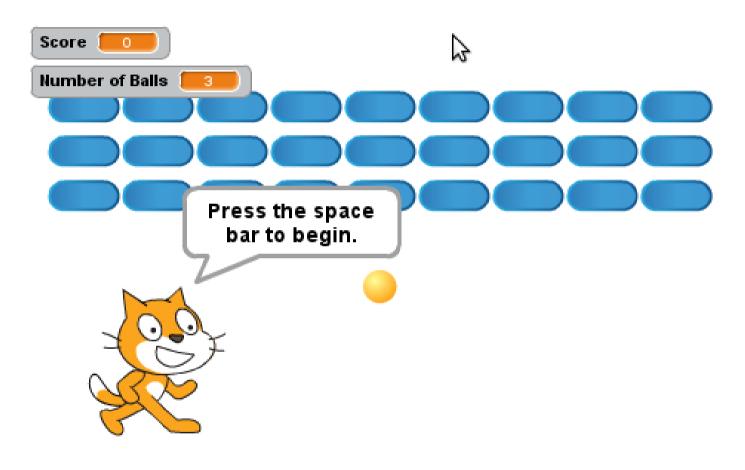
## Breakout Game, Step-by-Step



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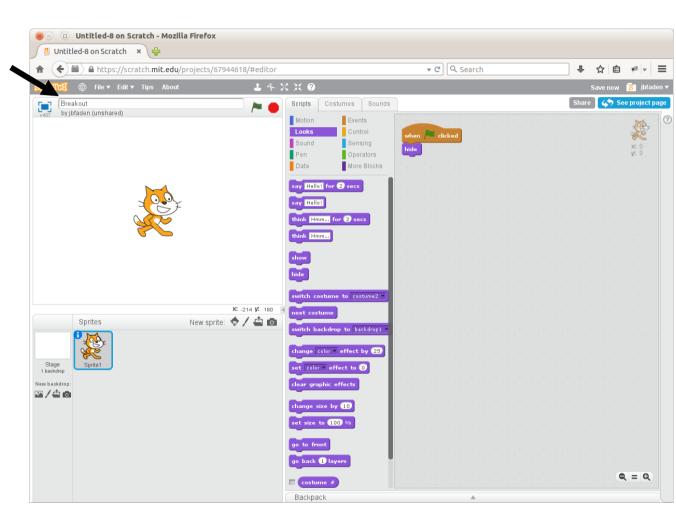
- It's pretty easy to make the game "Breakout," where you hit the ball with your paddle to knock out bricks.
- This shows how to make this game, step-bystep, showing how to use parts of Scratch along the way.

## Breakout Game, Step-by-Step

- We need to do several smaller sub-projects to make our game:
  - Set up the new project
  - Make the paddle for the ball
  - Make the ball
  - Make the ball go, bouncing off the walls
  - Detect when the ball is missed
  - Make the bricks, using sprite "cloning"
  - Broadcast messages so sprites work together
  - Add a variable for the score and one for the number of balls

## 1. Set up the new project

- New Project, call it "Breakout"
- Hide the cat when the green flag is clicked, we'll use him later.
- It's important that you follow the steps exactly, and you can add your own improvements later.

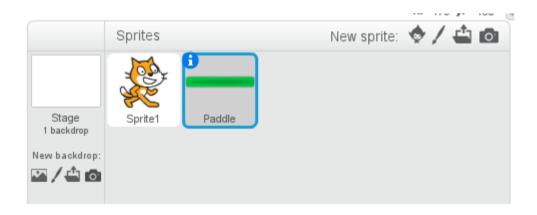


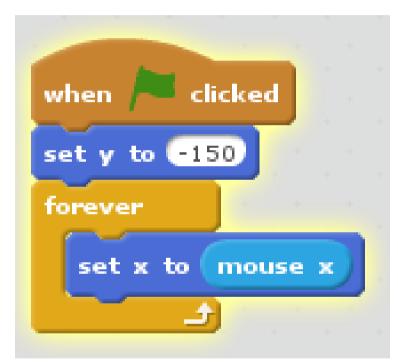
### 2. Make the paddle

New sprite, choosing from library:



- Look for green "Paddle"
- Its code is simple, it should just follow the mouse x.





#### 3. Make the ball

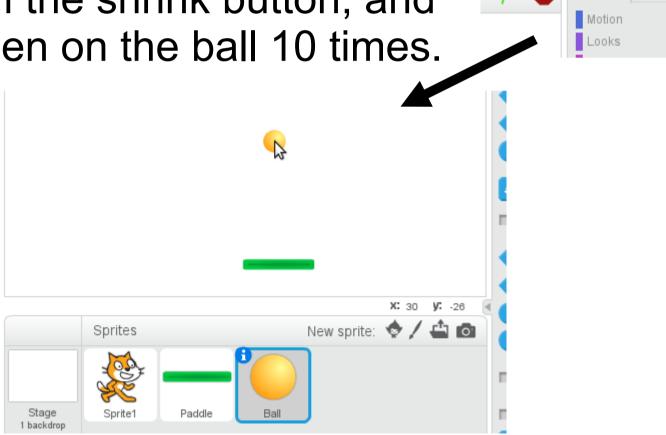
New sprite, choosing from library:



18/#editor

Look for yellow "Ball"

 Shrink it by clicking on the shrink button, and then on the ball 10 times.



#### 4. Make the ball

- When the green flag is pressed, move to 0,0 and point in direction 180 plus a random number.
- In a forever loop, move 6 steps. if on edge, bounce.

```
when clicked

go to x: 0 y: 0

point in direction 180 + pick random -20 to 20

forever

move 6 steps

if on edge, bounce
```

#### 5. Make the ball

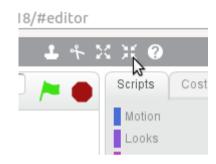
- When touching the paddle, we bounce the ball.
- Add an if-then block, and in the block we turn the ball around.

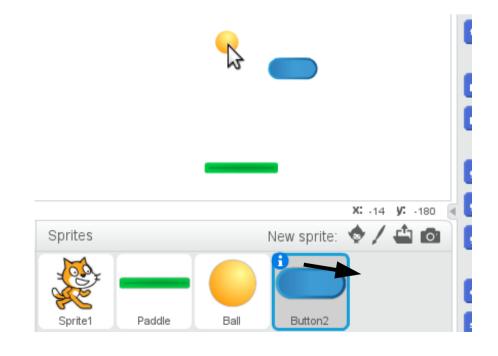
```
when 🦰 clicked
go to x: 0 y: 0
point in direction (180) + (pick random (-20) to (20)
forever
  move 6 steps
  if on edge, bounce
       touching Paddle ? ? then
    set y to (-131,
    point towards Paddle
    turn 🔼 (180) degrees
```

New sprite, choosing from library:

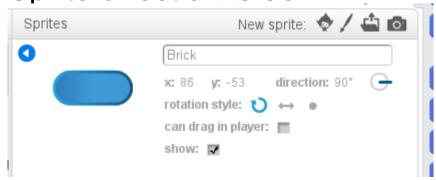


- Look for blue "Button2"
- Shrink it by clicking on the shrink button, and then on the brick 12 times





Rename the sprite from Button2 to Brick, by clicking on the "i" (for info) on the Sprite. Make sure the Sprite direction is 90°



Start by adding one brick at x:-200 y:120,

when green flag is pressed.

- Here's the new part: create a clone of myself to make many bricks.
- We repeat this nine times to make the row of bricks.

```
when clicked

go to x: -200 y: 120

repeat 9

create clone of myself v

move 50 steps
```

Start by adding one brick at x:-200 y:120,

when green flag is pressed.

- Here's the new part: create a clone of myself to make many bricks.
- We repeat this nines times to make the row of bricks.
- And make three rows...

```
when 🦰 clicked
go to x: -200 y: 120
repeat (9)
  create clone of myself -
  move 50 steps
go to x: -200 y: 90
repeat (9)
  create clone of myself -
  move (50) steps
go to x: -200 y: 60
repeat (9)
  create clone of myself -
  move (50) steps
```

Start by adding one brick at x:-200 y:120,

when green flag is pressed.

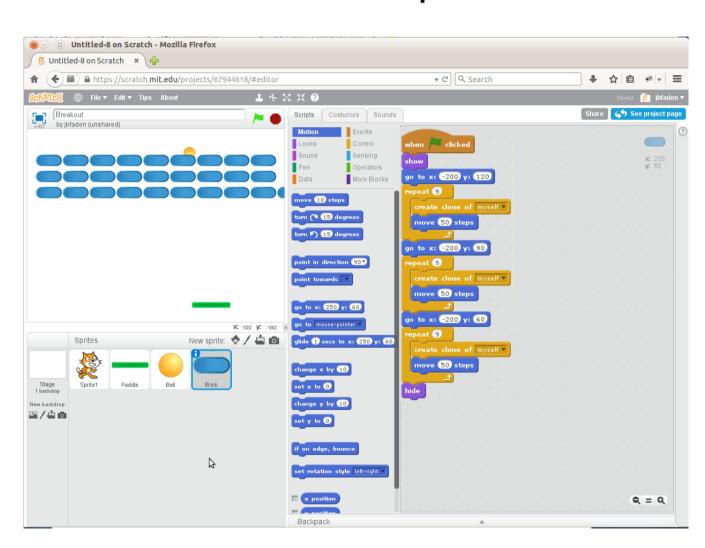
- Here's the new part: create a clone of myself to make many bricks.
- We repeat this nines times to make the row of bricks.
- And make three rows...
- And hide it when we're done. Show it so we

```
clicked
show
go to x: -200 y: 120
repeat (9)
  create clone of myself -
  move (50) steps
go to x: -200 y: 90
repeat (9)
  create clone of myself -
  move (50) steps
go to x: -200 y: 60
repeat (9)
  create clone of myself -
  move (50) steps
hide
```

Here's what it looks like when we press the

green flag:

 (Your screen might look just a little different.)



when I start as a clone

touching Ball ? ?

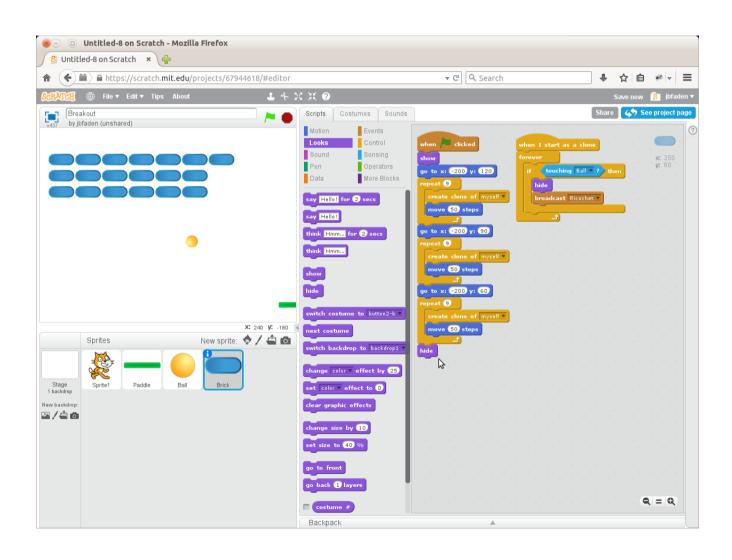
broadcast Ricochet

 Now we need to make the bricks disappear when they are hit.

 Look for "When I start as a clone" in the control scripts.

 We also do another new thing: we broadcast the message "Ricochet" which will be received by the ball to make it turn around. You'll have to click on the little triangle and add a new message.

So here's how the brick code should look now:



## 13. Making the ball Ricochet

 Go back to the Ball sprite, and add "when I receive Ricochet", "point in direction..."

```
when I receive Ricochet v

point in direction 180 - direction v: 97
y: 102

go to x: 0 y: 0

point in direction 180 + pick random -20 to 20

forever

move 6 steps
if on edge, bounce
if touching Paddle v

turn v 180 degrees
```

Make a Variable, name is Score, for all sprites

Make a Variable, name is Number of Balls, for

all sprites.

 When the flag is clicked and we initialize, we need to set the score and the number of balls.

```
Sounds
                Events
Motion
                Control
Looks
                                    when Fig. clicked
                                                                 when I receive Ricochet
Sound
                Sensing
                                     set Score ▼ to 0
                                                                 point in direction (180) - direction
Pen
                Operators
                                     set Number of Balls v to 3
                More Blocks
                                    go to x: 0 y: 0
 Make a Variable
                                    point in direction (180) + (pick random (-20) to (20)
Number of Balls
                                      move 6 steps
                                      if on edge, bounce
set Number of Balls ▼ to 0
                                           touching Paddle ▼ ? then
change Number of Balls v by 1
                                         set y to -131
                                         point towards Paddle
show variable Number of Balls
                                         turn 🔼 180 degrees
hide variable Number of Balls
```

 Increment (add one to) the Score when a brick is touching a Ball.

```
when I start as a clone

forever

if touching Ball ? then

hide

broadcast Ricochet 
change Score v by 1
```

(in the Brick sprite)

 Decrement (remove one from) the Number of Balls when the ball gets below the paddle.

```
point in direction (180) + pick random
forever
  move 6 steps
  if on edge, bounce
       touching Paddle ? ? then
    set y to (-131
    point towards Paddle
    turn 🔼 (180) degrees
        y position | < -160 | then
                                         (Add to
    change Number of Balls v by (-1)
                                         Ball sprite)
    set y to 0
    wait 1 secs
```

Check to see if they won. We'll broadcast a "You Won" message.

```
when I start as a clone
forever
       touching Ball ▼ ? then
    hide
    broadcast Ricochet -
    change Score by 1
          Score = 27 then
      broadcast You Won ▼
```

(in the Brick sprite)

 Check to see if they lost. We'll broadcast a "You Lose" message in this case.

```
touching Paddle 🔻
set y to (-131
point towards Paddle
turn 🔼 (180) degrees
    y position | < -160 | then
change Number of Balls v by (-1)
      Number of Balls = 0 then
  broadcast You Lose ▼
set y to 0
wait (1) secs
```

(in the Ball sprite)

### 18. Finally, the Narrator tells what's going on

- We'll have the Scratch cat give the instructions.
- Go back to the Scratch cat (Sprite1), and add this script to it.

```
when 🦰 clicked
go to x: -150 y: -50
show
    Welcome to Breakout for 2 secs
say Bounce the ball with the paddle, for (2) secs
say which is controlled by the mouse. for 2 secs
say Press the space bar to begin.
wait until ( key space v pressed?
hide
broadcast Start Game
```

### 19. Finally, the Narrator tells what's going on

 Change the Ball to wait for the broadcast message.

```
when 🖊 clicked
                             when I receive Ricochet
set Score ▼ to 0
                             point in direction (180)
                                                      direction
set Number of Balls v to 3
go to x: 0 y: 0
when I receive Start Game
point in direction (180) + pick random (-20) to (20)
forever
  move 6 steps
 if on edge, bounce
       touching Paddle 7 ? then
    set y to (-131
    point towards Paddle
    turn 🔼 (180) degrees
        y position | < -160 > then
    change Number of Balls v by (-1)
           Number of Balls = 0 then
      broadcast You Lose ▼
    set y to 0
    wait 1 secs
```

### 20. Finally, the Narrator tells what's going on

 Add "when I receive" scripts for the "You Win" and "You Lose" messages.

```
when 🦰 clicked
                                                  when I receive You Won T
                                                  show
go to x: (-150) y: (-50)
                                                  say You Won!!! for 2 secs
show
say Welcome to Breakout for 2 secs
                                                  stop all ▼
say Bounce the ball with the paddle, for (2) secs
say which is controlled by the mouse. for (2) secs
                                                  when I receive You Lose
say Press the space bar to begin.
                                                  show
wait until key space pressed?
                                                  say You Lost... for 2 secs
                                                  stop all ▼
hide
broadcast Start Game >
```

#### All done!

- So now you've seen how we add multiple sprites and have them interact to play a game.
  - Clone lets us have lots of the same sort of sprite
  - Broadcast lets us send messages from one part of the game to another.
- This is your project now, and it's yours to make your own. You could:
  - Add sound effects
  - Change speed and experiment with controls
  - Make your own narrator and You Win messages