

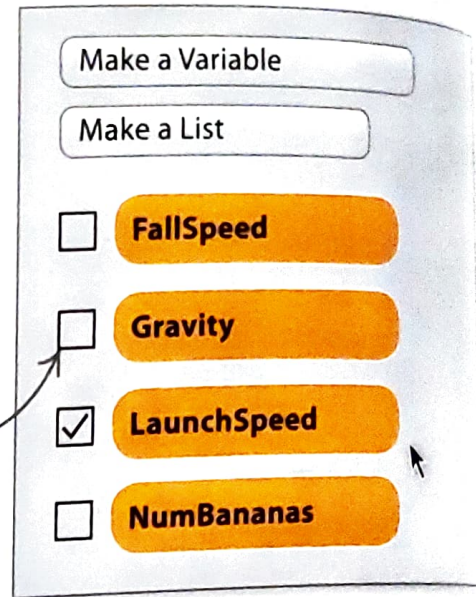
14 Make two more variables for all sprites: "FallSpeed" and "Gravity". Then add a "set Gravity" block to the monkey's "when clicked" script and amend his "when space key pressed" script as shown below. The new blocks use variables to simulate gravity. "FallSpeed" keeps track of how many steps the monkey needs to be moved down by gravity. The value of "Gravity" is how much "FallSpeed" increases each time the monkey moves.

```

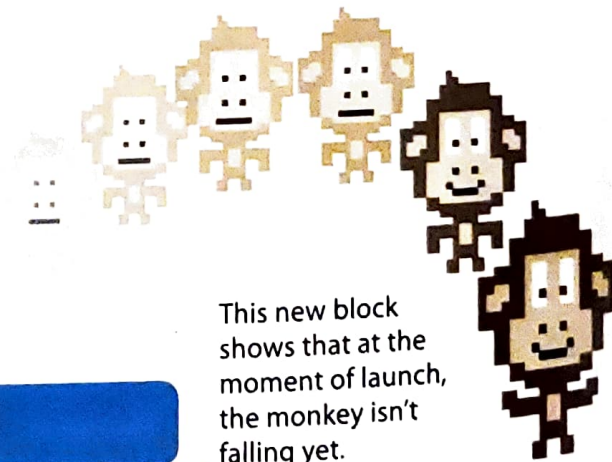
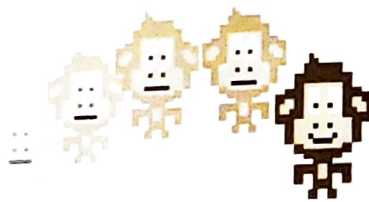
when clicked
  set size to 35 %
  set rotation style don't rotate
  go to Launcher
  set Gravity to -0.2
  
```

Deselect the box next to a variable to stop it appearing on the stage.

Add this block to the "when clicked" script.



△ Hiding variables
If you don't want variables to appear on the stage, you need to uncheck the box next to them in the Data section. Do this for these two new variables.



```

when space key pressed
  go to Launcher
  point in direction direction of Launcher
  set FallSpeed to 0
  repeat until touching edge ? or touching Palmtree ?
    move LaunchSpeed steps
    change y by FallSpeed
    change FallSpeed by Gravity
  go to Launcher
  
```

This new block shows that at the moment of launch, the monkey isn't falling yet.

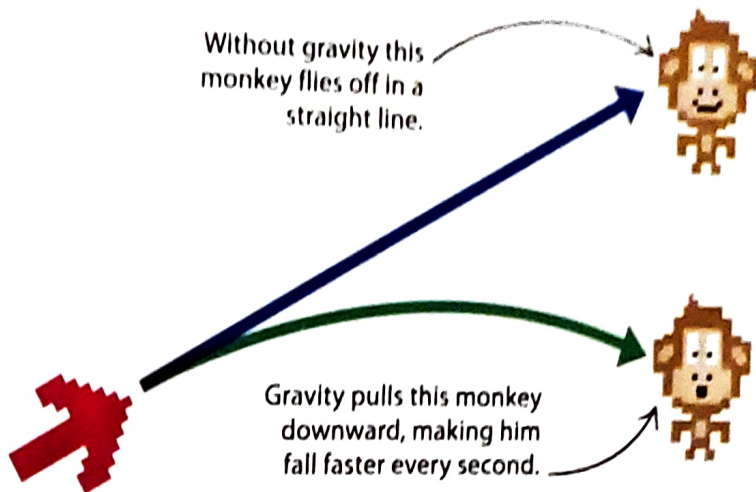
This new block moves the monkey down.

This new block contains the variable "Gravity", which makes the monkey fall faster each time the loop runs.

EXPERT TIPS

Real world gravity

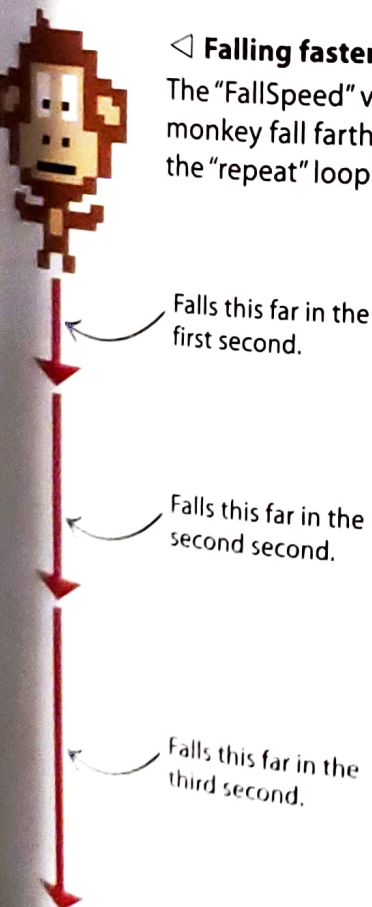
In the real world, when you try to throw something in a straight line it curves slowly back toward the ground as gravity pulls it down. To make the game work in the same way, you move the monkey along the straight line, but also add a downward move after each shift along that line, to create the same effect as the constant downward tug of gravity. This allows the monkey's movement to seem natural, making the game more engaging.



15 Run the project again—you can now direct the monkey over the tree to reach the tricky low bananas. But how exactly is the Scratch gravity working? Every second, the monkey falls a little bit faster than the second before, creating a downward curve.

◁ Falling faster

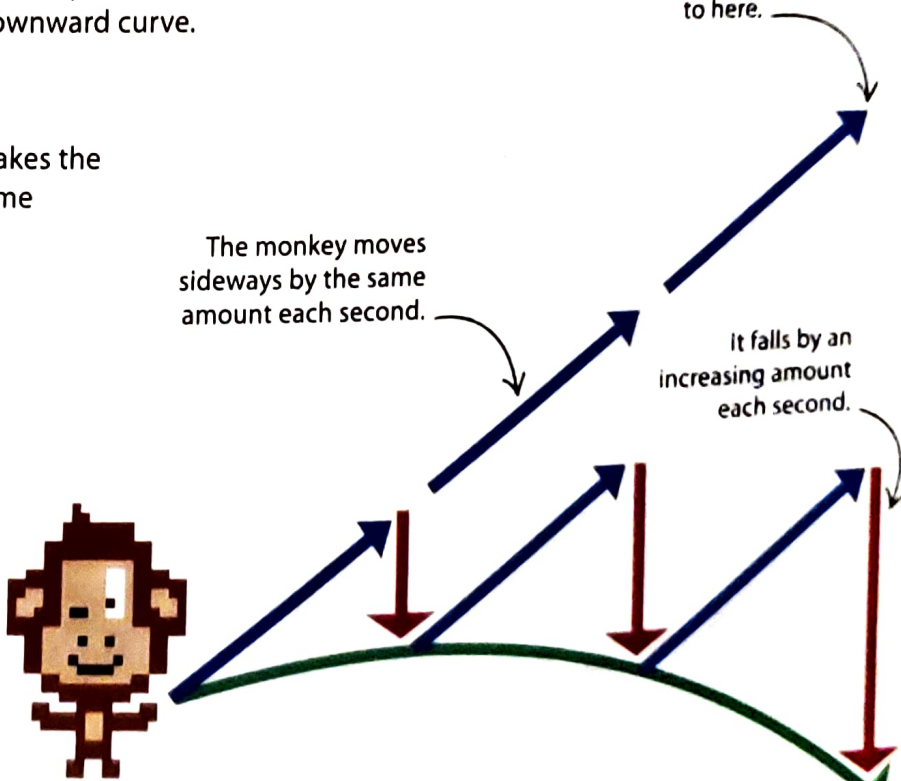
The "FallSpeed" variable makes the monkey fall farther each time the "repeat" loop runs.



Without gravity the monkey would get to here.

The monkey moves sideways by the same amount each second.

It falls by an increasing amount each second.



△ Gravity effect

When "FallSpeed" is combined with the straight line from the Launcher, the monkey's path curves back toward the ground in a realistic manner.

With gravity the monkey ends up here.