結合運算思維的教學單元設計比賽

數學科：1M2 貨幣（一）

概述

本單元共有一個教節,共 35 分鐘,旨在讓一年級學生透過 scratch 創建的平台，以遊戲化學習模式熟練本港通用的硬幣及其幣值，測試他們計算硬幣及位值的技能。整個學習工具的設計重點於讓教師即時評估學生的狀況及鞏固其學習，建議數學科老師可先向學生教授認識本港通用的硬幣及找出硬幣的總值後,再進行此單元教學。

學科結合

學科： **數學科**

相關單元： **小學一年級- 認識香港的硬幣和硬幣的總值 (1M2-貨幣一)**

學科教學應用： **運用 Scartch 程式輔助小一學生熟悉認識本港通用的硬幣及其幣值，並能運算有關含元角單位的加法基本算術**

設計理念

在一年級的這個單元課題中，學生的學習難點是未能快捷計算硬幣的幣值，當中需要運用加減混合計算的技能。整個設計以運算思維的技能進行編程工作。在編程的過程中，利用運算思維實踐中的< 測試及除錯 />、< 反覆構思及漸進編程 />、< 重用及整合 />、< 概念化及模組化 />及< 算法思維 />以解決編程時遇到的問題。

整個學習工具是以著名故事傑克與魔豆作藍本，傑克是一個數學能力差的學生，透過他需要買賣母牛來讓學生練習硬幣的加減計算。當中設置了四個關卡讓學生可以升級，利用不同的遊戲操控，照顧不同學習模式的學生，反覆加深概念及運算技巧。 為了讓學生可以反覆練習，學習工具的算法思維強調「隨機」數值。

整個學習工具是***參照 Bloom's Taxonomy 設計***，達到「應用」及「分析」這兩個階段，玩家「應用」香港硬幣知識及他們先前的算術技巧（加法和減法）知識來解決問題，在解決每個問題時，學生首先「分析」問題並提出解決方案（例如，2.8 港元需要用哪些硬幣加減）。此外課題亦以***問題為本學習***的課題，學習工具與實際生活情境作出關連，以故事的情節能激勵學生尋求對知識的更深入理解，對於同一個問題，將有多種解決方案。此外，學習工具亦根據***掌握學習 Mastery Learning*** 的理論設計，專注於頻繁的進展性評估和適當的反饋，利用生命值、關卡及正確的答案以讓學生回饋學習。

相關單元:運算思維發展(級別一)「跳舞貓」、「迷宮遊戲」、「說笑話」、「說故事」

預期學習成果

完成本單元後,學生能夠:

1. 認識本港通用的硬幣及其總幣值。
2. 找出硬幣的總值及計算加減運算。

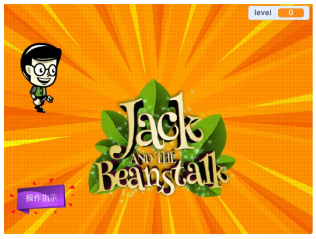
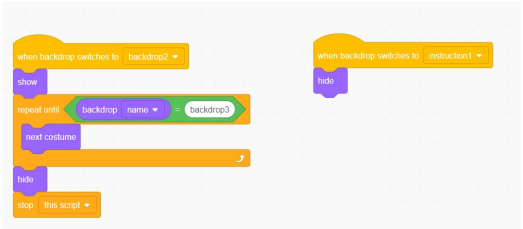
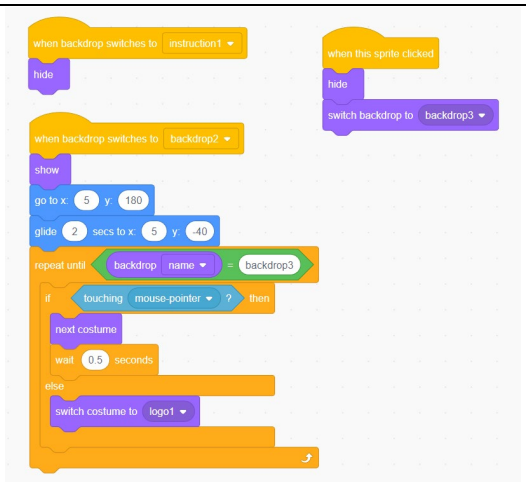
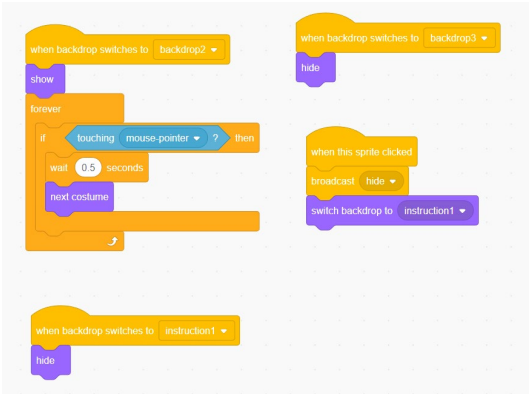
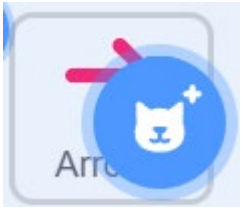
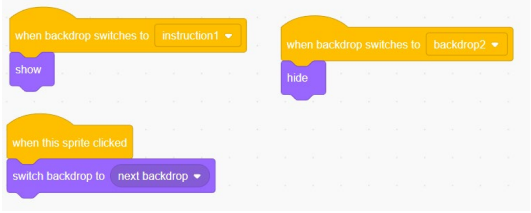
教案

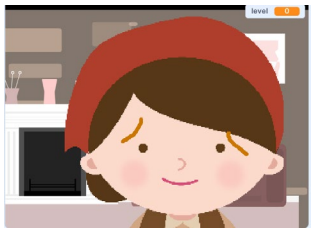
時間	活動	教學資源/備註
5”	重溫香港的通用硬幣及總幣值 1. 老師展示 5 個 1 元及 1 個 5 元，提問圖中硬幣的總值是多少元？ 2. 老師展示 5 個 1 角及 1 個 5 角，提問圖中硬幣的總值是多少元？ 3. 老師展示 5 個 1 元、1 個 5 元、5 個 1 角及 1 個 5 角的總值，並讓學生指出計算時需要注意的地方?	
10”	著學生進行「學習工具」中的關卡 1 及 2。從旁了解學生的學習難點。 1. 讓學生獨自完成，評估每個學生的運算速度。 2. 如遇見學生未能完成，可安排 2 人一組。透過同儕協作加快練習。	Scratch 傑克與魔豆
5”	邀請順利過關的同學分享過關的心得，並解說如何可以快速計算。	
10”	著學生進行「學習工具」中的關卡 3 及 4。從旁了解學生的學習難點。 1. 讓學生獨自完成，評估每個學生的運算速度。 2. 如遇見學生未能完成，可安排 2 人一組。透過同儕協作加快練習。 3. 如未能成功進級同學，派發工作紙 1 以用直式加強當中的訓練。	Scratch 傑克與魔豆 工作紙 1
5”	邀請順利過關的同學分享過關的心得，並解說如何可以快速計算。	
課業	著學生回家多練習，並進行快速破關的比賽，以提昇他們的運算能力。	Scratch 傑克與魔豆

教材內容

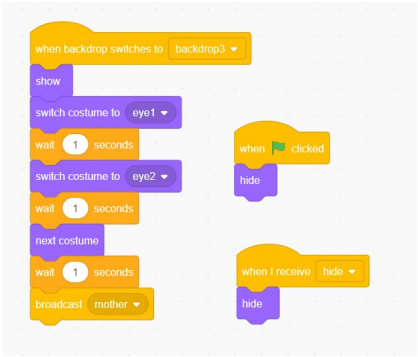
一個教節的教學和學習材料詳列於下列附件,包括程式的完整版本及範本 sb3 檔。

程式碼：

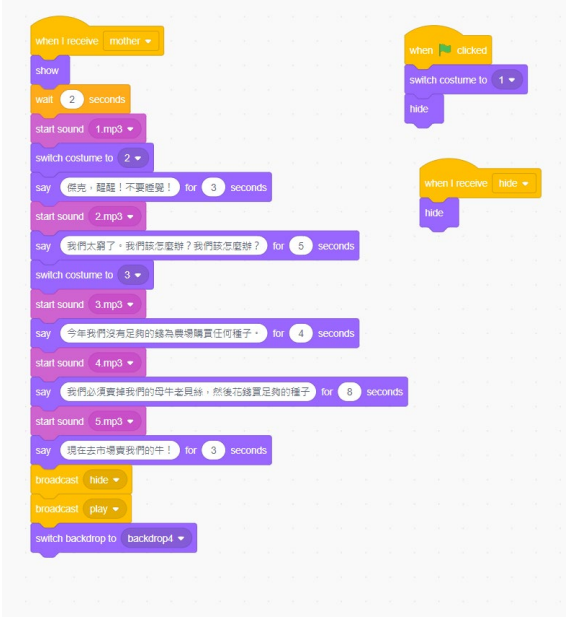
版面	角色	程式碼
		
		
		
		

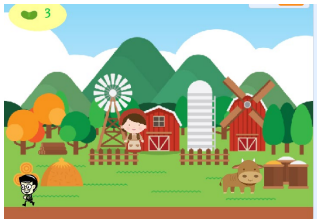



eyeview

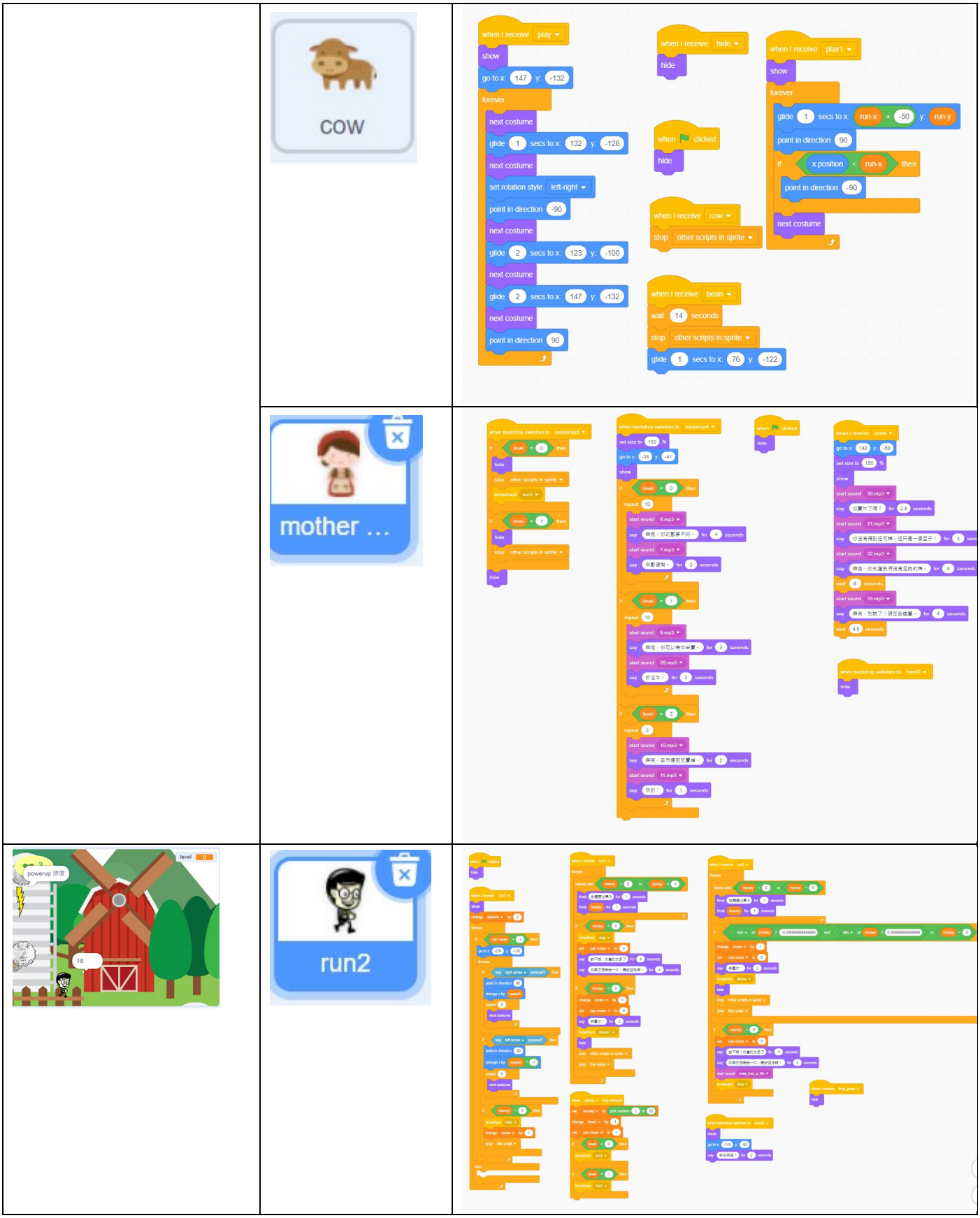

when backdrop switches to backdrop3
show
switch costume to eye1
wait 1 seconds
switch costume to eye2
wait 1 seconds
next costume
wait 1 seconds
broadcast mother
when clicked
hide
when I receive hide
hide

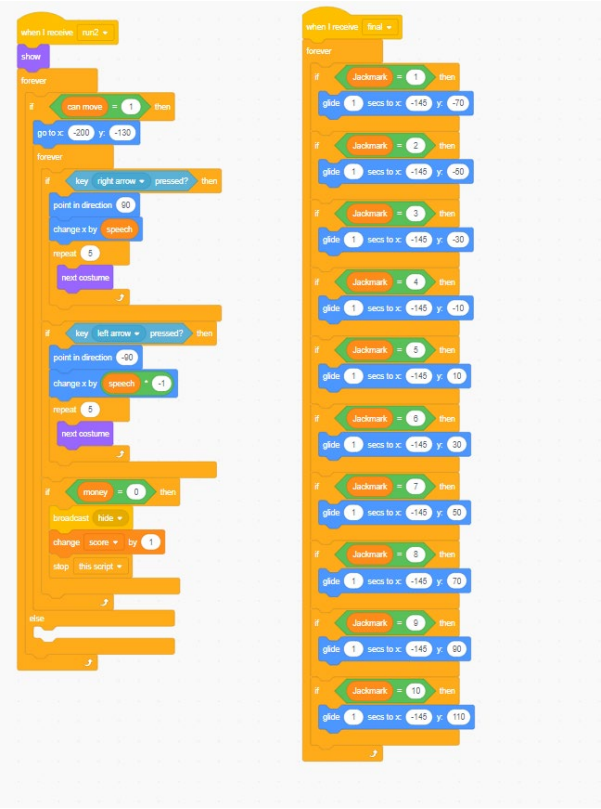

mother

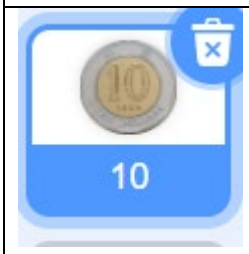

when I receive mother
show
wait 2 seconds
start sound 1.mp3
switch costume to 2
say 倍完，醒醒！不要睡覺！ for 3 seconds
start sound 2.mp3
say 我們太窮了，我們該怎麼辦？我們該怎麼辦？ for 5 seconds
switch costume to 3
start sound 3.mp3
say 今年我們沒有足夠的錢為農場購買任何種子， for 4 seconds
start sound 4.mp3
say 我們必須賣掉我們的母牛老貝絲，然後花錢買足夠的種子 for 8 seconds
start sound 5.mp3
say 現在去市場賣我們的牛！ for 3 seconds
broadcast hide
broadcast play
switch backdrop to backdrop4
when clicked
switch costume to 1
hide
when I receive hide
hide

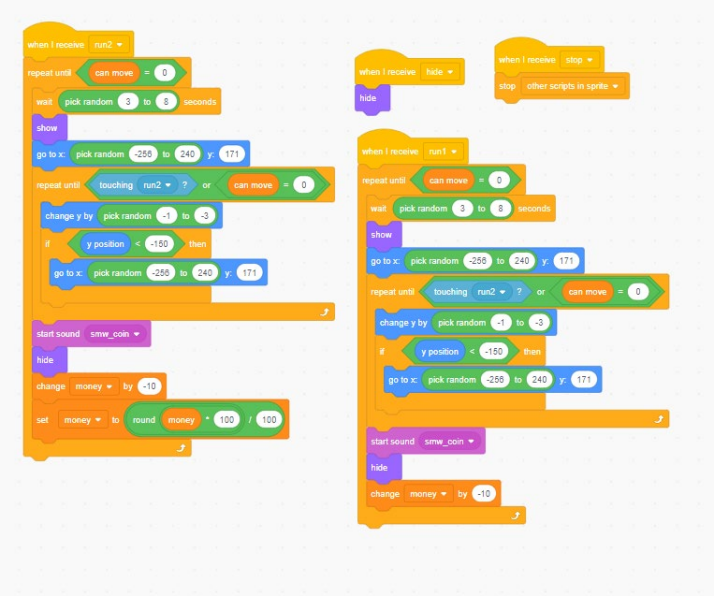



run

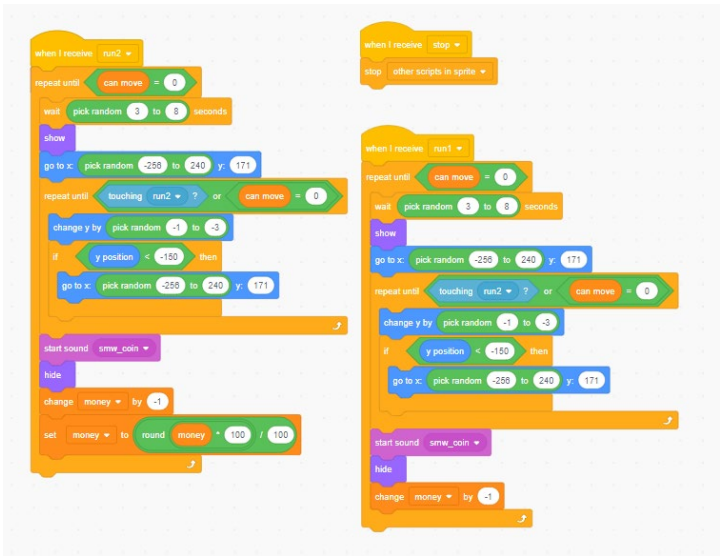

cow
when I receive play
show
go to x: 147 y: -132
forever
next costume
glide 1 secs to x: 132 y: -128
next costume
set rotation style left-right
point in direction -90
next costume
glide 2 secs to x: 123 y: -100
next costume
glide 2 secs to x: 147 y: -132
next costume
point in direction 90
when I receive hide
hide
when clicked
hide
when I receive cow
stop other scripts in sprite
when I receive bean
wait 14 seconds
stop other scripts in sprite
glide 1 secs to x: 76 y: -122
when I receive play1
show
forever
glide 1 secs to x: run-x + -50 y: run-y
point in direction 90
if x position < run-x then
point in direction -90
next costume
mother ...
run2


when I receive run2
show
forever
if can move = 1 then
go to x: -200 y: -130
forever
if key right arrow pressed? then
point in direction 90
change x by speech
repeat 5
next costume
if key left arrow pressed? then
point in direction -90
change x by speech * -1
repeat 5
next costume
if money = 0 then
broadcast hide
change score by 1
stop this script
when I receive final
forever
if Jackmark = 1 then
glide 1 secs to x: -146 y: -70
if Jackmark = 2 then
glide 1 secs to x: -146 y: -50
if Jackmark = 3 then
glide 1 secs to x: -146 y: -30
if Jackmark = 4 then
glide 1 secs to x: -146 y: -10
if Jackmark = 5 then
glide 1 secs to x: -146 y: 10
if Jackmark = 6 then
glide 1 secs to x: -146 y: 30
if Jackmark = 7 then
glide 1 secs to x: -146 y: 50
if Jackmark = 8 then
glide 1 secs to x: -146 y: 70
if Jackmark = 9 then
glide 1 secs to x: -146 y: 90
if Jackmark = 10 then
glide 1 secs to x: -146 y: 110

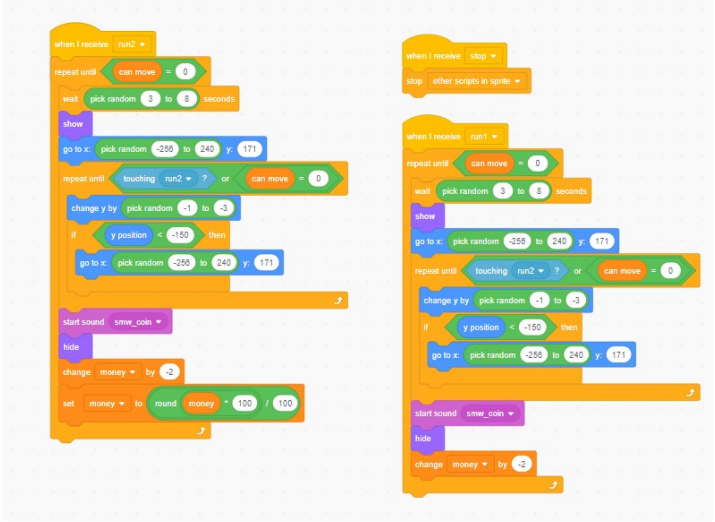

10


when I receive run2
repeat until can move = 0
wait pick random 3 to 8 seconds
show
go to x: pick random -256 to 240 y: 171
repeat until touching run2 ? or can move = 0
change y by pick random -1 to -3
if y position < -150 then
go to x: pick random -256 to 240 y: 171
start sound smw_coin
hide
change money by -10
set money to round money * 100 / 100
when I receive hide
hide
when I receive stop
stop other scripts in sprite
when I receive run1
repeat until can move = 0
wait pick random 3 to 8 seconds
show
go to x: pick random -256 to 240 y: 171
repeat until touching run2 ? or can move = 0
change y by pick random -1 to -3
if y position < -150 then
go to x: pick random -256 to 240 y: 171
start sound smw_coin
hide
change money by -10

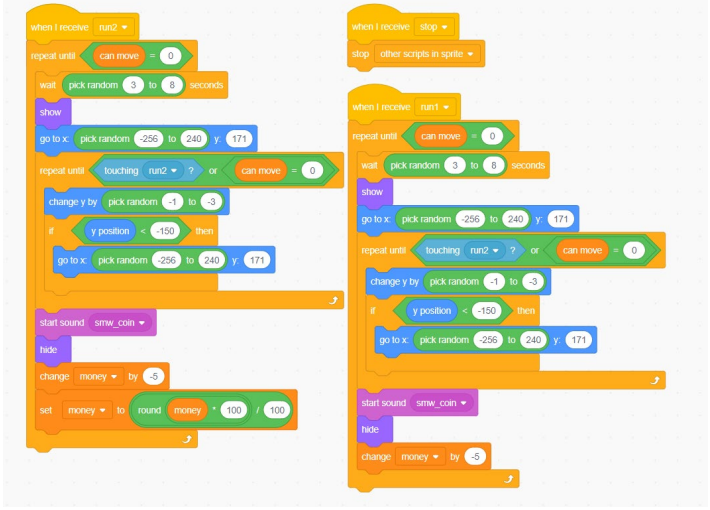

1


when I receive run2
repeat until can move = 0
wait pick random 3 to 8 seconds
show
go to x: pick random -256 to 240 y: 171
repeat until touching run2 ? or can move = 0
change y by pick random -1 to -3
if y position < -150 then
go to x: pick random -256 to 240 y: 171
start sound smw_coin
hide
change money by -1
set money to round money * 100 / 100
when I receive stop
stop other scripts in sprite
when I receive run1
repeat until can move = 0
wait pick random 3 to 8 seconds
show
go to x: pick random -256 to 240 y: 171
repeat until touching run2 ? or can move = 0
change y by pick random -1 to -3
if y position < -150 then
go to x: pick random -256 to 240 y: 171
start sound smw_coin
hide
change money by -1


2


when I receive run2
repeat until can move = 0
wait pick random 3 to 8 seconds
show
go to x: pick random -256 to 240 y: 171
repeat until touching run2 ? or can move = 0
change y by pick random -1 to -3
if y position < -150 then
go to x: pick random -256 to 240 y: 171
start sound smw_coin
hide
change money by -2
set money to round money * 100 / 100
when I receive stop
stop other scripts in sprite
when I receive run1
repeat until can move = 0
wait pick random 3 to 8 seconds
show
go to x: pick random -256 to 240 y: 171
repeat until touching run2 ? or can move = 0
change y by pick random -1 to -3
if y position < -150 then
go to x: pick random -256 to 240 y: 171
start sound smw_coin
hide
change money by -2


5


when I receive run2
repeat until can move = 0
wait pick random 3 to 8 seconds
show
go to x: pick random -256 to 240 y: 171
repeat until touching run2 ? or can move = 0
change y by pick random -1 to -3
if y position < -150 then
go to x: pick random -256 to 240 y: 171
start sound smw_coin
hide
change money by -5
set money to round money * 100 / 100
when I receive stop
stop other scripts in sprite
when I receive run1
repeat until can move = 0
wait pick random 3 to 8 seconds
show
go to x: pick random -256 to 240 y: 171
repeat until touching run2 ? or can move = 0
change y by pick random -1 to -3
if y position < -150 then
go to x: pick random -256 to 240 y: 171
start sound smw_coin
hide
change money by -5

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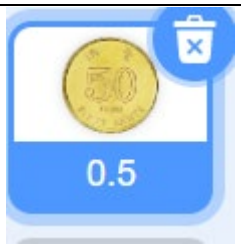
<td> 
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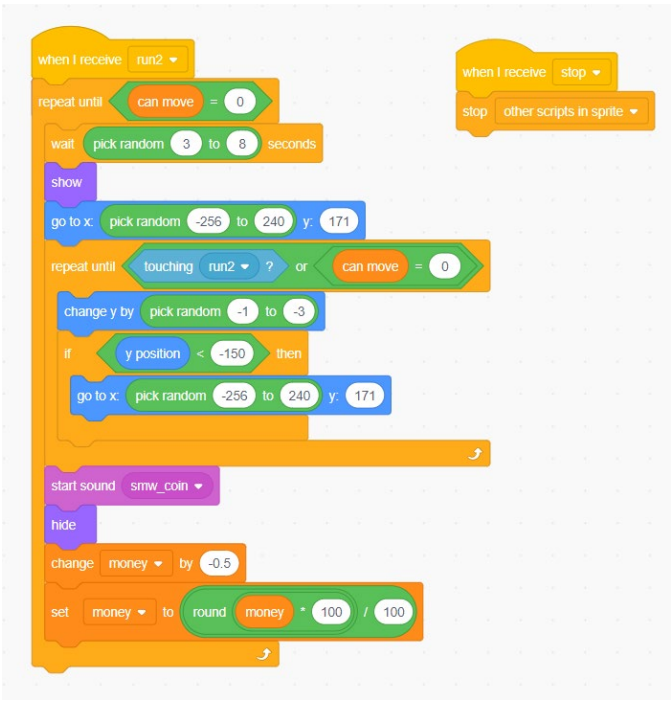
<td> 
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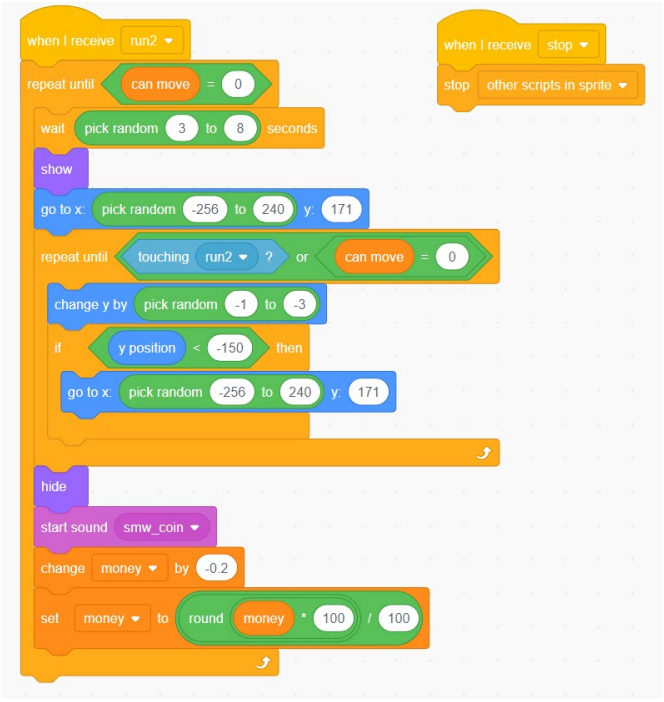
<td> 
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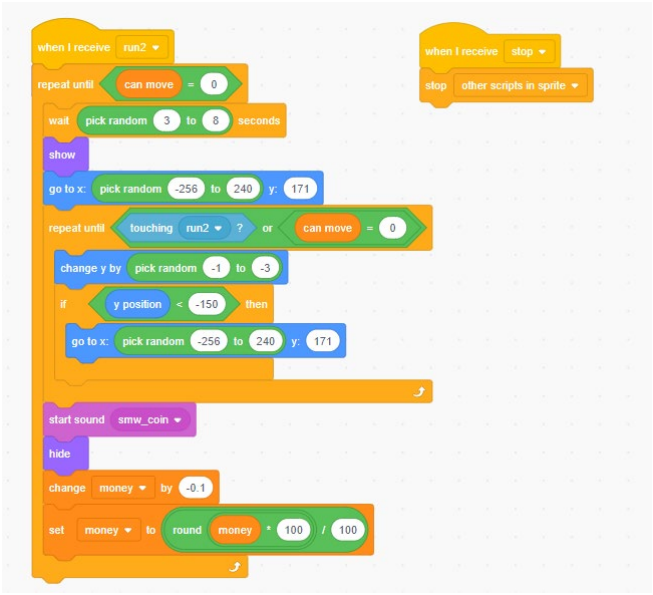
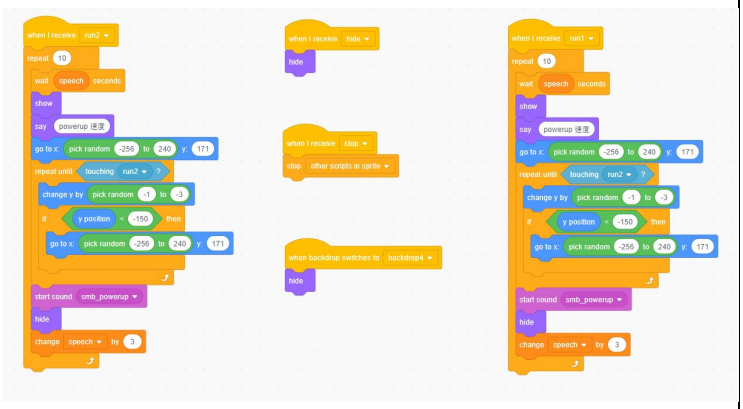
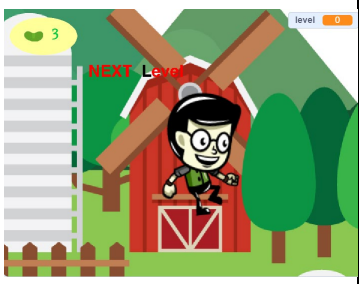
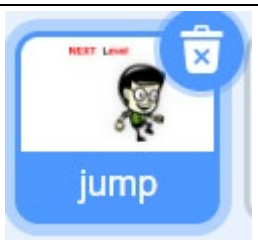
0.1

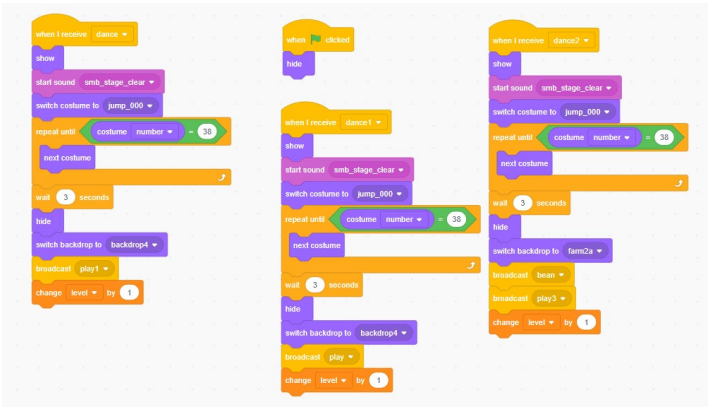

when I receive run2
repeat until can move = 0
wait pick random 3 to 8 seconds
show
go to x: pick random -256 to 240 y: 171
repeat until touching run2 ? or can move = 0
change y by pick random -1 to -3
if y position < -150 then
go to x: pick random -256 to 240 y: 171
start sound smw_coin
hide
change money by -0.1
set money to round money * 100 / 100
when I receive stop
stop other scripts in sprite


Lightning

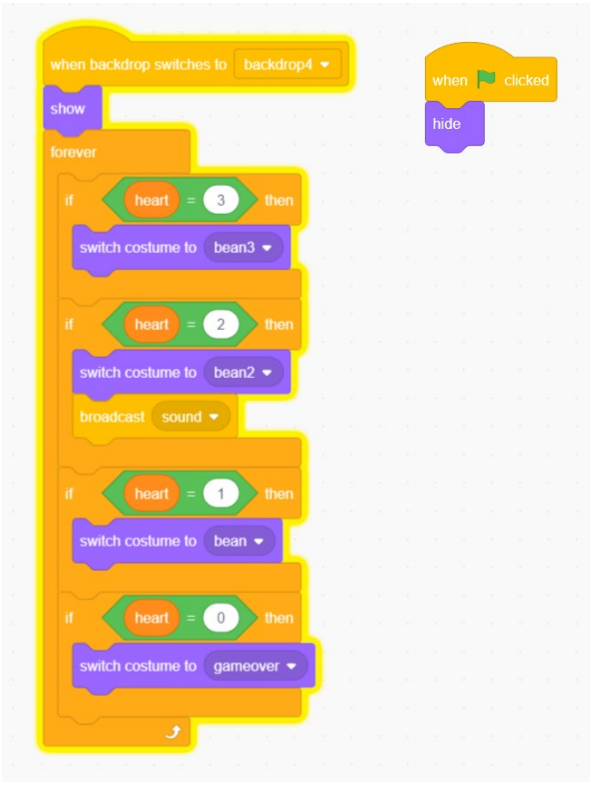


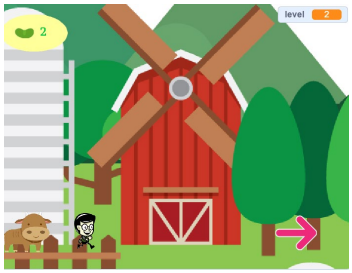

level 0
NEXT Level


NEXT Level
jump

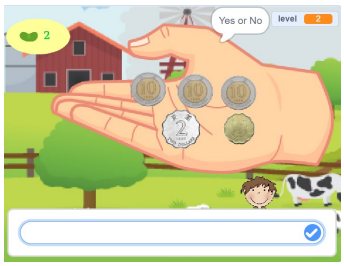



3
bean

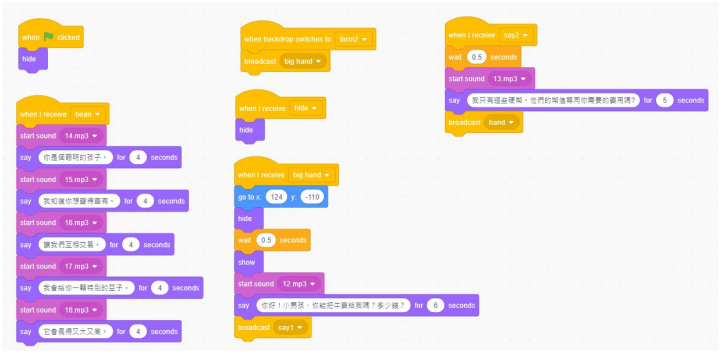

when backdrop switches to backdrop4
show
forever
if heart = 3 then
switch costume to bean3
if heart = 2 then
switch costume to bean2
broadcast sound
if heart = 1 then
switch costume to bean
if heart = 0 then
switch costume to gameover
when clicked
hide


2
level 2


run


2
Yes or No
level 2


kisspng...



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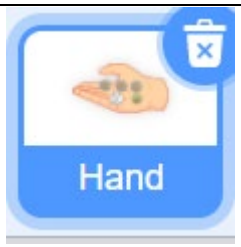
<td> 
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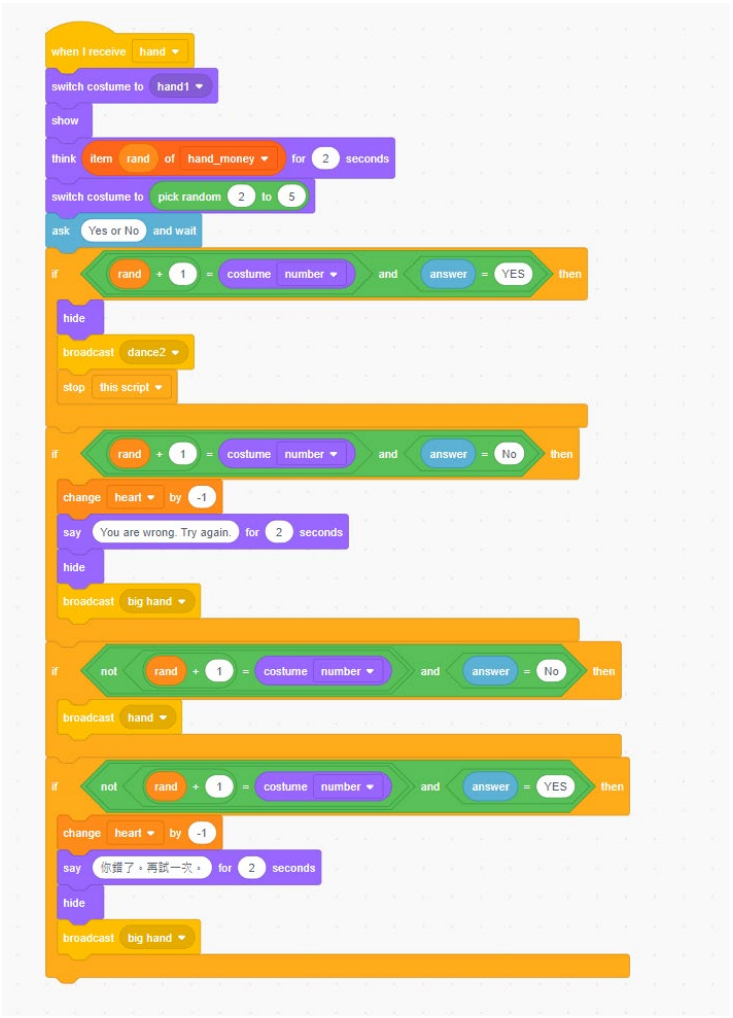
<td> 
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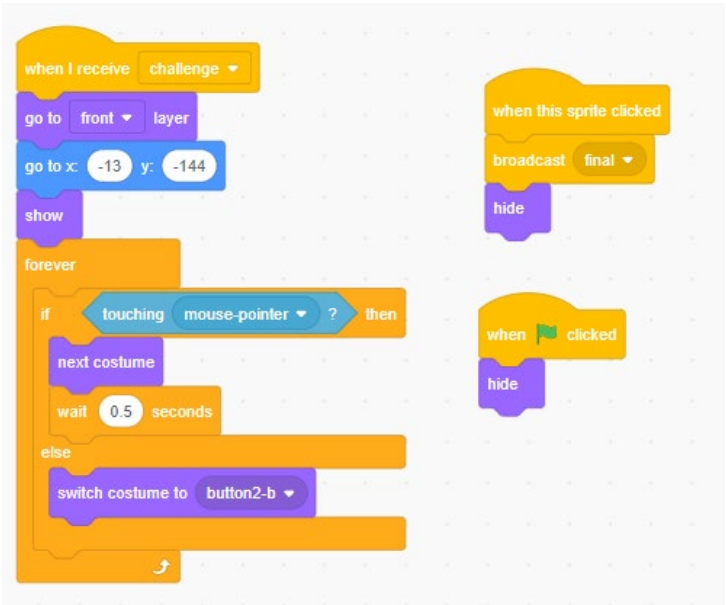
<td> 
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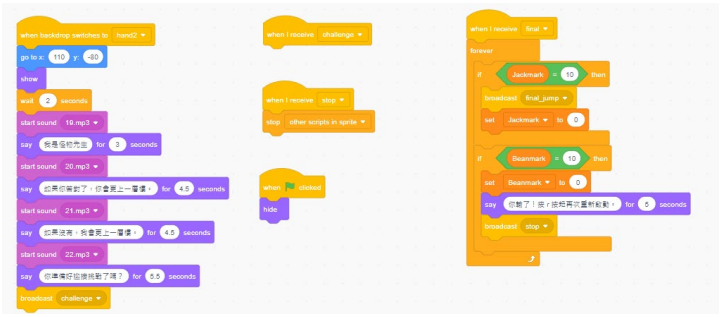
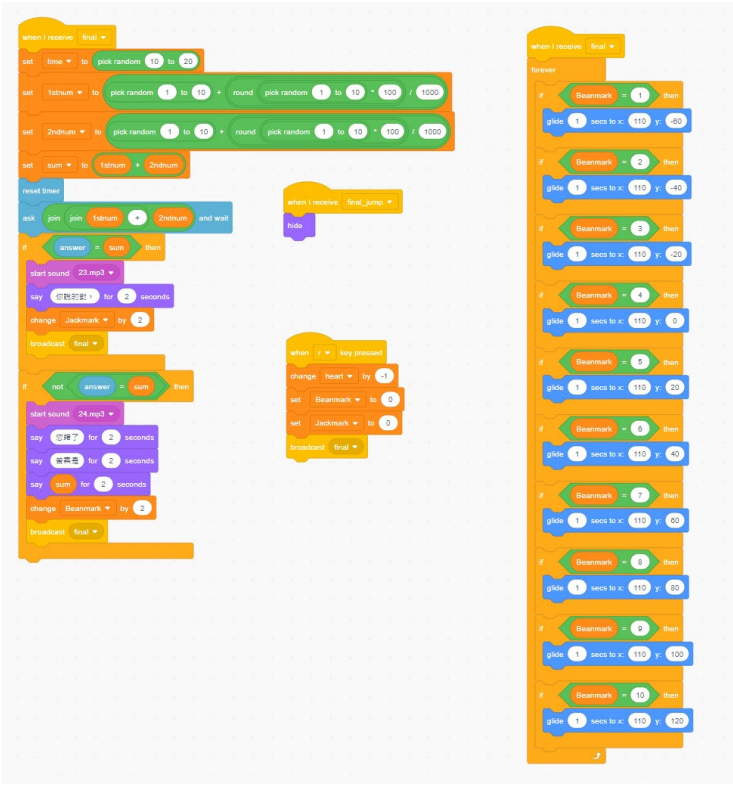
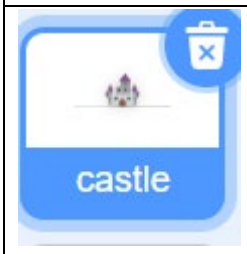
bean3

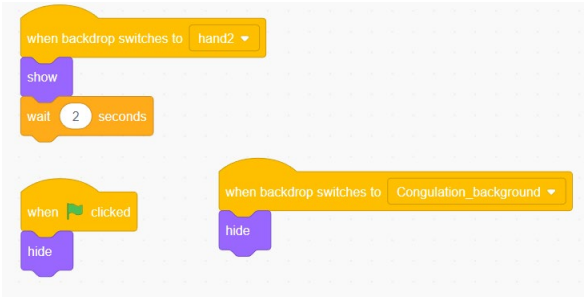

when backdrop switches to hand2
go to x: 110 y: -80
show
wait 2 seconds
start sound 19.mp3
say 我是怪物先生 for 2 seconds
start sound 20.mp3
say 如果你贏了，你會更上一層樓 for 4.5 seconds
start sound 21.mp3
say 如果沒有，我會更上一層樓 for 4.5 seconds
start sound 22.mp3
say 你準備好迎接挑戰了嗎？ for 4.5 seconds
broadcast challenge
when I receive challenge
when I receive stop
stop other scripts in sprite
when clicked
hide
when I receive final
forever
if Jackmark = 10 then
broadcast final_jump
set Jackmark to 0
if Beanmark = 10 then
set Beanmark to 0
say 你贏了！按 r 按鈕再次重新啟動 for 5 seconds
broadcast stop

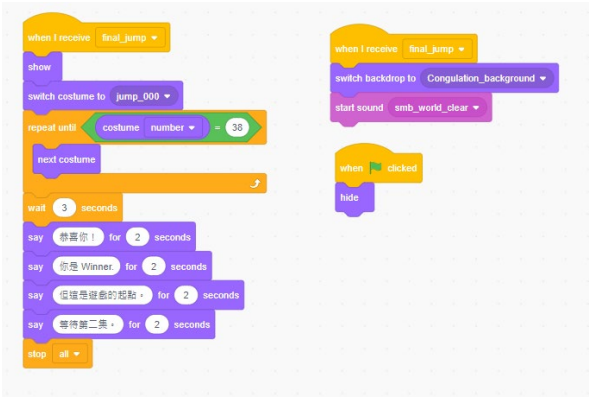

when I receive final
set time to pick random 10 to 20
set 1stnum to pick random 1 to 10 + round pick random 1 to 10 * 100 / 1000
set 2ndnum to pick random 1 to 10 + round pick random 1 to 10 * 100 / 1000
set sum to 1stnum + 2ndnum
reset timer
ask join join 1stnum + 2ndnum and wait
if answer = sum then
start sound 23.mp3
say 你說的對 for 2 seconds
change Jackmark by 2
broadcast final
if not answer = sum then
start sound 24.mp3
say 你錯了 for 2 seconds
say 答案是 for 2 seconds
say sum for 2 seconds
change Beanmark by 2
broadcast final
when I receive final_jump
hide
when r key pressed
change heart by -1
set Beanmark to 0
set Jackmark to 0
broadcast final
when I receive final
forever
if Beanmark = 1 then
glide 1 secs to x: 110 y: -60
if Beanmark = 2 then
glide 1 secs to x: 110 y: -40
if Beanmark = 3 then
glide 1 secs to x: 110 y: -20
if Beanmark = 4 then
glide 1 secs to x: 110 y: 0
if Beanmark = 5 then
glide 1 secs to x: 110 y: 20
if Beanmark = 6 then
glide 1 secs to x: 110 y: 40
if Beanmark = 7 then
glide 1 secs to x: 110 y: 60
if Beanmark = 8 then
glide 1 secs to x: 110 y: 80
if Beanmark = 9 then
glide 1 secs to x: 110 y: 100
if Beanmark = 10 then
glide 1 secs to x: 110 y: 120


castle


when backdrop switches to hand2
show
wait 2 seconds
when clicked
hide


角色1


when backdrop switches to hand2
show
wait 2 seconds
when clicked
hide
when backdrop switches to Congulation_background
hide

	 You are winner ! final_jump	 when I receive final_jump show switch costume to jump_000 repeat until costume number = 30 next costume wait 3 seconds say 恭喜你！ for 2 seconds say 你是 Winner. for 2 seconds say 但這是遊戲的起點， for 2 seconds say 等待第二集， for 2 seconds stop all when I receive final_jump switch backdrop to Congulation_background start sound smb_world_clear when clicked hide