Java Fundamentals
2-7: Functions
Project

This project will progress with you throughout the course. After each lesson there will be more to add until it builds into a complete animation that you can upload to YouTube or export as a local animation file.

Lesson Objectives:

- Use functions to control movement based on a return value
- Write a storyboard

Instructions:

1. Open Alice 3 on your computer.
2. Either using the My Projects tab or the File System tab, browse for and open the Fish_6.a3p file.
3. Using the Save As command from the file menu, rename the file to Fish_7.a3p.
4. If you are not already in the code editor use the Edit Code button to go to the code editor.

   For this lesson you are going to experiment with functions in your animation.
5. You added a treasure chest to the world and buried it under the sea floor. You will now bring it up. Select treasure chest from the object list and drag a move procedure to the bottom of the fish code (above the seaweed code block) and choose up and 1 for the arguments. 1 is a placeholder value you will replace with a function.
6. This would move the chest up 1 metre but we want to make the chest rise up the height of itself. You are going to use a function to calculate the actual distance the chest will move. A function returns a value and the getHeight function returns the height of the object. To do this, choose the function tab under the treasure chest object list.
7. In the functions tab select the getHeight function and drag and drop it on top of the 1 placeholder value.
8. Change the duration of the move procedure to 4 seconds.
9. Save your program and run the animation to test it.
10. Remember you can disable the code that moves the fish for testing purposes!

    Textual storyboard - Explanation of the next set of events

    The Blue Tang fish is going to notice and look towards the treasure chest,
    The Blue Tang fish will swim over to it,
    The chest lid will open
    The Blue Tang fish will swim away out of the scene.
    The Pajama fish will swim over to the chest
    The Clown fish will swim over the chest

The textual story board can be used to identify where control statements can be used.

Do in order

The Blue Tang fish is going to notice and look towards the treasure chest,

The Blue Tang fish will swim over to it,

The chest lid will open,

The Blue Tang fish will swim away out of the scene.

Do together

The Pajama fish will swim over to the chest,

The Clown fish will swim over the chest.

The Blue Tang fish is going to notice and look towards the treasure chest

11. Use a turnToFace procedure choosing treasureChest as the argument and place it under the statement that moves the treasure chest up.

The Blue Tang fish will swim over to it,

12. Make the fish move towards the chest. This requires a few steps in order to make this happen realistically.

13. Next you need to make the fish move towards the chest. This requires a few steps in order to make this happen realistically. First drag a move statement to the code window and choose 10 as the placeholder argument for the move. You will change this in a second.

14. You are going to use a function to calculate the real distance between the objects. For this operation you need to use the getDistanceTo function that will return the distance between our two objects.

    Drag the function over the current distance value of 10 and choose the treasure chest from the drop down list.

15. Run the program and see what happens.

    The fish collides with the treasure chest because it travels from the centre point of the fish to the centre point of the chest.

16. You want the fish to stop before it hits the chest so you have to do a bit of math. Fortunately Alice makes this relatively straight forward for us.

    Click on the getDistanceTo function and choose Math then **getDistanceTo - ???** and once again choose a placeholder value of 10, you will change this next with another function.

17. Now you can use another function to calculate the depth of the fish. Drag the Blue Tang's getDepth function onto the placeholder value.

18. Run the program to test this.

    The chest lid will open

19. Now you will get the treasure chest lid to open. Using the sub-part option in the object list select the treasure chest's getChestLid joint.

    Add a turn procedure that turns the lid backwards 0.35.

    The Blue Tang fish will swim away out of the scene.

20. Choose the Blue Tang fish from the object list. Select a turn statement and choose right and .25 as the arguments.

    Remember the objects move in relation to their direction not ours!

21. Select a move statement and add forward and 10 as the arguments

This concludes the first section of the textual storyboard. You stated that these statements should be in a do in order control statement.

22. Add a do in order, drag the statements into it and add a comment that explains the code block. You can use multiple comment lines if it makes it easier to read.

The Clown and Pajama fish will swim over to investigate the chest together

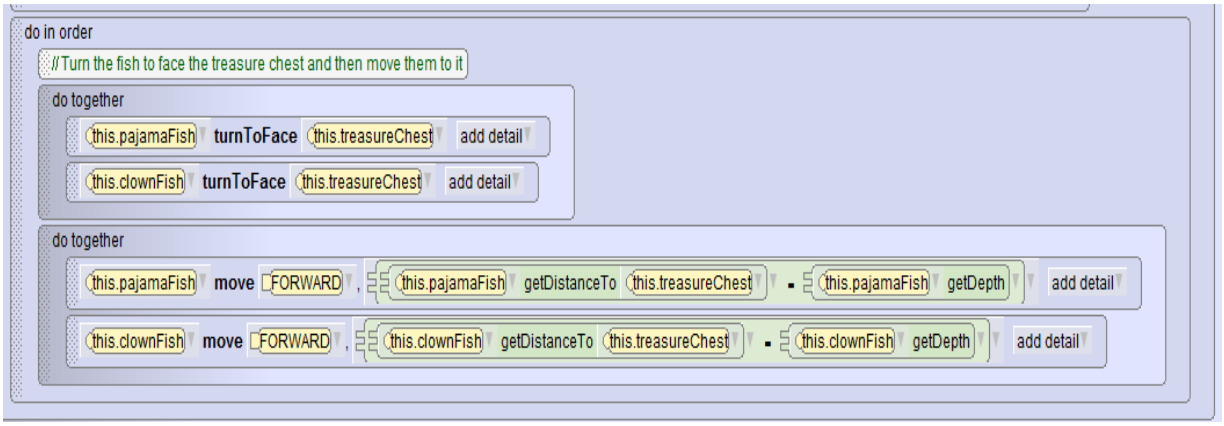
The next section of the textual storyboard was identified as a do together statement.

23. You need to add a do together statement under the treasure chest code.

24. Using the CTRL + mouse click method drag the blue tang's turnToFace procedure into the do together statement twice. Change the blueTang arguments to the Pajama fish and Clown fish respectively.

25. Drag another do together statement under this one. Drag the blue tangs move procedure into the new do together statement and again change the arguments to match the Pajama and Clown fish.

26. To create a code block for this sequence wrap the two do together statements inside a do in order statement. Add a comment to explain the code



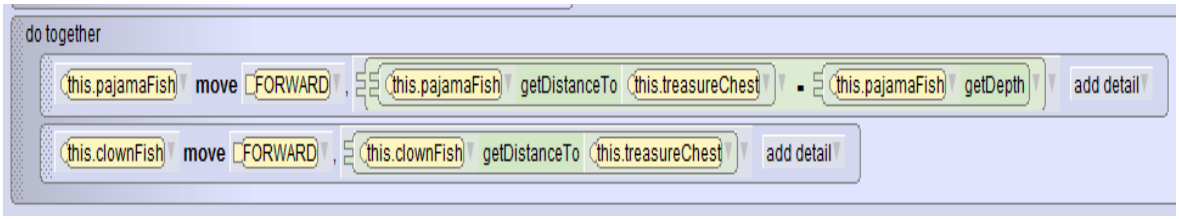
27. Run the program. What happens?

The Clown fish will swim over the chest

You will notice that the Clown fish stops before it gets to the chest. To fix this you can change the statement by removing the math portion of the code.

28. To do this click on the centre of the function and choose reduce to left operand only.

Leaving you with:



29. Test your program to ensure that the Pajama fish stops short of the treasure chest but the Clown fish swims on top of it.

30. Re-enable all code that has been disabled and run the full program.

31. Save your program.

32. Exit Alice 3.