

Scratch Basics



GETTING STARTED

Card 1 of 7

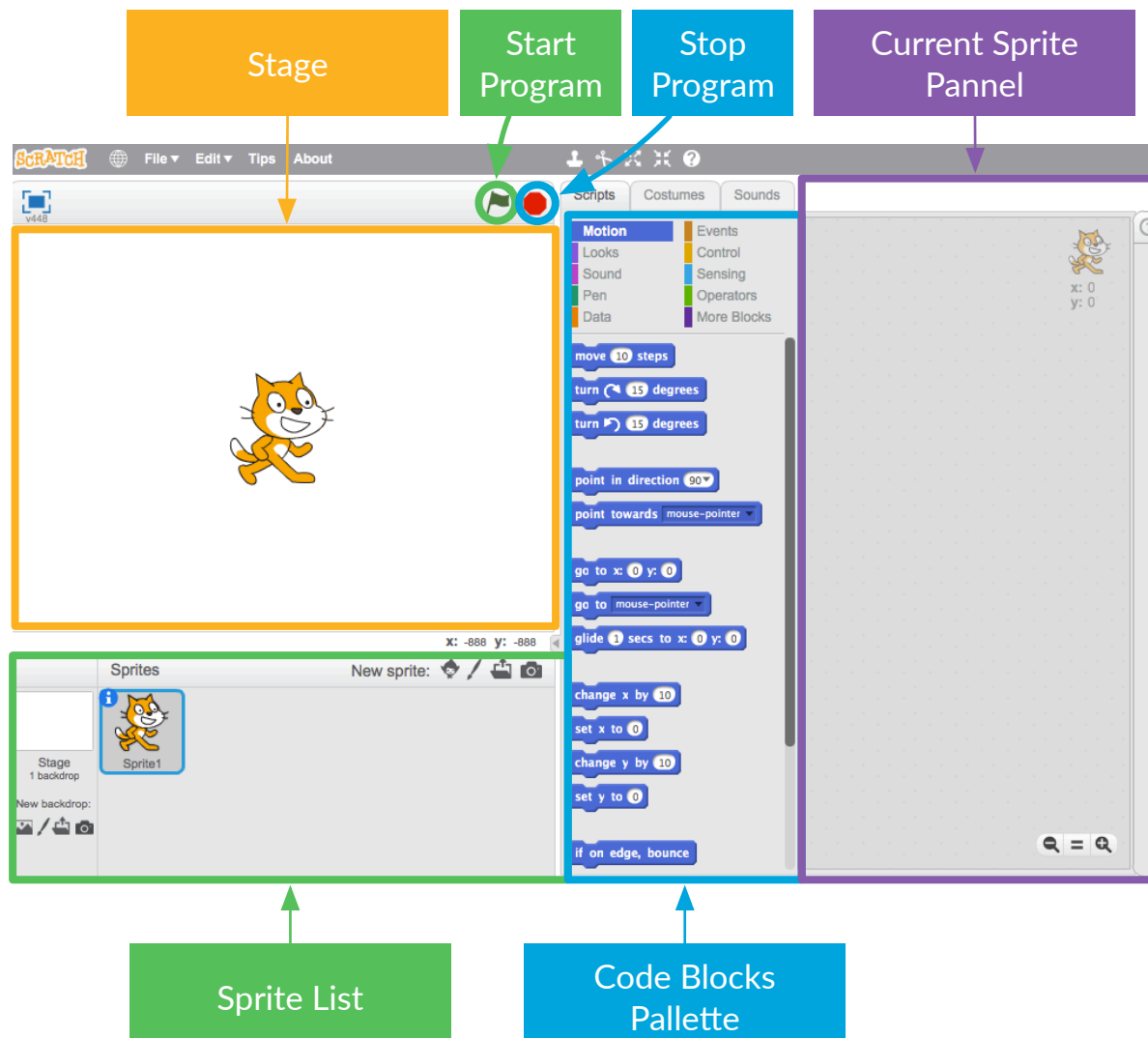
I'm Learning: Scratch

- 1 These Sushi Cards are going to help you learn to create computer programs in **Scratch**. To do this, you're going to need to have Scratch!

You can either download it and install it on your computer by going to **dojo.soy/downloadsscratch** or use it in your web browser by going to **dojo.soy/usescratch**. Do one of these two and once you're set up, move on to the next step.

- 2 Once you sign-in to the online Scratch, or load it on your computer, you'll see a screen like the one below.

This screen has a few parts you'll need to remember. They are labeled in the picture below.



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There are a few words from that picture that need explaining:

The Stage

This is where your Scratch Programs run. It has

- One or more **backgrounds** (images on the background of the screen)
- Any **code blocks** associated with it (we'll get to this)

Sprites

Any object that goes on the stage is a sprite. In Scratch, the sprite is:

- The image on the **stage**
- Any alternative **costumes** (looks) it has
- Any **sounds** associated with it
- Any **code blocks** associated with it



The **current sprite** is the one that's selected in the **sprite list**.

Code Blocks

Code in Scratch comes as blocks, that you click together to make programs. You choose blocks from the **code blocks palette** and drag them into the **current sprite panel**, then click them together.

There are 10 categories of blocks, which are colour coded, and you can select each category from the list at the top of the **code blocks palette**.

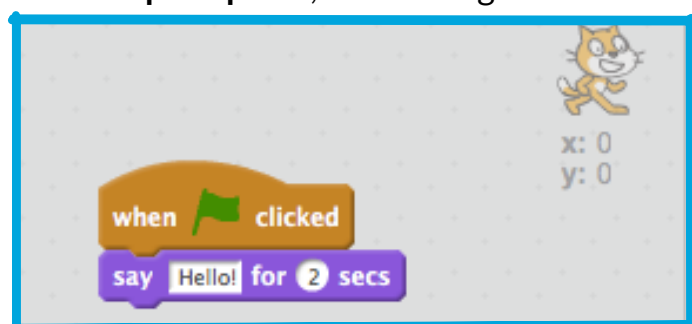
4

Time to get coding! Go back to Scratch and click on the Scratch Cat in the **sprite list**. The cat is now the **current sprite**.

Go to the **Events** category in the **code blocks palette** and choose the "when [flag symbol] clicked" event, then drag it onto the **current sprite panel**.

Then go to **Looks** in the **code blocks palette** and choose the "say [Hello!] for [2] secs" block and drag it onto the **current sprite panel**, connecting it to the end of the other block, like this:

Now click the **Start Program** button and watch what happens!



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ADDING & REMOVING CODE

Card 2 of 7

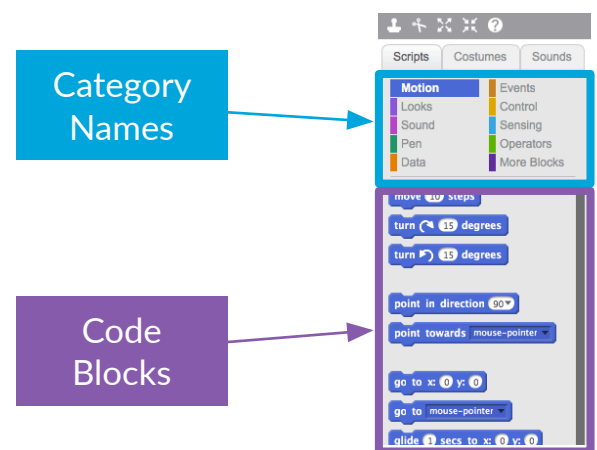
I'm Learning: Scratch

- 1 Great! You've written your first Scratch program. Time to learn a little more about getting code in and out of Scratch! Scratch code is made up of **blocks** that you snap together to make programs.



These blocks come from the **Code Blocks Pallet** where they are broken up into different categories. By clicking on the category names, you can see the blocks in that category. Here, the **motion** category is selected.

All of the blocks in the selected category are shown in a list. You can pick the one you want, click on it and hold down the mouse button, then just drag it onto the **current sprite panel** and let go.



- 2 Once the block is in the **current sprite pane** you can move it around and snap it to other blocks. If you want to see what a block does, you can double-click on it and it will run!

Normally, you want your blocks to run automatically, when something happens. This is why most of your programs will start with a block from the **events** category. Most often, it will be this one:



The code blocks connected to this block will run after the green flag is clicked



- 3 Code blocks run from top to bottom, so the order you snap your code together in matters.

In this example, the sprite will **say** "Hello!" before it will **play** the meow sound.



Scratch Basics



ADDING & REMOVING CODE

Card 2 of 7

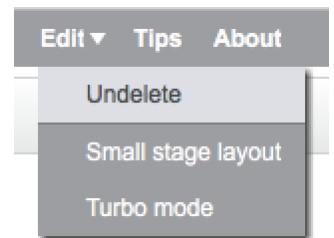
I'm Learning: Scratch

- 4 Removing, or deleting, code blocks you don't want in your program is easy! You just have to click on the **scissors** icon and then click on the code you want to remove.



Be careful though! **You will delete all the blocks connected to the one you click on.**

If you do this by accident and want to get your code back, you can use the **edit** menu and click on **undo**. Try adding, deleting, and undoing some code blocks now!



- 5 Now you know how to move code around and make things happen, time to try a simple program: Making the Scratch Cat walk in a circle!

Make sure you have the cat selected in the **sprite list** and then drag these blocks together. You'll find them in **events** and **motion**.



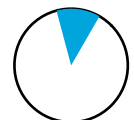
Then, click on the green flag above the **stage**. If you click too many times and the cat walks away, you can drag it back!



That's a cat walking in a straight line... not exactly what you want. Snap this block to the end to make it walk in a circle. It's in **motion** too.



This block makes the cat turn 15 degrees of the full 360 degrees that make up a circle. You can change that number, and the number of steps, by clicking on the number and typing a new value.

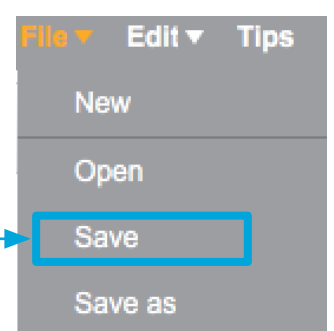


- 6 Now save your work! You do this by going to the **file** menu and clicking **save**.

Remember to save regularly as you work!

You can also use **save as** to save a copy of your program with a new name.

This one!



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MOVING THINGS AROUND

Card 3 of 7

I'm Learning: Scratch

- 1 Now your scratch cat moves, but wouldn't it be more fun to control it with the arrow keys? On this card, you're going to learn how to do that!

As you've probably guessed, you're going to need **event** and **motion** blocks again! This time, you're looking for this block:



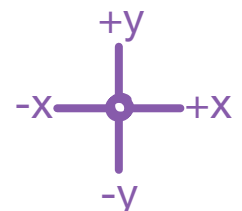
If you click the little arrow (▼) beside "space" you'll get a list of all the keys on your keyboard to pick from. You're going to need four of these blocks and you can connect them to **motion** blocks like this:



- 2 Your cat moves back and forwards now, which is pretty cool, but it doesn't move up or down. Also, if you look through the **motion** blocks, you'll see there are no blocks for "up" or "down". There are a whole bunch of them related to **x** and **y** though...

When programmers need to talk about the positions of objects, like sprites, we often use **x** and **y** coordinates to describe them. The **x-axis** runs from left to right, while the **y-axis** runs from bottom to top.

An sprite can be located by the coordinates of its centre, written something like (15, -27) where 15 is the **x** position and -27 is the **y** position.



To get a feel for how this actually works, take the **go to** block from **motion** and drop it onto your **sprite panel**. You don't need to connect it to anything.

Next, pick some values for **x** and **y**, fill them in, and double click on the block. Try different sets of values to see where the cat goes! In Scratch **x** goes from -240 to 240 and **y** goes from -180 to 180.



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MOVING THINGS AROUND

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I'm Learning: Scratch

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Now you know about **x** and **y** coordinates, you can make the cat move up and down! You just need to change its **y** value. You can update your code like this:

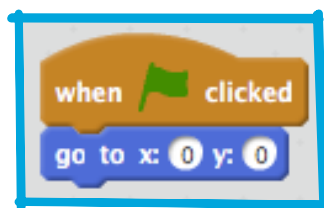


Now when the arrows are pressed, the cat can move all over the stage!

4

The cat moves all over the screen, but imagine this is a game: How do you restart it? You need to get the cat back to its original location when the player starts the game. In Scratch, they start the game by clicking on the green flag, so you need to change the cat's **x** and **y** coordinates when that happens.

That's actually pretty easy! The centre of the stage is (0,0) in **x** and **y** coordinates. So all you need is an **event** block for that green flag and the **go to** block you're already using. Set the **go to** to (0,0) and then snap it to the flag event block.



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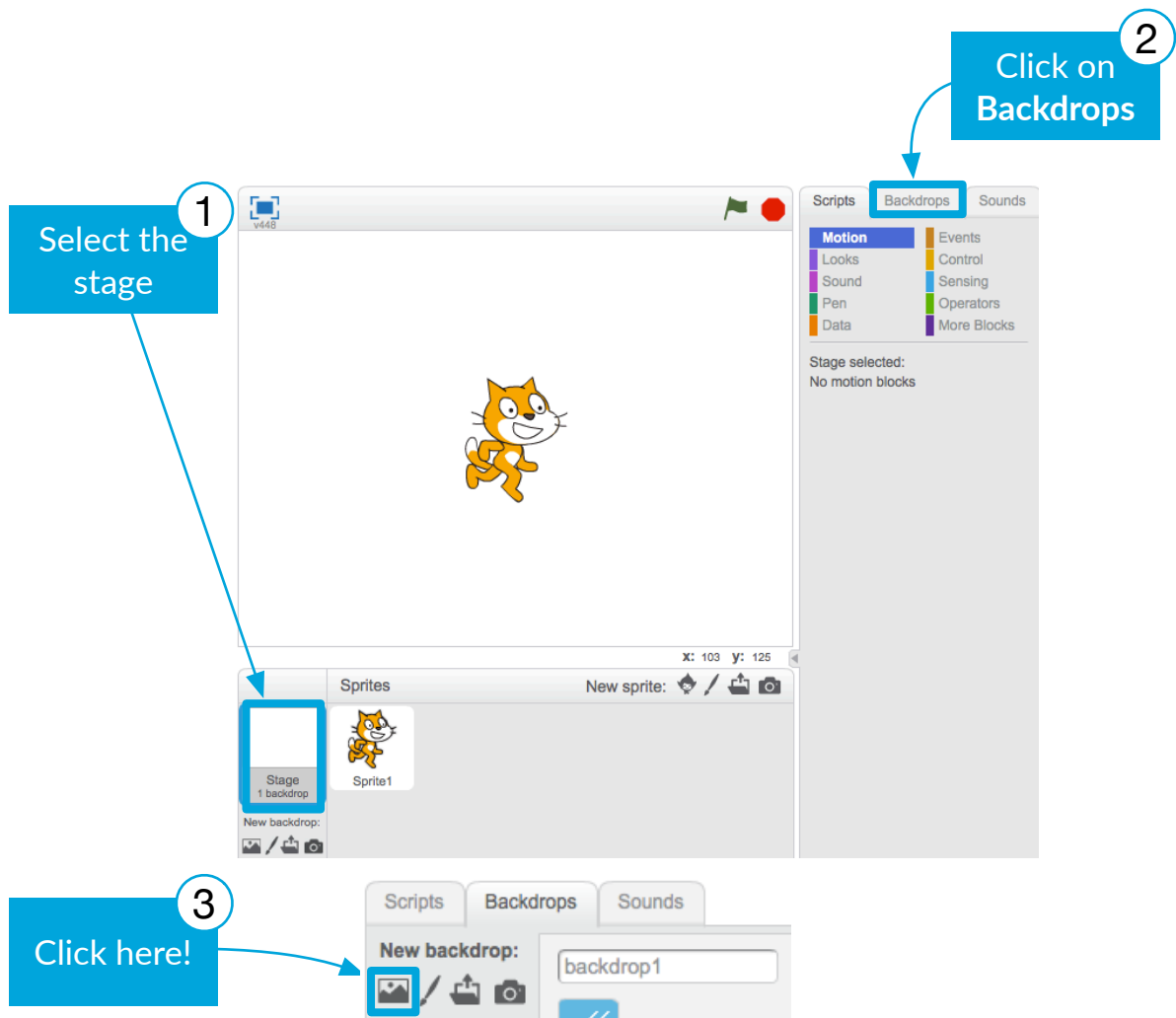
LOOKING COOL

Card 3 of 7

I'm Learning: Scratch

1

So your cat moves up and down, as well as left to right. You should probably put it somewhere sensible for that... like under water! Scratch has a library of backgrounds and sprites for you to use to make your project look awesome.



Then pick your favourite underwater background!

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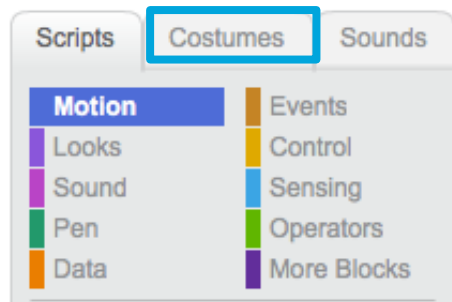
LOOKING COOL

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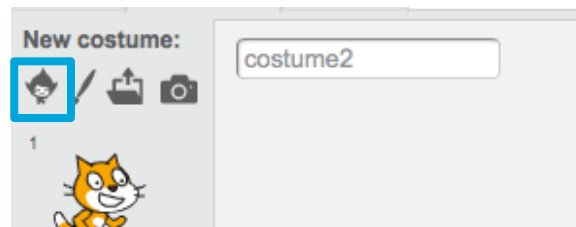
I'm Learning: Scratch

- 2 Great! Of course, now you have a cat underwater. Cats aren't usually big fans of that, but you can fix that. You can turn the cat into a shark!

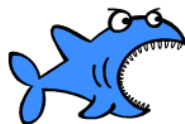
First, select the cat and click on the **Costumes** tab



- 3 Then, click on **Choose Costume from Library**



- 4 Pick this shark



- 5 Now remove the cat costumes by selecting each of them and clicking on the x



Click here

Now you have a shark!

Scratch Basics



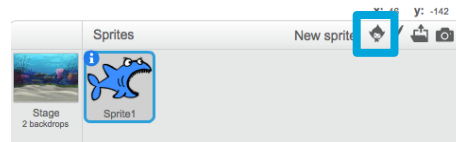
ALL THE SPRITES

Card 5 of 7

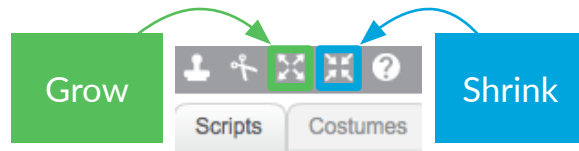
I'm Learning: Scratch

- 1 Now you have a shark that moves about underwater. Nice! Time to add some fish for it to catch!

Click the **new sprite** button and then choose a fish from the screen that opens.



That fish is a bit big compared to your shark though. Use **grow** and **shrink** to make it the right size.

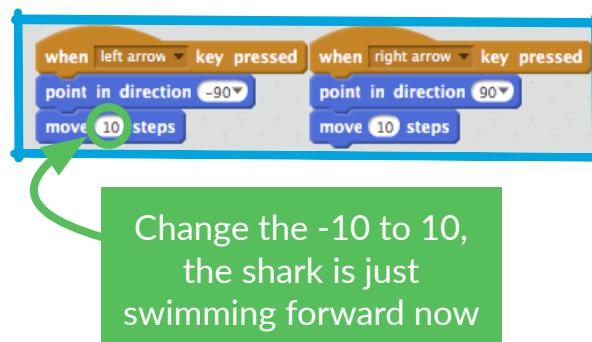


Click on **grow** or **shrink** and then click on the fish to make it get bigger or smaller.

- 2 Nice! Later, you're going to add some code to make the fish move around on its own, without help from the player. Your player will be the shark, trying to catch the fish.

However, it does look a little funny to have that shark swimming backwards. Just like you'd usually turn around rather than walking backwards, the shark would turn around rather than swimming that way. Luckily for you, Scratch has a block for this!

The **point in direction** block lets you pick the direction your sprite is pointing in. You can type in any number, but it comes with the four you'll need most already in there: **up**, **down**, **left** and **right**. You'll find it in the **motion** blocks section. Grab it and snap a couple of them into your shark's code, like this:



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ALL THE SPRITES

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I'm Learning: Scratch

3 If you tried moving the shark around after you added the “point in direction” blocks, you might have noticed something a little strange happening. The shark may not be turning quite right!

The problem here is that the shark sprite started, as all sprites do, with the “all around” **rotation style**, and what you need it to have is the **left-right** style.



As usual, there's a block for that and it's in **motion**! You just need to update your reset code from Card 3 to set the rotation style, like this:



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REMOTE CONTROL FISH

Card 6 of 7

I'm Learning: Scratch

- 1 Ok, now it's time to make the fish swim on its own. To do this, you're going to need a new kind of block: a **control** block. These let you do things a certain number of times, or under certain conditions.

Select your fish sprite and drag a “when green flag clicked” **event** block, a “forever” **control** block and a “move 10 steps” **motion** block into the **sprite panel** like this:



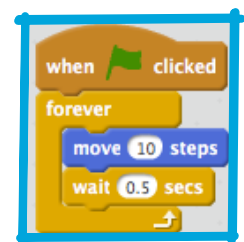
The fish does whatever is in the “forever” block over and over again, forever. Once it has reached the end it goes back to the top of the block and starts again. Now click the green flag and watch what happens!

- 2 Well, that fish just crashed into the side of the **stage**, and it was moving far too fast for your shark to catch. First, you need to slow it down. That's actually pretty easy, you just need it to wait for a little while after it moves those 10 steps.

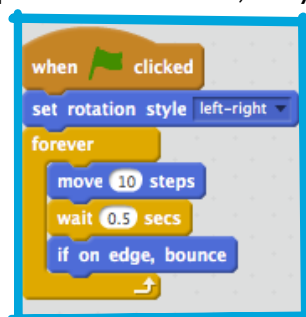
There's a **control** block that can help you here:



You can set how many **seconds** you want the fish to wait. For now, try half a second (0.5). You can test out different values later, to see which is the best for the game. Remember you can change the number of steps too!



- 3 The fish moves now, but you need it to bounce off the edge too. Yet again, there's a **motion** block for this! It's the “if touching edge bounce” block. It checks if the sprite is touching the edge and, if it is, turns left, right, up or down as appropriate. Of course, this will lead to an upside-down fish, so you need “set rotation style” again.



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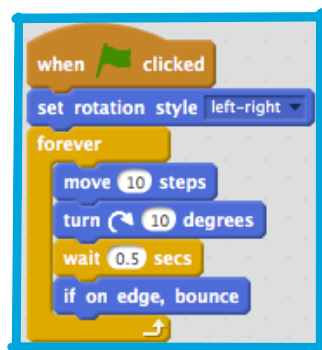
REMOTE CONTROL FISH

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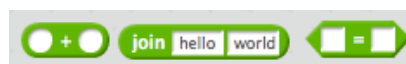
- 4 The fish moves back and forward now, but only in a straight line. That's going to be a bit too easy for the player to catch with the shark. You need to make the fish swim more unpredictably.

You already know from Card 2 how to make a sprite turn, so start there: Add a turn into the fish's swimming and click the green flag.



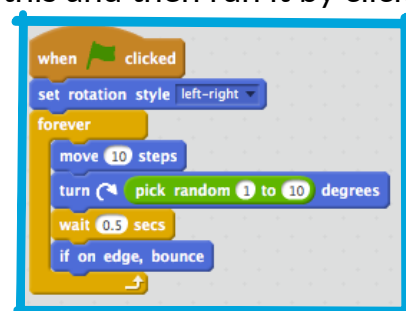
- 5 It's better, but there's still too much of a pattern. It needs to be more random. Luckily, Scratch can do random for you! You'll just need a new kind of block, called an **operator** block.

Operators take in one or more values (numbers, text, true/false values) and give back a single value. You can tell the kind of value it will give back by the shape of the block: round ends give numbers or text, pointy ends give true/false.



You need the “pick random” **operator** block, and you need to plug it into the “turn degrees” **motion** block by clicking and dragging it into the field where you set the number of degrees. You can change the minimum and maximum numbers it will pick, but the default values (1 and 10) are pretty good for this game, so you can just leave them.

Update the fish code to this and then run it by clicking the green flag:



Next: Catching that fish!

Scratch Basics



FISHING!

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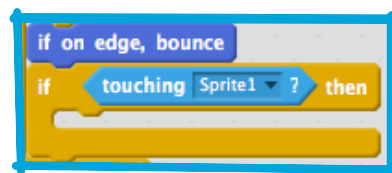
I'm Learning: Scratch

- 1 The shark moves, the fish swims, but they don't interact: If the fish swims right into the shark's mouth, nothing happens. Time to change that!

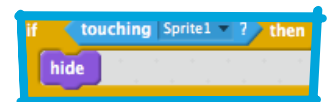
First, you need to know if the fish is touching the shark. For this, you'll need a **control** block and a **sensing** block. **Sensing** blocks collect information, like where the sprite is, what it's touching, etc.

The **control** block is an "if... then" block and needs to be given a true/false value. The **sensing** block you're going to use is "touching..." where you have to pick the sprite name (if you haven't changed it, it'll be Sprite1). From those pointy ends, you can tell it's going to give you the true/false value "if... then" needs.

You can add this into the "forever" loop on the fish, after the "if on edge bounce":



- 2 Of course, you've just added an "if... then" with no then. You can make the fish vanish, as if the shark ate it by using the "hide" block you can find in **looks** inside the "if... then".



- 3 Now once the shark catches the fish it disappears for good. That's not great. Put the "show" block, also from **looks** in at the very start of the fish code, so you can reset the game.



- 4 Better, but you don't want the player restarting every time they catch one fish! You can be clever here — when the fish is hidden, wait, move it, then show it again. It looks like lots of fish, but it's that one sprite moving around!



Scratch Basics



FISHING!

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I'm Learning: Scratch

5

That's a game! There's no way to keep score, though... or to win. You can fix that too! To keep score, you'll need somewhere to store the score, a way of adding to it and a way of resetting it when the game is restarted.

First: Storing it. When you want to store information in a program, you use something called a variable. Think of it like a box with a label on it: you can put something in it, check what's in it and change what's in it. You'll find variables under **data**, but you need to create one first!

1 Click "Make a Variable"

2 Enter "Score" as the name

3 It's in your program!

6

Now you need to update the variable whenever a fish is eaten, and to reset it when the game is restarted. Those are both pretty easy: From the **data** section, take the "Set Score to 0" and "Change Score by 1" blocks and put them into your program:

when clicked

set rotation style left-right

go to x: 0 y: 0

set Score to 0

if touching Sprite1? then

change Score by 1

hide

wait 1 secs

7

Cool! Now you've got a score and everything. Pick a score at which the player wins and make something cool happen! Maybe the shark congratulates them, or a "You Win" sprite appears, or music plays or... you get the idea!