball (16 x 16)

Collision Mask: Same As Sprite

☑ Visible ☑ Solid

□ Persistent □ Uses Physics

☑ Managed

Events: Create, obj_barrier, obj_bat, obj_wall

obj_ball: Events — obj_barrier

Add 10 to obj_game
Destroy other on ot
Reverse direction
Set speed to 3

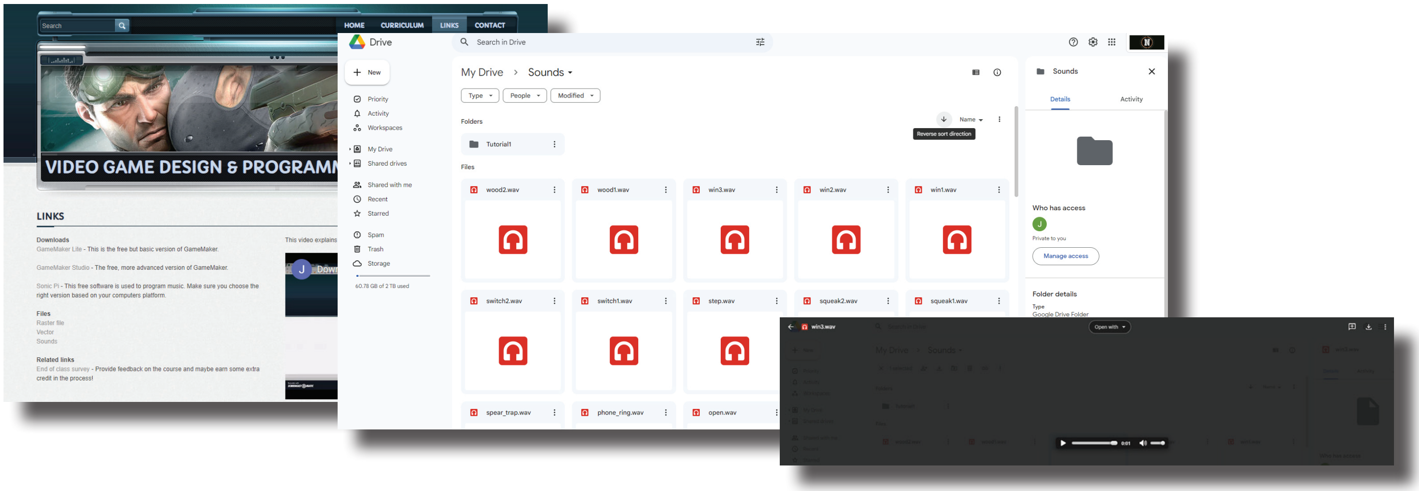
Assign Variable
Name: obj_game.points
Value: 10 ☑ Relative

Destroy Instance — Destroy other on other

Reverse
Direction: Direction

Set Speed
Type: Direction
Speed: 3 □ Relative

6. The game is silent as it is now. There are sounds (free to use without copyright concerns) on the course site. Navigate there and click on links. One of the things listed there is sounds. Clicking on this will open a Google Drive folder full of various sounds. Double clicking on one will open and play the sound. Choose and download four sounds as each collision should make a sound. The download icon in the top right corner will do the trick.



VIDEO GAME DESIGN & PROGRAMM

LINKS

Downloads
GameMaker Lite - This is the free but basic version of GameMaker.
GameMaker Studio - The free, more advanced version of GameMaker.
Sonic Pi - This free software is used to program music. Make sure you choose the right version based on your computers platform.

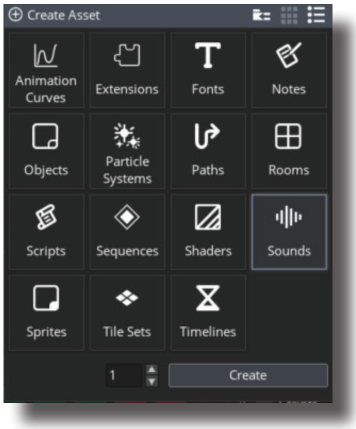
Files
Raster file
Vector
Sounds

Related links
End of class survey - Provide feedback on the course and maybe earn some extra credit in the process!

My Drive › Sounds

Folders: Tutorial1

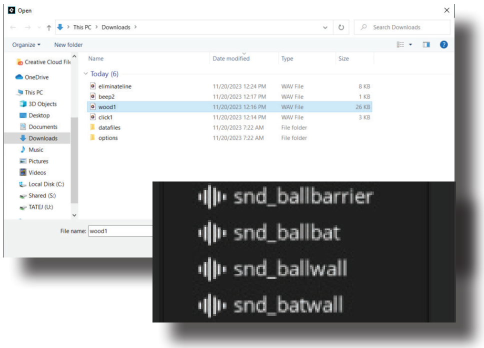
Files: wood2.wav, wood1.wav, win3.wav, win2.wav, win1.wav, switch2.wav, switch1.wav, step.wav, squeak2.wav, squeak1.wav, spear_trap.wav, phone_ring.wav, open.wav



7. With the sounds collected and in the downloads folder, it's time to return to GameMaker. In the Asset Browser, click on the plus enclosed in a circle. Choose Sounds and four for the number to create. In the Workspace three new dialogue boxes should appear.

8. Name one of the new sounds snd_batwall and then click on the three dots just to the right of the name box. This will open a new window to choose what sounds to use. Navigate to downloads and choose the desired sound effect for the collision between the bat and the wall. The other setting can be left in their default positions.

9. Repeat step 8 for the other sounds using the names snd_ballbat, snd_ballwall and snd_ballbarrier and appropriate sounds. Then close each of the sounds.



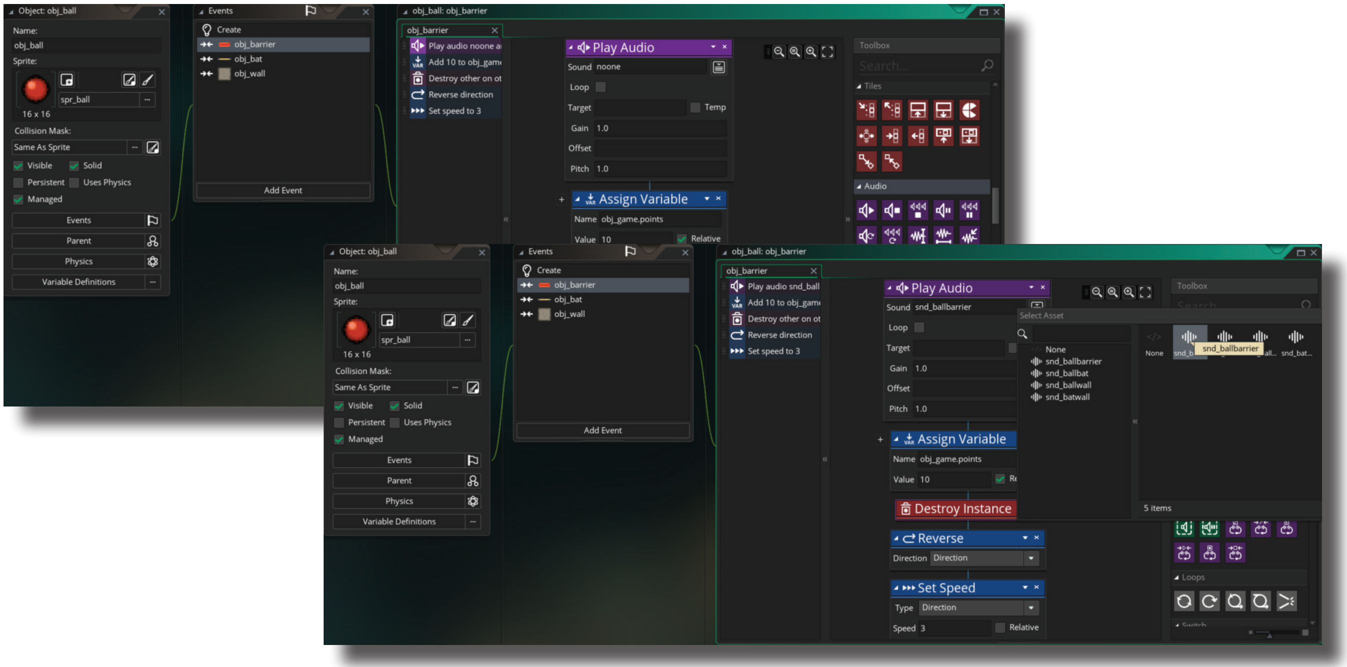
Today (6)

Name	Date modified	Type	Size
eliminateline	11/20/2023 12:24 PM	WAV File	8 KB
beep2	11/20/2023 12:17 PM	WAV File	1 KB
wood1	11/20/2023 12:16 PM	WAV File	26 KB
click1	11/20/2023 12:14 PM	WAV File	3 KB
datafiles	11/20/2023 7:22 AM	File folder	
options	11/20/2023 7:22 AM	File folder	

File name: wood1

snd_ballbarrier
snd_ballbat
snd_ballwall
snd_batwall

10. Open the obj_ball since this is where all of the collisions exist. Open the Collision Event between obj_ball and obj_barrier. From the Audio Section of the toolbox, drag Play Audio to the Actions area and attach it above the Assign Variable block. To the right of the Sound box, click on the Select an Asset icon and choose the appropriate sound. Repeat this process for the other two collisions the ball has and close obj_ball.



Name: obj_ball
Sprite: spr_ball
16 x 16
Collision Mask: Same As Sprite
☑ Visible ☑ Solid
☐ Persistent ☐ Uses Physics
☑ Managed

Events: Create, obj_barrier, obj_bat, obj_wall

obj_barrier:
Play audio snd_ballbarrier
Add 10 to obj_game
Destroy other on ot
Reverse direction
Set speed to 3

Play Audio
Sound snd_ballbarrier
Loop ☐
Target
Gain 1.0
Offset
Pitch 1.0

Assign Variable
Name obj_game.points
Value 10 ☑ Relative

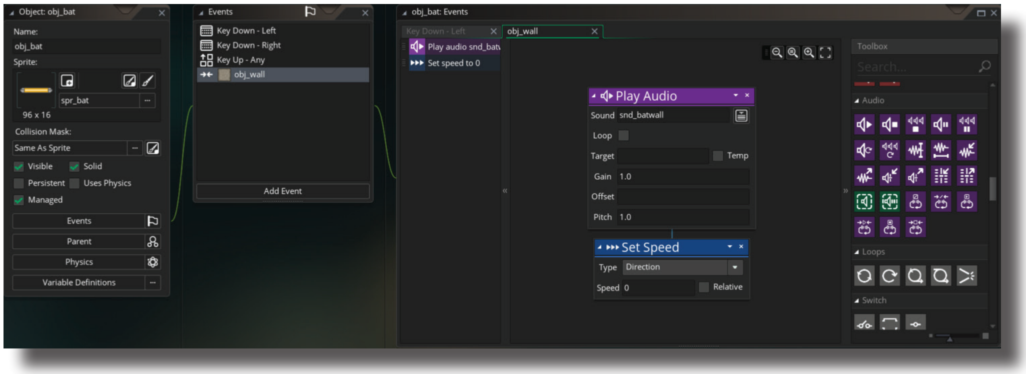
Destroy Instance

Reverse
Direction Direction

Set Speed
Type Direction
Speed 3 ☐ Relative

Select Asset: None, snd_ballbarrier, snd_ballbat, snd_ballwall, snd_batwall
5 items

11. The last collision is with the bat and the wall so open obj_bat. This is where the collision has been programmed. Select the Collision Event and add the Play Audio to the Actions area, attaching it above the Set Speed block. Close obj_bat and save the game. This should complete the sounds. Run the game to test if this works.



Name: obj_bat
Sprite: spr_bat
96 x 16
Collision Mask: Same As Sprite
☑ Visible ☑ Solid
☐ Persistent ☐ Uses Physics
☑ Managed

Events: Key Down - Left, Key Down - Right, Key Up - Any, obj_wall

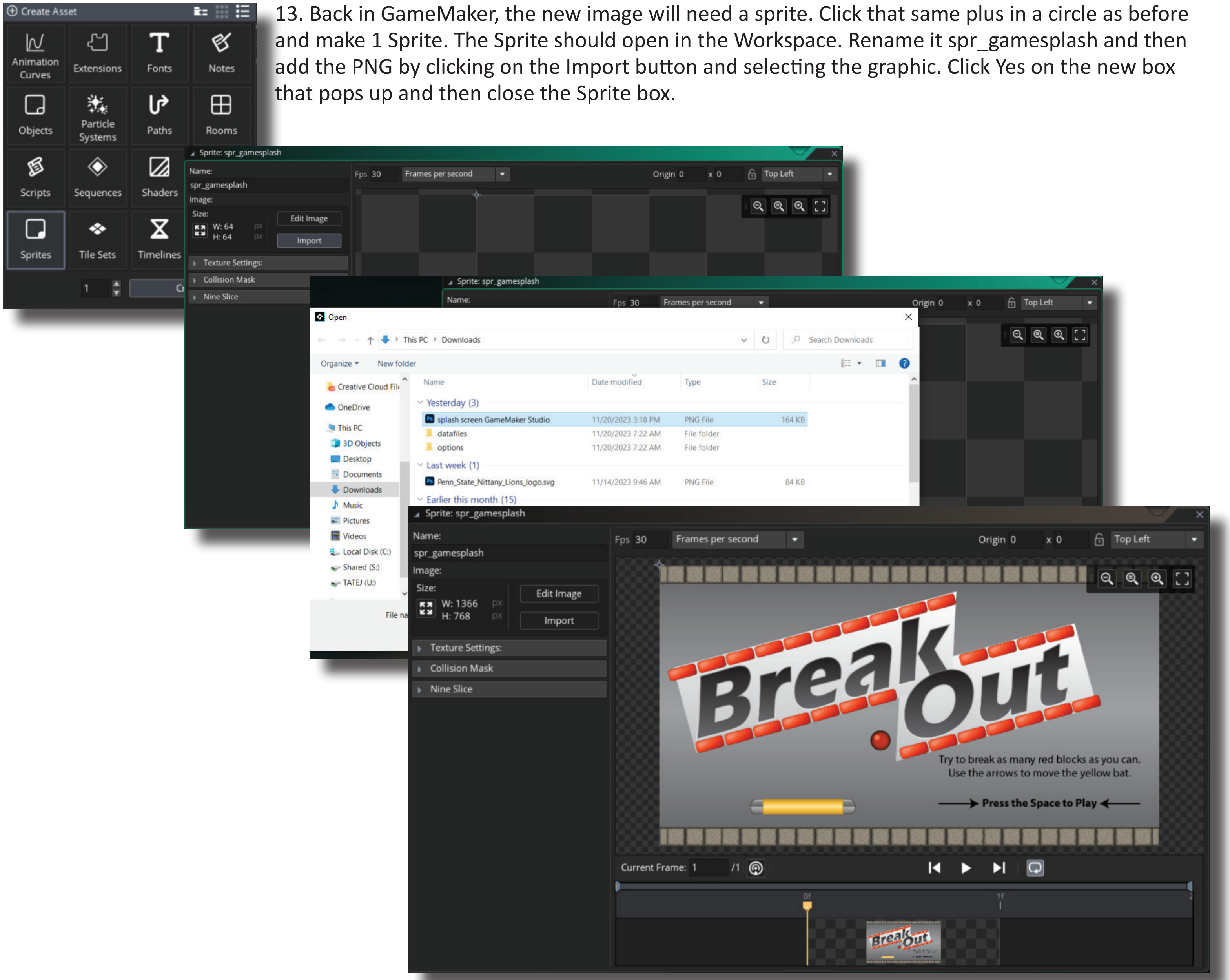
obj_wall:
Play audio snd_batw
Set speed to 0

Play Audio
Sound snd_batwall
Loop ☐
Target ☐ Temp
Gain 1.0
Offset
Pitch 1.0

Set Speed
Type Direction
Speed 0 ☐ Relative

12. Most games have at least one splash screen… a screen to welcome you to the game and maybe even tell you a little bit about it. Sometimes there are many… for companies that helped to develop the game. At the very least, this game will have a welcoming splash screen that will be the players first impression of the game. As such, it's important to make it look good and also fit the vibe that the game is going for. Using Illustrator and any of the tips and tools that were given, make a splash screen that is designed for the web (72ppi, RGB) with a pixel count of 1366 x 768. When done, export the document as a PNG file just as was done for the sprites.

13. Back in GameMaker, the new image will need a sprite. Click that same plus in a circle as before and make 1 Sprite. The Sprite should open in the Workspace. Rename it spr_gamesplash and then add the PNG by clicking on the Import button and selecting the graphic. Click Yes on the new box that pops up and then close the Sprite box.



Sprite: spr_gamesplash

Name: spr_gamesplash

Size: W: 64 H: 64

Fps 30 Frames per second

Origin 0 x 0 Top Left

Name	Date modified	Type	Size
Yesterday (3)			
splash screen GameMaker Studio	11/20/2023 3:18 PM	PNG File	164 KB
datafiles	11/20/2023 7:22 AM	File folder	
options	11/20/2023 7:22 AM	File folder	
Last week (1)			
Penn_State_Nittany_Lions_logo.svg	11/14/2023 9:46 AM	PNG File	84 KB
Earlier this month (15)			

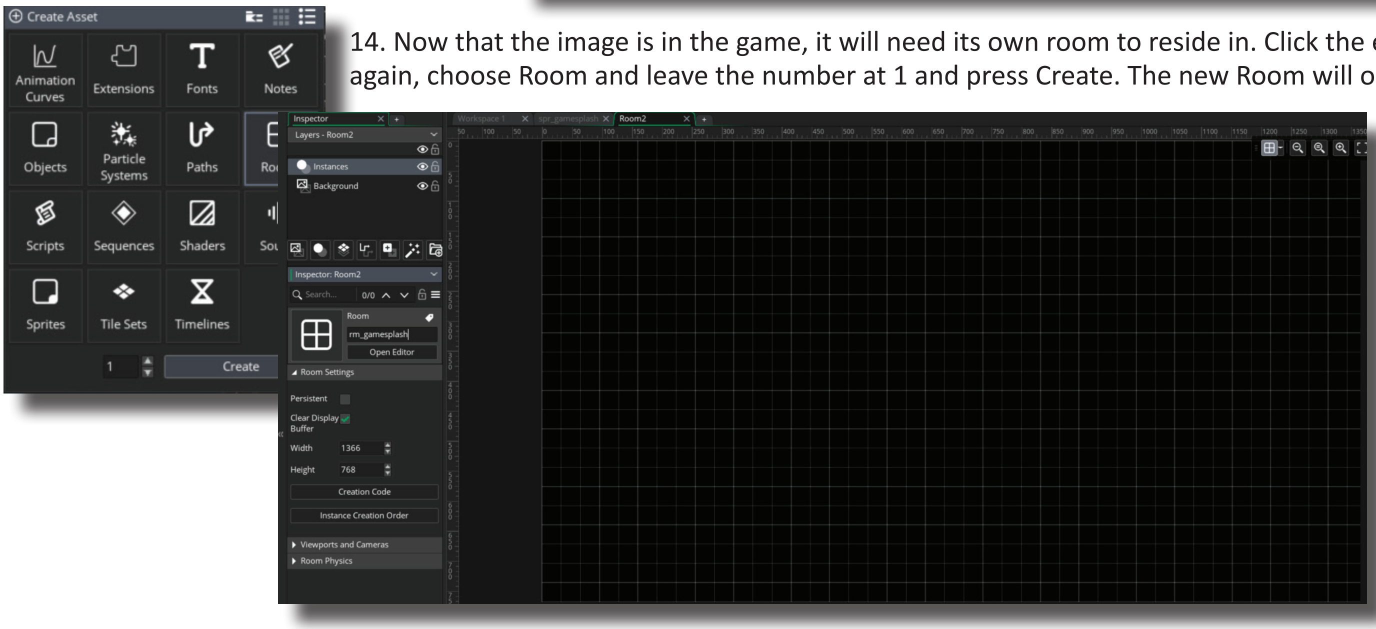
Sprite: spr_gamesplash

Name: spr_gamesplash

Size: W: 1366 H: 768

Current Frame: 1 /1

14. Now that the image is in the game, it will need its own room to reside in. Click the encircled plus again, choose Room and leave the number at 1 and press Create. The new Room will open in the

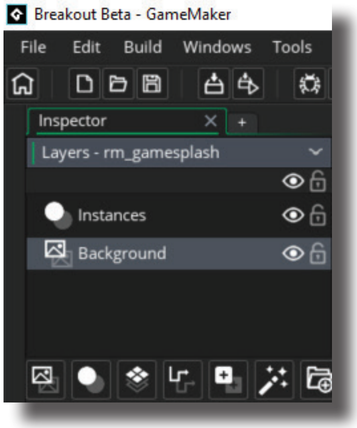


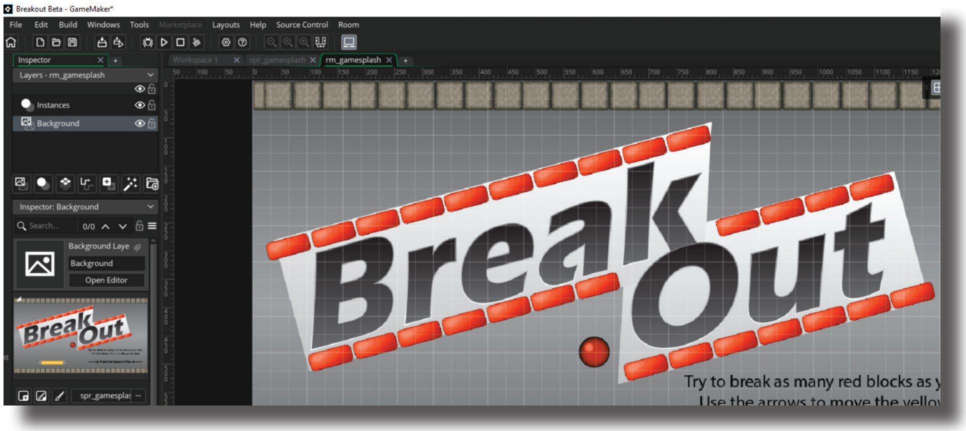
Room: rm_gamesplash

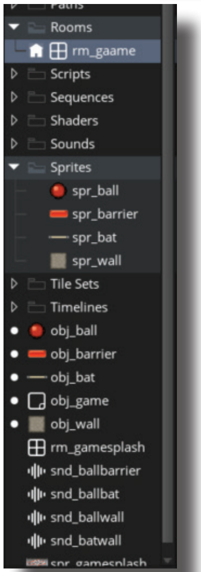
Width 1366

Height 768

Workspace. Along the left side, change the Room's name to rm_gamesplash. Above this area there is Layers. So far everything in the game has existed on the Instances layer. This is where individual instances of objects are placed inside the room. This time, the sprite will be a background and actually not an object so select the background layer. From the Asset Browser on the right side, click on spr_gamesplash and drag it to the top left corner of the Room. This should line spr_gamesplash up perfectly with the room. If not, reposition it or adjust the size in Illustrator (which would require re-exporting and importing the new PNG to the spr_gamesplash). Close the tab for rm_gamesplash.

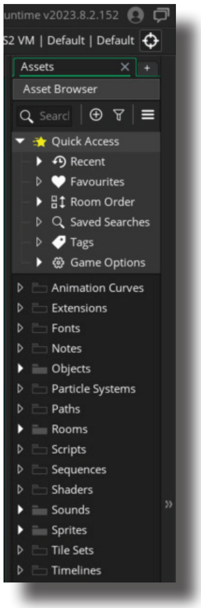




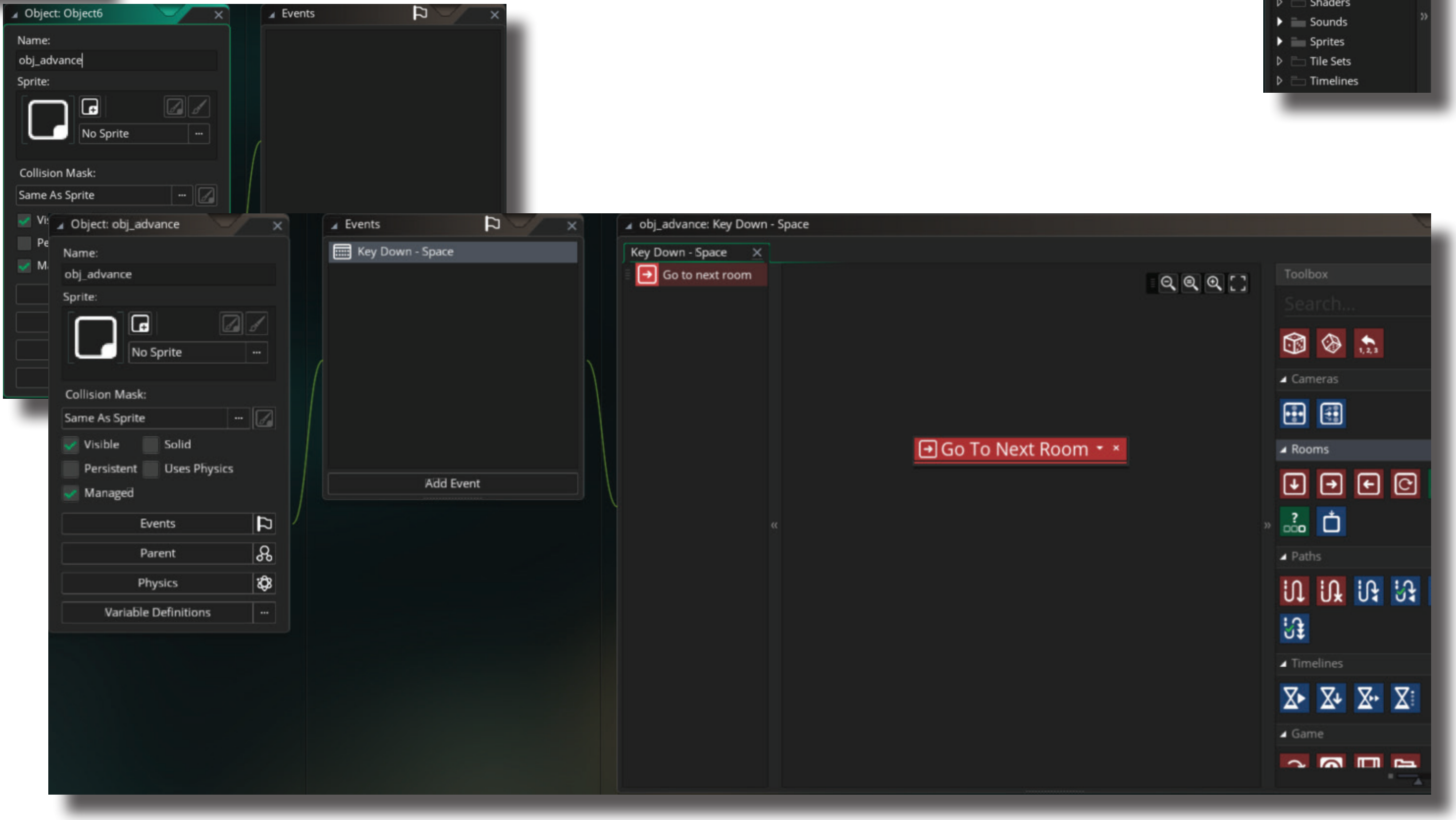


15. Open Room1 from the Asset Browser on the right. Along the left side, change the name of Room1 to rm_game. Save the game and run in to test the new programming. When ran, the splash screen doesn’t appear!

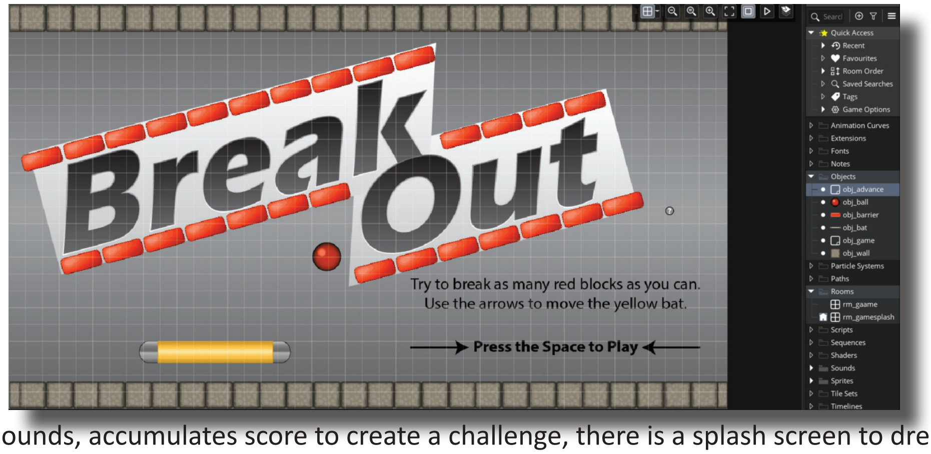
16. Before proceeding, clean up the Asset Browser. All of the sprites, sounds, objects and rooms are piling up at the bottom of the browser. Click and drag each to the folder that it should reside in. Now open the Rooms folder. Which room is the Home? The order that they are listed in is the order in which they will play and if only two exist, the one that is marked with home will go first. Click on the first icon that looks like a house to open the Room Manager. Here, drag it below rm_splash. Now save and run the game. Rm_gamesplash is now visible but there is no way to move past it!



17. The next step is to advance the game with a press of the space bar. To start, click the Create Asset icon (+ in a circle), choose object, 1 and press Create. Change the Name of the new Object to obj_advance. No sprite will be necessary. Now choose Add Event>Key Down>Space. From the Toolbox, scroll to the Rooms Section and click and drag in the Go To Next Room block. Close obj_advance.



18. Now the object needs to be added to the room, with it in the room, there is nothing to trigger the game to move on. Open rm_splash. With the room open in the workspace, click and drag obj_advance to the room. Since there is no sprite, it will be the gray question circle, just like obj_game. Close the tab for rm_splash, then save and run the game to test it.



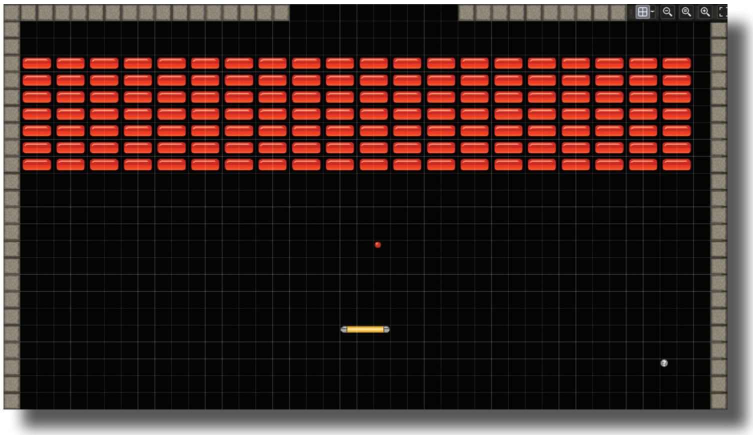
Break Out

Try to break as many red blocks as you can.
Use the arrows to move the yellow bat.

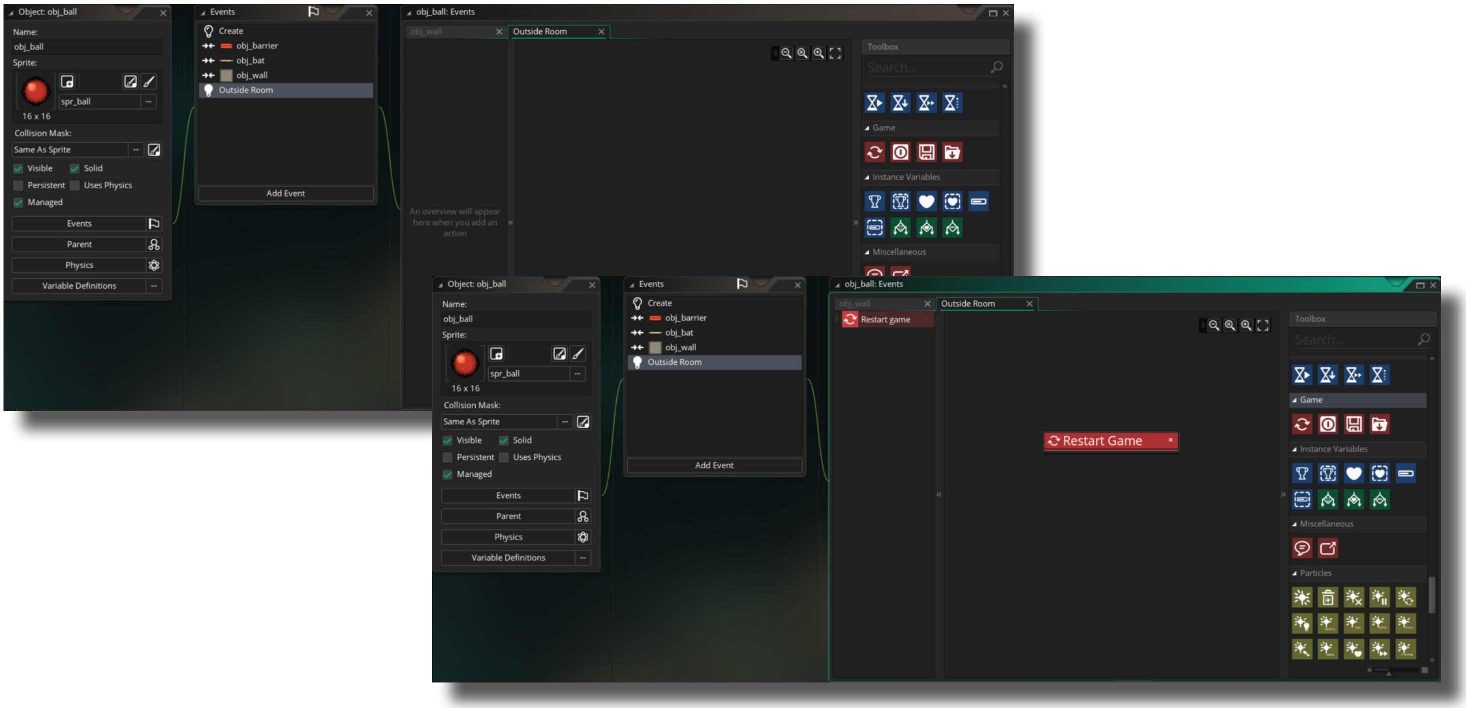
Press the Space to Play

19. So the game now has sounds, accumulates score to create a challenge, there is a splash screen to dress it up and explain how to play, but there isn't a message for if the player loses (the ball exits the bottom) and it is too easy not to lose. This is the next thing to address.

20. Open rm_game. Select and delete each instance of obj_wall along the bottom of the room. This will make the game a bit more challenging and more like classic Breakout. Close rm_game's tab.



21. Open obj_ball and choose Add Event>Outside Room. Then, from the Game Section of the Toolbox, drag the Restart Game Block into the actions area. This will cause the game to restart (go back to the splash screen) when the ball leaves the room.



Object: obj_ball

Name: obj_ball

Sprite: spr_ball

16 x 16

Collision Mask: Same As Sprite

☑ Visible ☑ Solid
□ Persistent □ Uses Physics
☑ Managed

Events: Create, obj_barrier, obj_bat, obj_wall, Outside Room

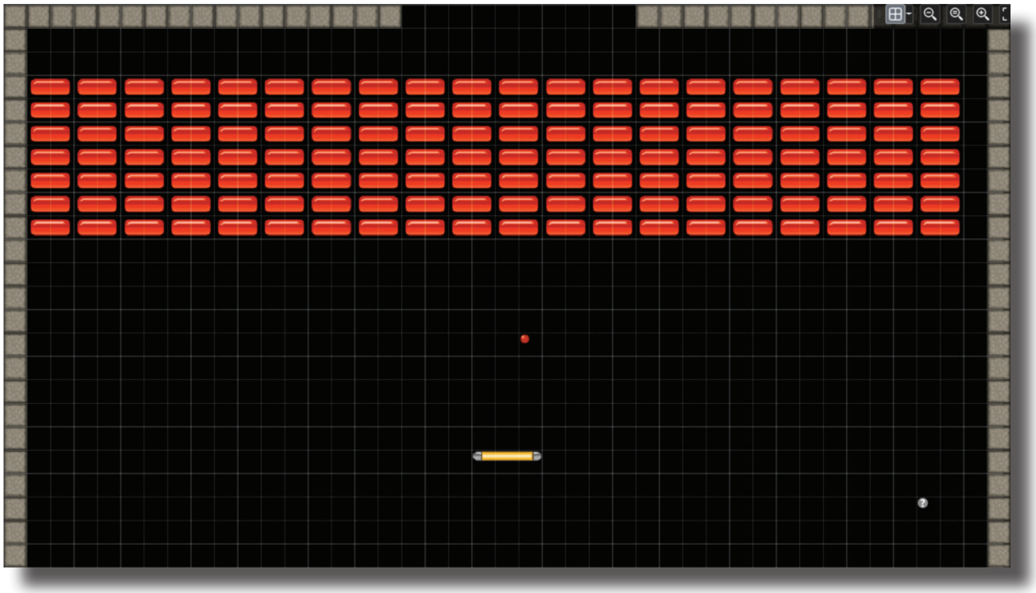
obj_ball: Events

Outside Room

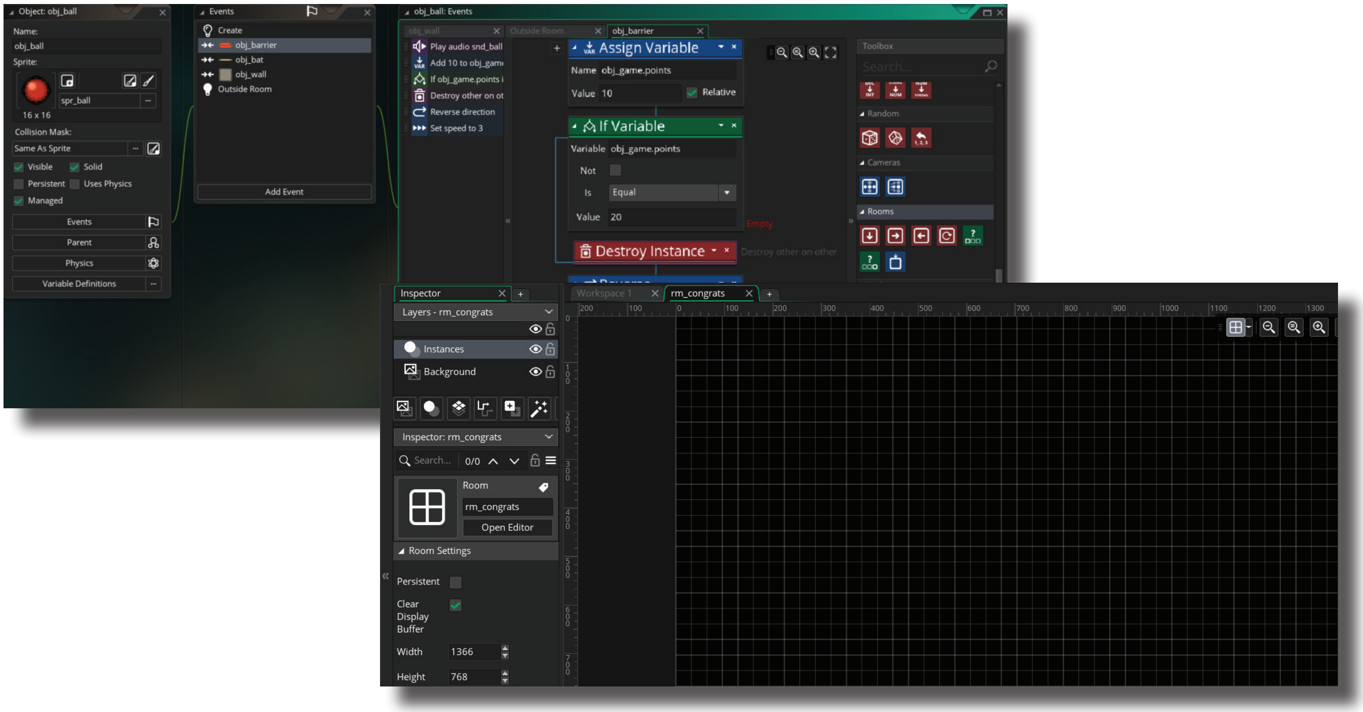
Restart Game

An overview will appear here when you add an action

22. Next count the number of blocks that are in the game room. Each block adds 10 points to the score so multiply the number of blocks that are in the room by 10 to find the maximum score possible. When this score is reached, the player has won the game. In the example game there are 140 blocks. 140 X 10 = 1400 pts.



23. So how does this function in the game? Open obj_ball and then choose the collision event between the ball and the barrier. This event is where barriers are destroyed and points are added. From the Toolbox, find the If Variable and drag it in to attach just below the blue Assign Variable block. For Variable, type in obj_game.points (remember that spelling and capitalization is crucial), change Is to Equal and make the Value 20. Now create a new room This room will display a congratulatory message for the player. For now, don't worry about this part just yet! Rename the Room rm_congrats and close the room's tab. The If Variable was created. In other words, the game is testing to see if a condition exists or is true. As it exists now, there is nothing set to happen if the condition is true though. Now return to obj_ball and the collision event with the barrier. From the Toolbox drag the Go to Room icon from the Rooms section into the actions area and connect it to the right of the If Variable. Change the Room to rm_congrats. Save and run the game. After collecting 20 points the game should proceed to an empty splash screen that will eventually say congratulations.



Name: obj_ball
Sprite: spr_ball
16 x 16
Collision Mask: Same As Sprite
☑ Visible ☑ Solid
□ Persistent □ Uses Physics
☑ Managed

Play audio snd_ball
Add 10 to obj_gam
If obj_game.points i
Destroy other on ot
Reverse direction
Set speed to 3

Assign Variable
Name obj_game.points
Value 10 ☑ Relative

If Variable
Variable obj_game.points
Not □
Is Equal
Value 20

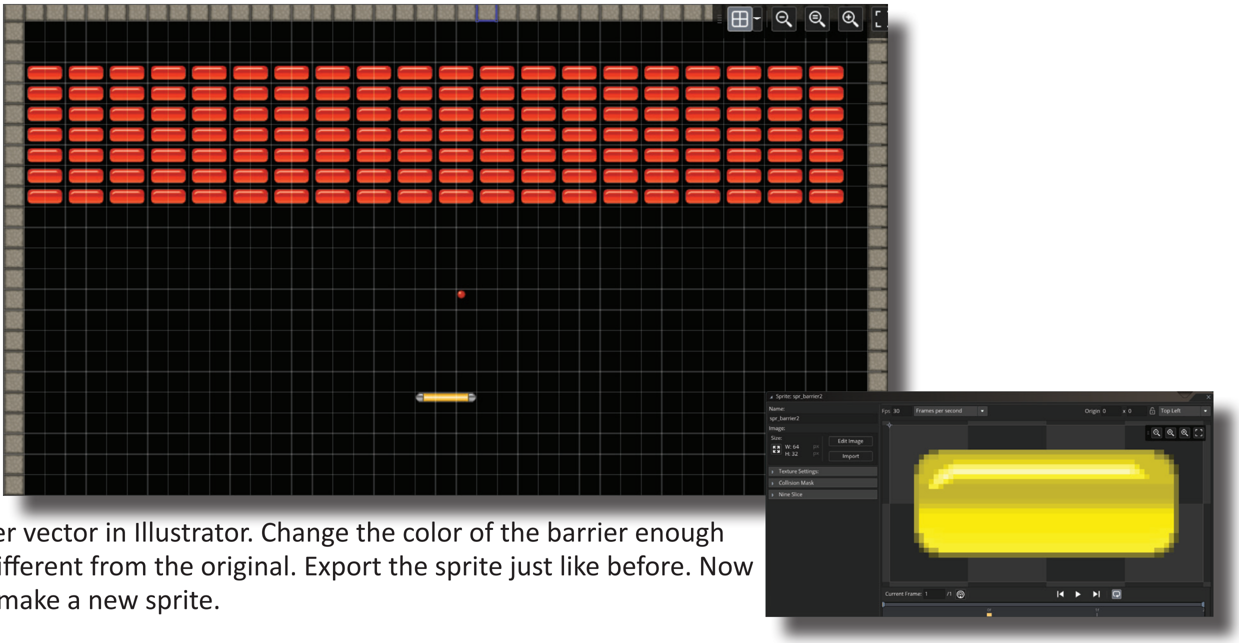
Destroy Instance

Room
rm_congrats

Persistent □
Clear Display Buffer ☑
Width 1366
Height 768

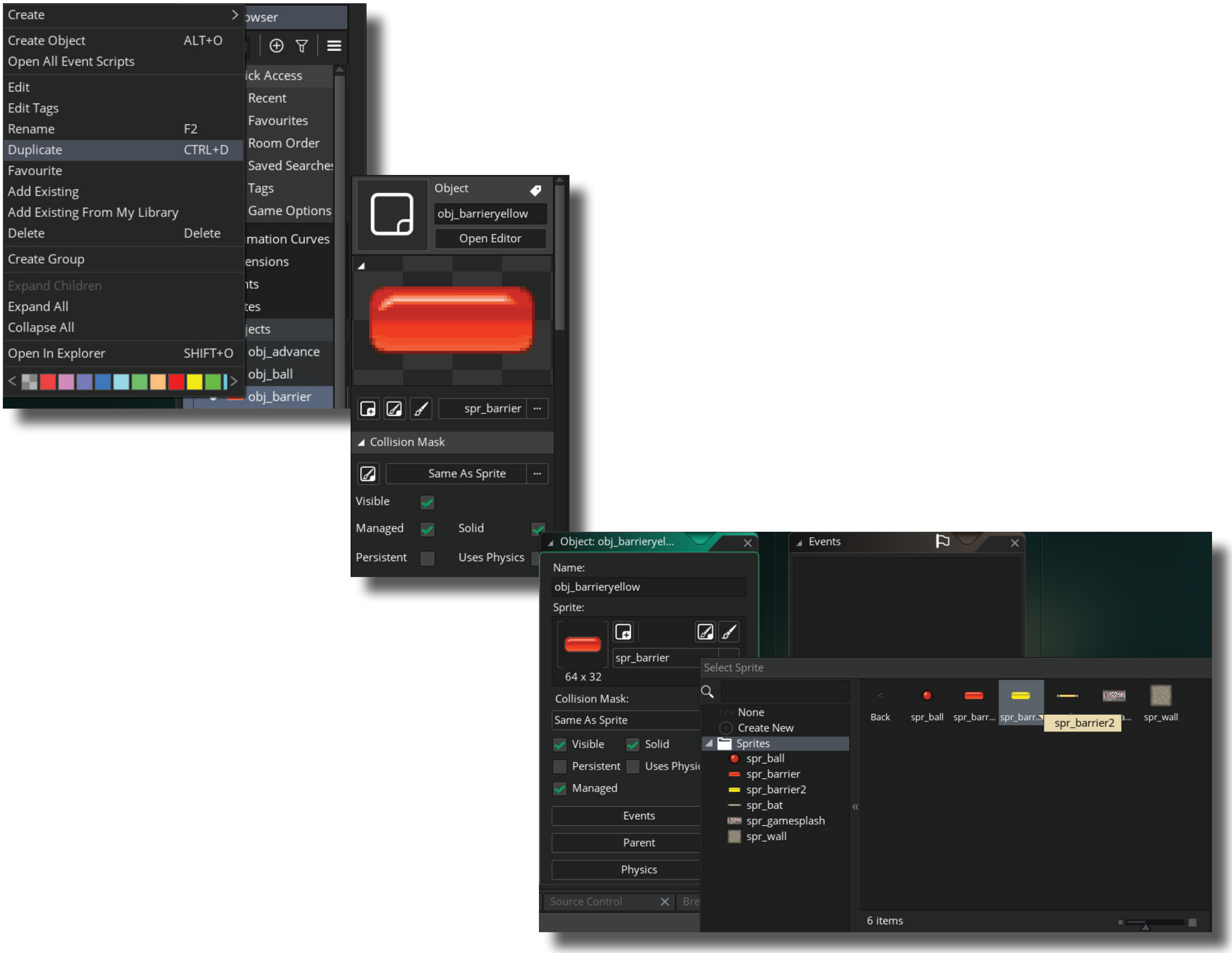
24. Wondering why 20? Rather than having to smash each barrier to see if it works, set the number low and save time! If it works, reset the number to the value found in step 22. This little hack saves time and is the reason that cheat codes were made… to save the programmer time.

25. Now close the top of the game room by adding instances of obj_wall to the gap that exists. With the top closed, the only way to lose the game is to let the ball leave the room at the bottom, which will restart the game.



26. Open the original barrier vector in Illustrator. Change the color of the barrier enough to make it look obviously different from the original. Export the sprite just like before. Now return to GameMaker and make a new sprite.

27. Rather than creating a new object, find the original barrier, obj_barrier and duplicate it by right clicking on it and choosing Duplicate. Rename the duplicate obj_barrier and the new color. Open the object and change the sprite to the one that was just created.



Object: obj_barrieryellow

Sprite: spr_barrier

Collision Mask: Same As Sprite

☑ Visible ☑ Managed ☑ Solid

□ Persistent □ Uses Physics

Object: obj_barrieryel...

Name: obj_barrieryellow

Sprite: spr_barrier

64 x 32

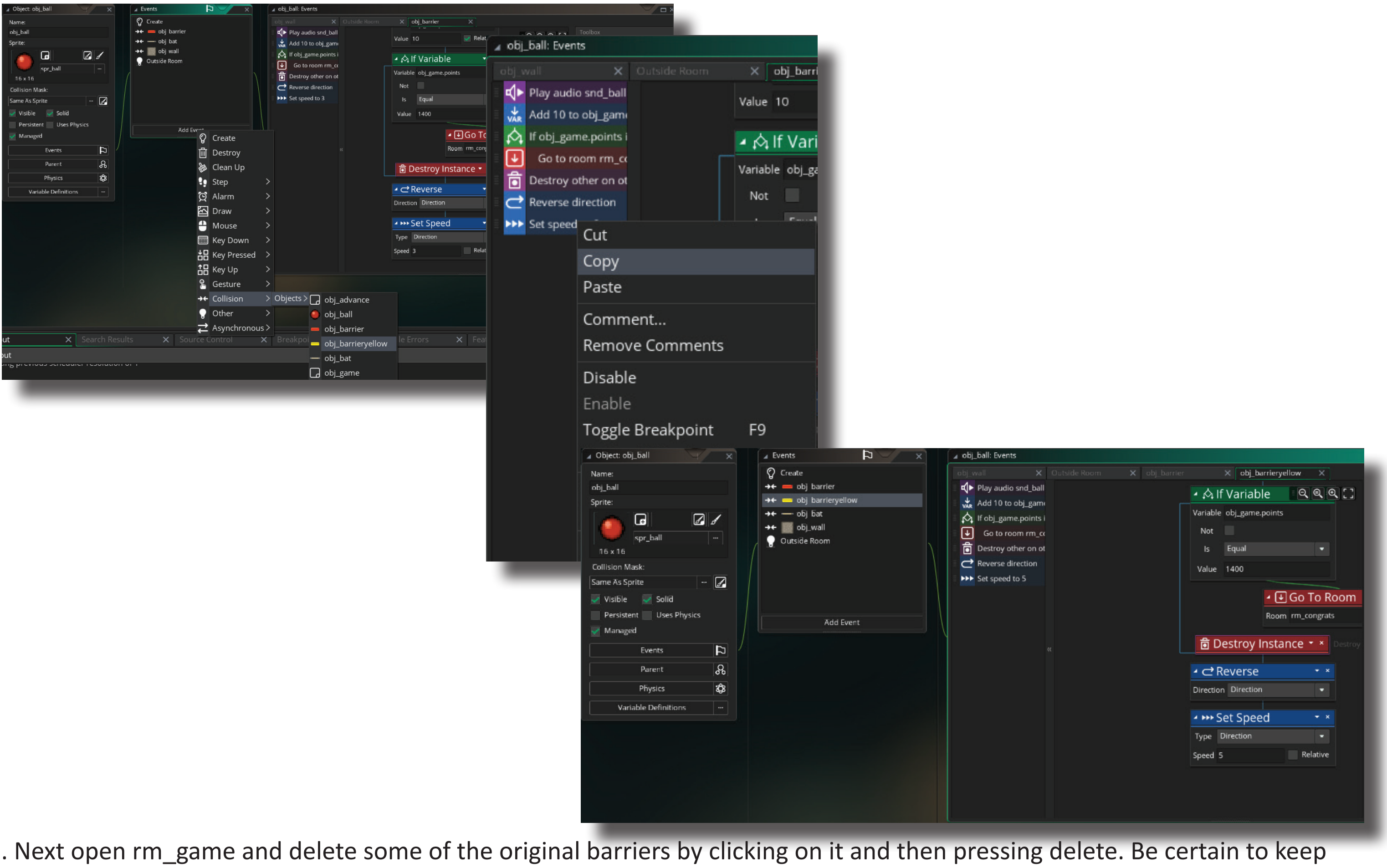
Collision Mask: Same As Sprite

☑ Visible ☑ Solid

□ Persistent □ Uses Physics

☑ Managed

28. Open obj_ball and press Add Event>Collision>Object>obj_barrier(color). Rather than programming all of the actions again, select the collision event for the other barrier, hold the ctrl key and select each action. Then right click on the actions and choose Copy. Open the new barrier collision and past those actions into actions area. The only difference is that the speed should be quicker than the other object. Since the first one was 3, change the speed to 5 for this one.


Object: obj_ball
Name: obj_ball
Sprite: spr_ball
16 x 16
Collision Mask: Same As Sprite
☑ Visible ☑ Solid
□ Persistent □ Uses Physics
☑ Managed

Events
Create
obj barrier
obj barrieryellow
obj bat
obj_wall
Outside Room

obj_ball: Events
Play audio snd_ball
Add 10 to obj_game...
If obj_game.points i...
Go to room rm_c...
Destroy other on ot...
Reverse direction
Set speed to 5

If Variable
Variable obj_game.points
Not □
Is Equal
Value 1400

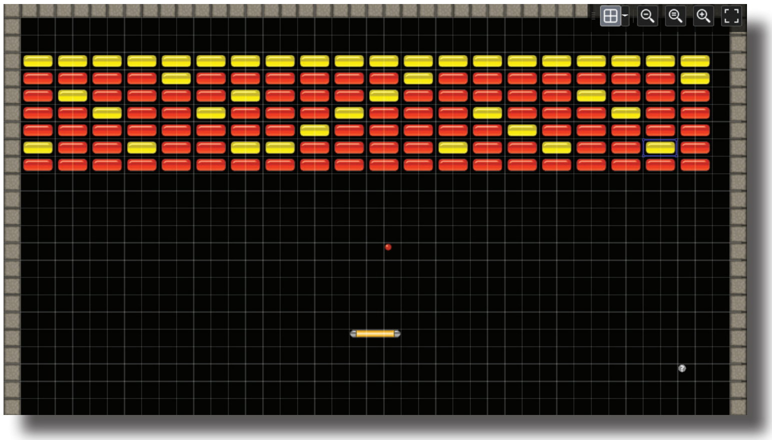
Go To Room
Room rm_congrats

Destroy Instance

Reverse
Direction Direction

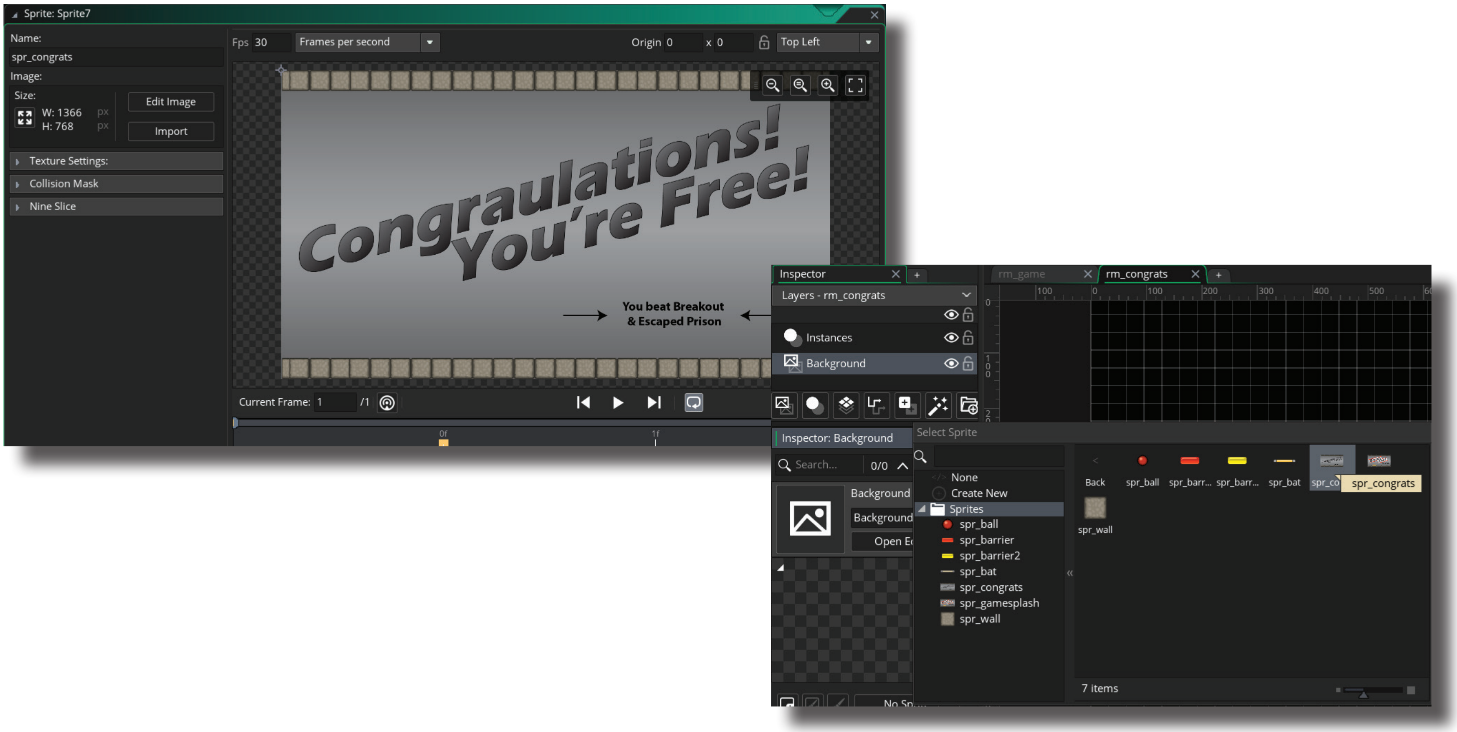
Set Speed
Type Direction
Speed 5
□ Relative

29. Next open rm_game and delete some of the original barriers by clicking on it and then pressing delete. Be certain to keep track of the number than are deleted so the correct number can be added. If there are different, the win condition may not function correctly. This should beef up the gameplay to make it more challenging. Save and run the game to test it.



30. The last thing is to create a splash screen to announce that the player won the game. Open Illustrator and make a new document for Web that has a width of 1366 pixels by 768 pixels high. The splash screen should match the vibe of the game and welcome screen and tell the player that they have one the game. Once the design is completed export the file as a PNG file.

31. Now go back to GameMaker and create a new sprite for congratulations splash screen. Now open rm_congrats. Select the background layer and drag in the new sprite. This will appear when the each barrier is broken to reach the score that was set in the If Variable. This completes the game!



Sprite: Sprite7

Name: spr_congrats

Size: W: 1366 px H: 768 px

Fps 30 Frames per second

Origin 0 x 0 Top Left

Current Frame: 1 /1

Layers - rm_congrats

Inspector: Background

Select Sprite

7 items