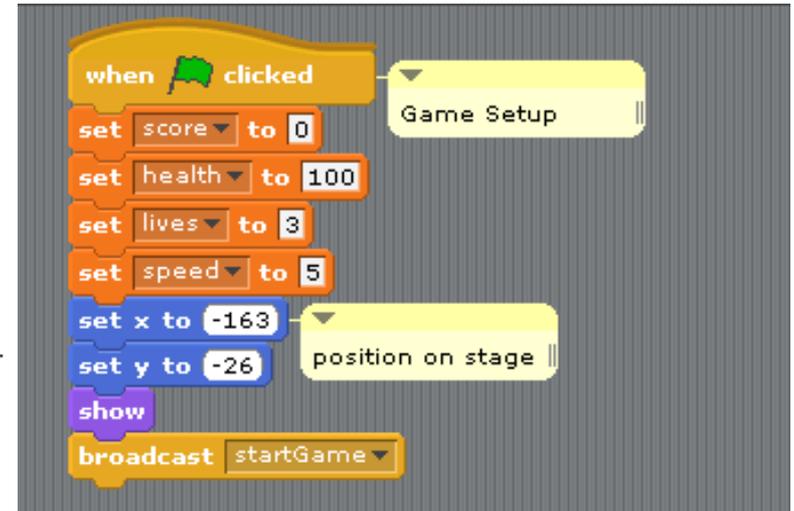


Game/Simulation Design Tips with Scratch

**An Introduction to Computer Science
Programming 1**

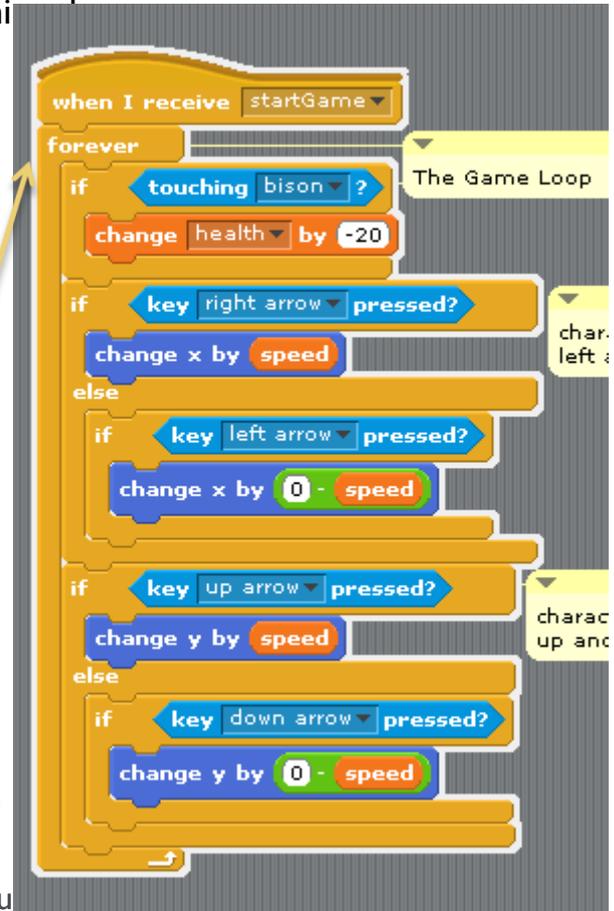
Set-up

- ▶ Create 3 main variables:
 - ▶ score
 - ▶ health, &
 - ▶ lives
- ▶ Reset the position of any sprites that move through-out the game
- ▶ Make sure the stage resets the correct background for the beginning of the stage
- ▶ Show any sprites that need to be visible



The Game Loop

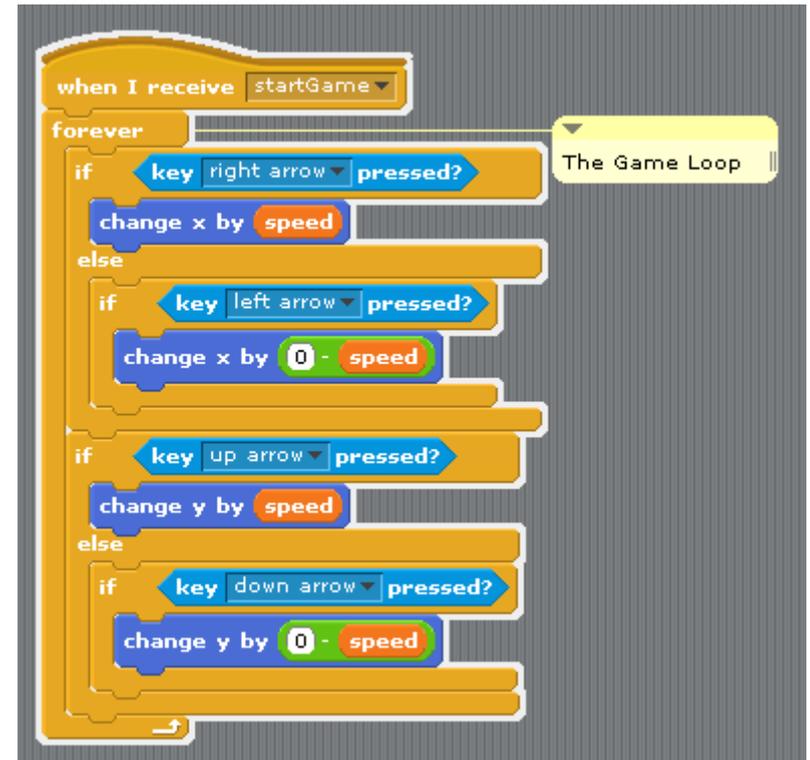
- ▶ From the time the game begins until it ends, the game is continually running a game loop
 - ▶ 30x a second
 - ▶ typically – I really don't know how many loops there are a second with Scratch
- ▶ During the game loop, you need to program the following elements:
 - ▶ Player/object movement control
 - ▶ Collision-detection – is the object touching a/an...
 - ▶ Enemy sprite
 - ▶ Bonus sprite
 - ▶ wall/obstacle/etc.
 - ▶ Scoring – you will probably code this with the collision-detection
 - ▶ Add points when you hit an enemy
 - ▶ Subtract health when an enemy hits you or collide with obstacle
 - ▶ Subtract a life when health is 0 or lower
 - Don't forget to add back to health
 - ▶ End game when there are no more lives
- ▶ Anything that happens during the game loop must happen in a forever loop
 - ▶ Typically when the start button goes
 - ▶ But not when you want to start with a splash page – ask Mr.Winikka if you splash page



The image shows a Scratch script for a game loop. It starts with a 'when I receive startGame' event block. This is followed by a 'forever' loop containing several conditional blocks: 1. An 'if touching bison?' block with a 'change health by -20' block below it. 2. An 'if key right arrow pressed?' block with a 'change x by speed' block below it. 3. An 'else' block containing an 'if key left arrow pressed?' block with a 'change x by 0 - speed' block below it. 4. An 'if key up arrow pressed?' block with a 'change y by speed' block below it. 5. An 'else' block containing an 'if key down arrow pressed?' block with a 'change y by 0 - speed' block below it. The script ends with a return arrow block. A yellow callout box labeled 'The Game Loop' points to the 'forever' loop. Other partial callouts on the right include 'charac left' and 'charac up and'.

Object Control

- ▶ To control objects, a simple, but effective way to do it is to
 - ▶ set a variable for speed (speed)
 - ▶ change x by speed to move to the right
 - ▶ change x by (0 - speed) to move to the left
 - ▶ change y by speed to move up
 - ▶ change y by (0 - speed) to move down
- ▶ Place a block of if-else statements in your while loop
 - ▶ Have 1 if-else for left and right
 - ▶ Have 1 if-else for up and down



Game Design Tips

▶ Object-Control

- ▶ Place in forever loop (the game loop)
- ▶ Check for key presses
- ▶ Code what happens when a particular key is pressed
 - ▶ If up arrow > move it up
 - ▶ If down arrow > move it down
 - ▶ Etc.

▶ Collision-detection

- ▶ Place in forever loop
- ▶ Check to see “if touching...”
 - ▶ Color
 - ▶ A particular sprite
- ▶ Depending on what you are colliding with
 - ▶ Either add or subtract to score
 - ▶ If it’s an enemy, subtract from health
 - ▶ If it’s a bonus object, add to score

▶ Health & Lives

- ▶ Place in a forever loop
- ▶ If no more health...
 - ▶ Subtract 1 from life
 - ▶ Add back to health
- ▶ If no more lives...
 - ▶ End game

