

# Plants vs. Zombies Challenges

## Part I

Scratch blocks needed for challenges 1 through 12: “when flag clicked”,

### Moving the Characters

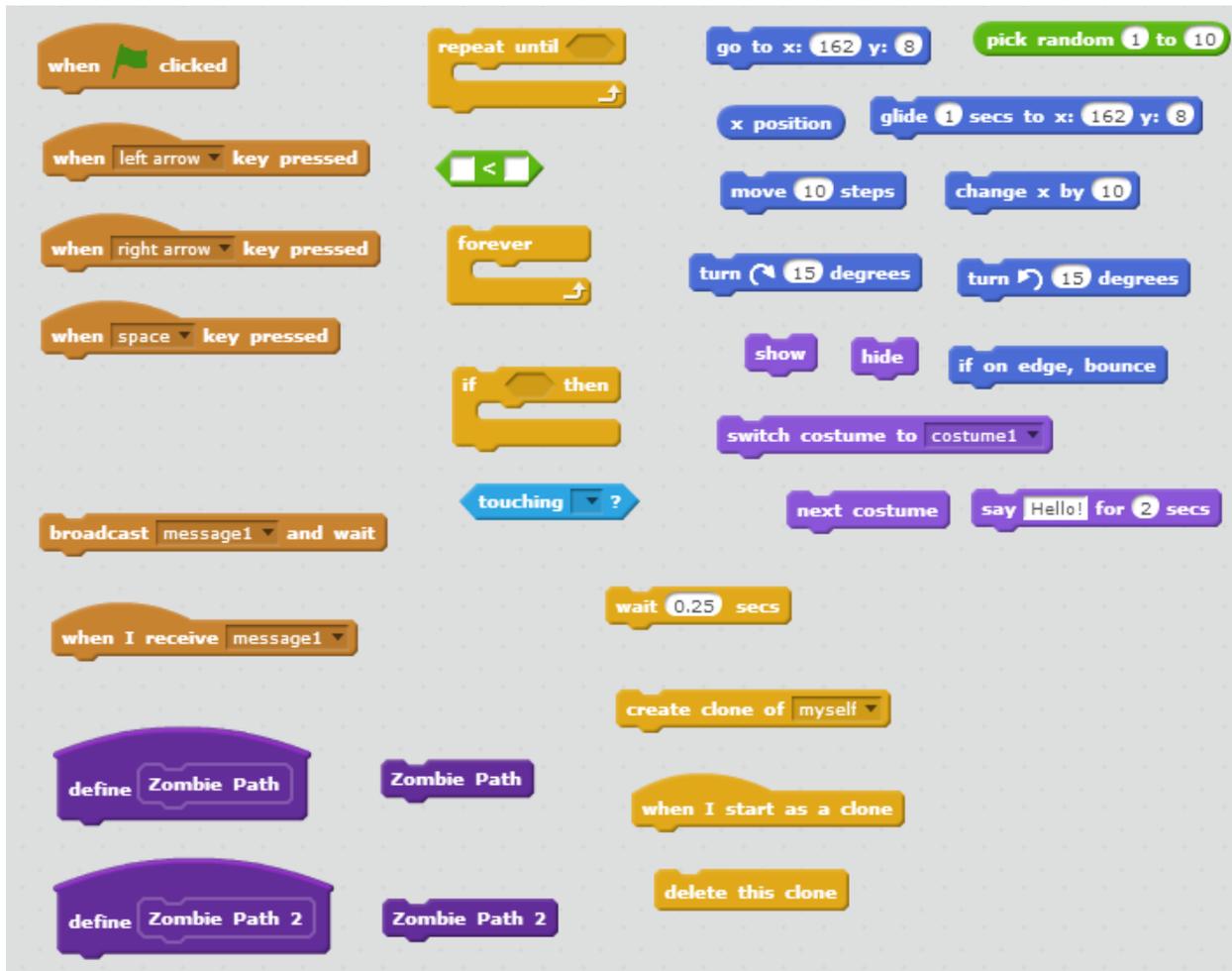
1. Make it so that when you click the green flag the zombie goes to the right side of the screen and the pea shooter goes to the left side of the screen. Test your code by dragging the sprites to some other place on the screen. Then click the green flag to see if they go where you want.
2. Make a functions (“more blocks”) called “Zombie Path” and “Zombie Path 2” that move the zombie from the right side of the screen to the left side.
  - a. In “Zombie Path”: use a simple “slide” block.
  - b. In “Zombie Path 2”: use a “repeat” block, moving the zombie 5 steps each time.
3. Make it so that when the zombie reaches the left side of the screen it goes back to the right size (at a random y coordinate) and moves left again. You will want to use a “forever” block on the outer loop. Test your “forever” block with both your “Zombie Path” and “Zombie Path 2” functions.
4. Make the pea shooter rotate 10 degrees to the left when you press the left arrow, and 10 degrees to the right when you press the right arrow.
5. Make it so when you press the space bar the pea shoots out of the pea shooter. The pea faces the direction the pea shooter is facing. It then moves forward until it’s touching an edge. Then it hides. (The pea should start hidden when you click the green flag.)
6. Make it so that when the pea hits the zombie the zombie says “ouch!”.
7. Make the pea into a super pea by making it bounce off the walls – so when it touches an edge it bounces and keeps going instead of disappearing.
8. Make it so when the zombie says “ouch!” it broadcasts a message “hide pea” that causes the pea to hide.

9. Right now, there is only one pea. Change your pea script to use cloning so you can shoot multiple peas at one time. Each time you press the space bar, a new pea is cloned. Only the cloned pea shows. The “real” pea stays hidden. When a pea stops (either by hitting an edge or hitting a zombie), instead of hiding it, use “delete this clone”.
  - a. Cloned peas create a problem with our “hide pea” message, because all the peas will hide whenever one pea hits a zombie. We will talk next week about how to fix this, but one thing you can do for now is: When a pea gets the “hide pea” message, only hide it if it’s touching a zombie.

### **Animating the Characters**

10. Make the pea shooter constantly move side-to-side as it does in the real Plants vs. Zombies game. Duplicate the pea’s costume a few times and modify the positions of the head and neck. You should then be able to use “next costume” in a “forever” loop to make the pea go side-to-side.
11. Make the zombie look like it’s walking. Do this by duplicating its costume a few times, and adjusting the left and right legs so that they look like they are walking. (Don’t worry about doing this perfectly. It’s very hard to get perfect, and even if you just move the legs a bit it will look much better than if the zombie just slides.
12. Next week we are going to make the zombie die when enough peas hit him. You can start creating a “die” animation for the zombie by making more costumes. You can rotate the body to make it look like the zombie is falling down, and you can even have the zombie’s head pop off.

Scratch blocks needed for challenges 1 through 12.



## Part II

13. **Shoot pea immediately.** Right now, when you make a pea shooter, it waits five seconds before firing its first shot. Make it so it fires as soon as it's created.
14. **Killing zombie earns sun.** Make it so each time a zombie dies, it earns a certain amount of Sun (\$) for you. Maybe 10?
15. **Game over.** Make it so the message says "Game Over" when a zombie reaches the edge. If you want to be fancy, you can figure out all the places in the game you have to change to really make the game over. The zombies should stop moving. The plants should stop shooting. The keyboard commands should no longer work.
16. **Zombie hit points.** Right now, a zombie as soon as a pea hits it. Make a variable called "hit points" (be sure to make it "for this sprite only" -- very important!) that keeps track of hit points for the zombie. A zombie starts with 3 hit points. Each time it gets hit by a pea, it loses one hit point. When it gets to zero hit points, it dies. Use the "think" block inside the zombie's "repeat" block to show how many hit points each zombie has at all times. You could make it so that when a zombie is cloned, it gets a random number of hit points from 3 to 10, so some zombies are stronger than others.
17. **Pea shooter hit points.** Just like you did for the zombie, make a variable ("for this sprite only") for the pea shooter called "hit points". Create a forever loop in the pea shooter clone that checks once per second if it's touching a zombie. If so, it loses a hit point. When it gets to zero hit points, it dies and goes away. Figure out a good number of hit points to start the pea shooter at so the zombies can kill it, but not too quickly.
18. **Fast Pea Shooter.** Duplicate the Pea Shooter sprite and make a new sprite called Fast Pea Shooter. Make it so when the user presses the "F" key they can place a fast pea shooter. The fast pea shooter is just like the shooter, but costs more and shoots more rapidly.
  - a. **Challenge:** We actually can make the fast pea shooter without making a new sprite. Instead of making a new sprite, make a new variable ("for this sprite only") for the pea shooter that is set to either "slow" or "fast". That variable determines how fast the pea shooter shoots. Remember to ask if you need help on this one. You will need to set a shared variable on the Stage, similar to "pea start x", that tells the shooter which type to be.

19. **Double-Headed Pea Shooter.** Duplicate the Pea Shooter sprite and make a new sprite called Double-Headed Pea Shooter. Make it so when the user presses the “D” key they can place a double-headed pea shooter. Each time the double-headed pea shooter shoots, it shoots one pea forward and one pea backward. One way to make this work is to create a new kind of Pea spite called a Backward Pea. Another way to make it work is to have just one kind of pea, but have it keep track of whether it’s a forward pea or a backward pea (see the Fast Pea Shooter challenge above for more info).

## Part III

20. **Night and Day.** Use the “change brightness effect” block to darken the background. Make it so a “day” lasts about 30 seconds, then it gets dark slowly, then it stays dark for 15 seconds, then it gets light slowly and another day starts. You can do this by modifying the “forever” loop in the background and using a variable.
21. **Sunflower.** When the user presses the S key, they can place a Sunflower. A Sunflower produces a sun every 20 seconds. The user can click the sun to earn Sun (\$). Also, even without Sunflowers, you can make it so a free sun falls from the sky every 30 seconds (like in the real game).
22. **Chomper.** When the user presses the C key, they can place a Chomper. A Chomper eats any zombie that touches it. However, the Chomper takes 30 seconds to eat the zombie, and while it’s chewing, if another zombie touches it, it loses hit points.