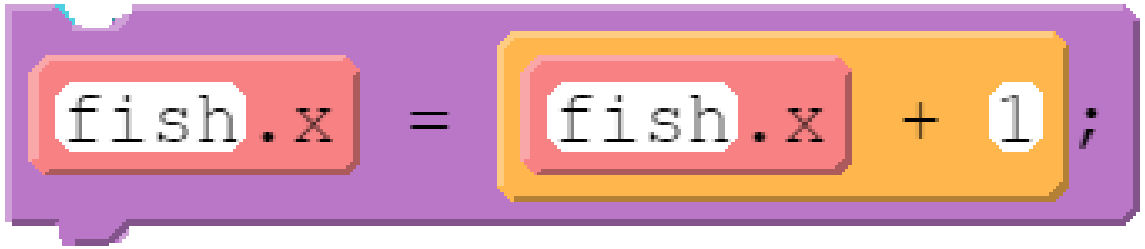
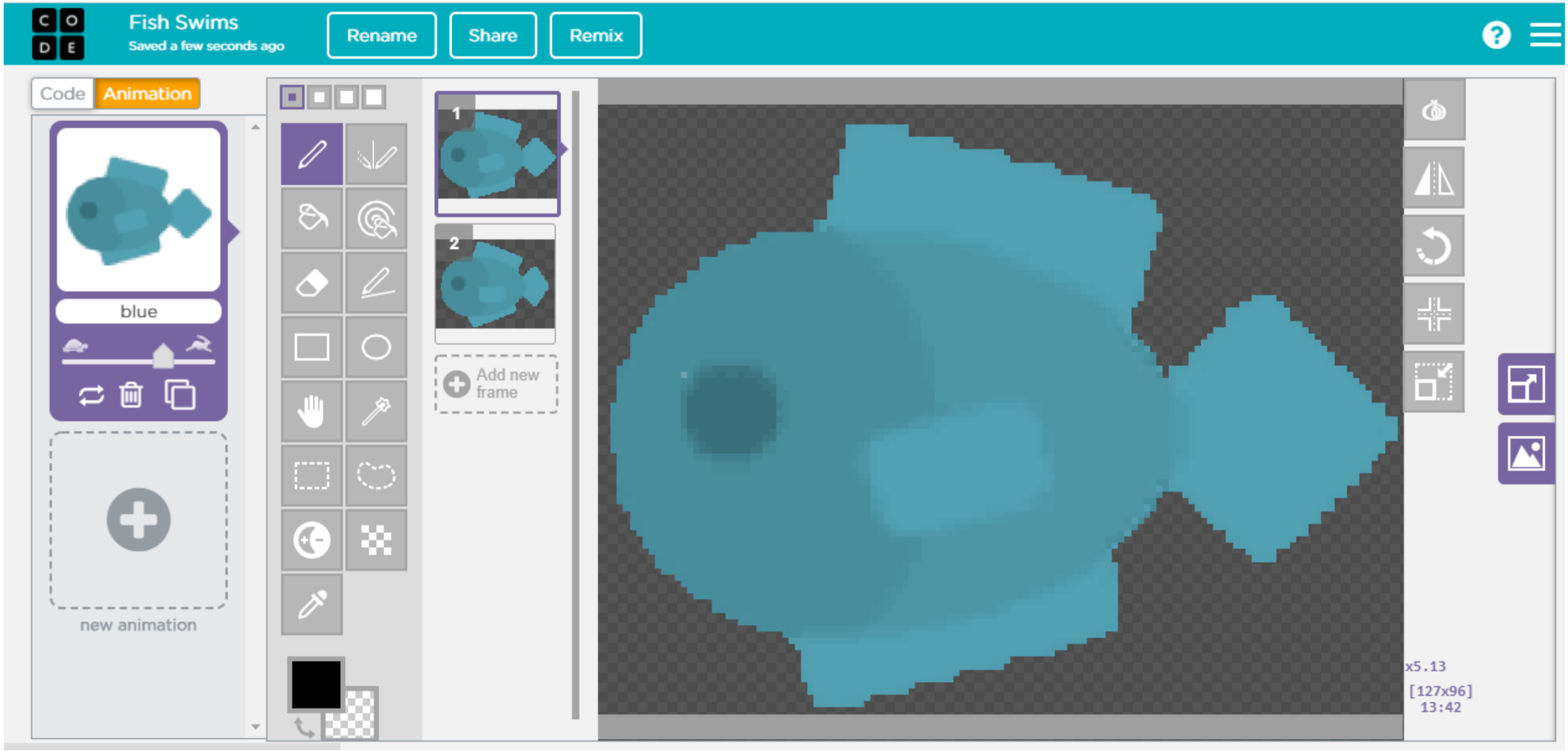
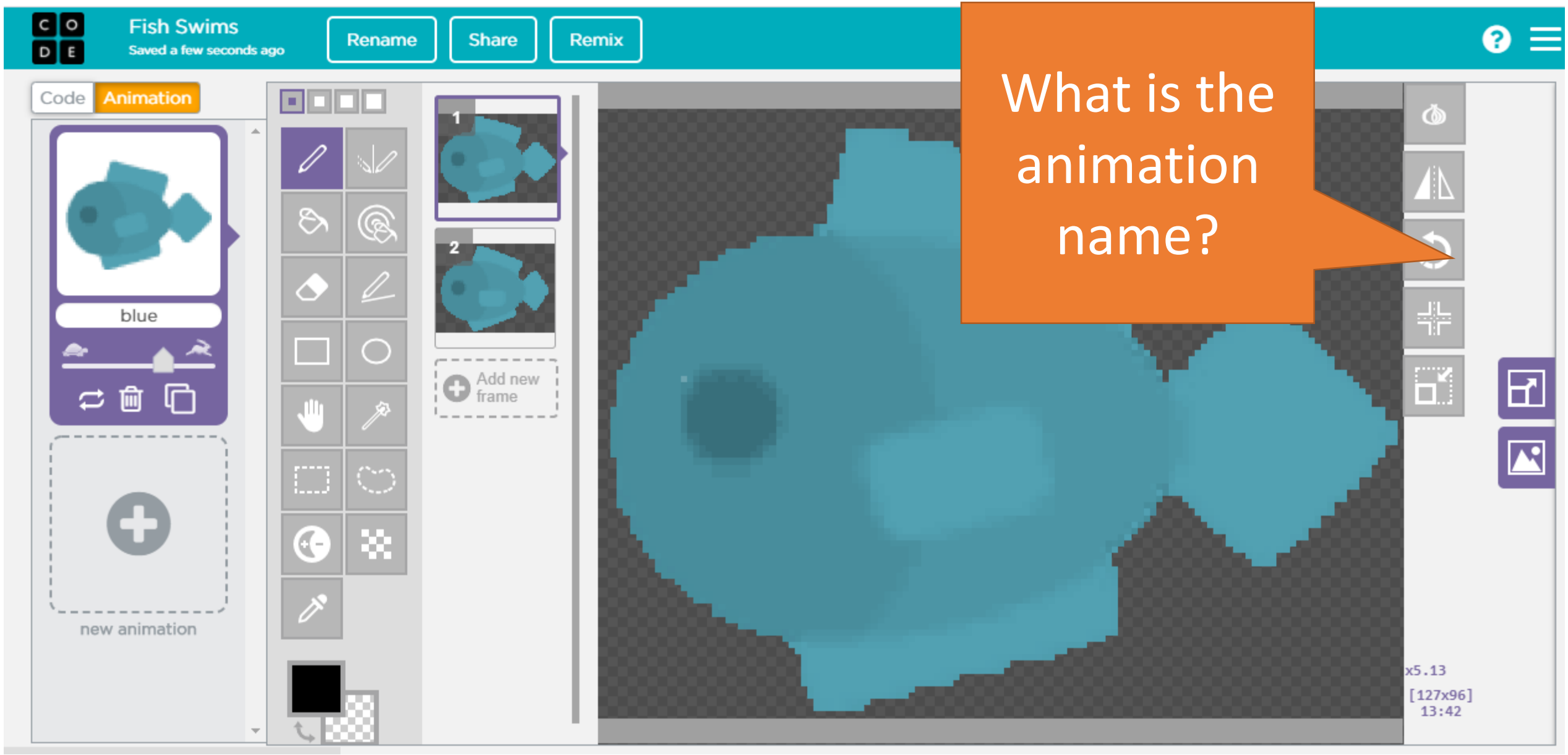
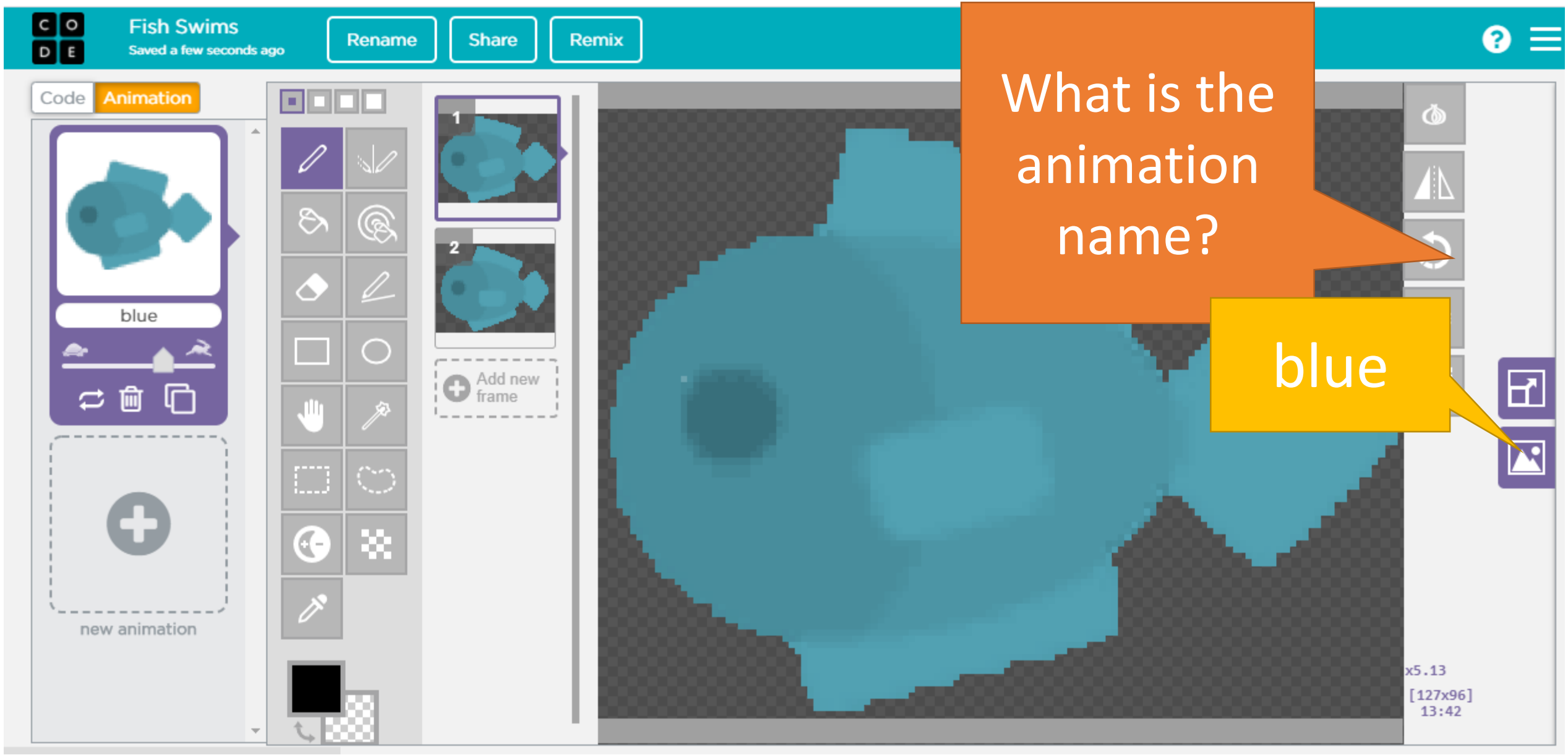
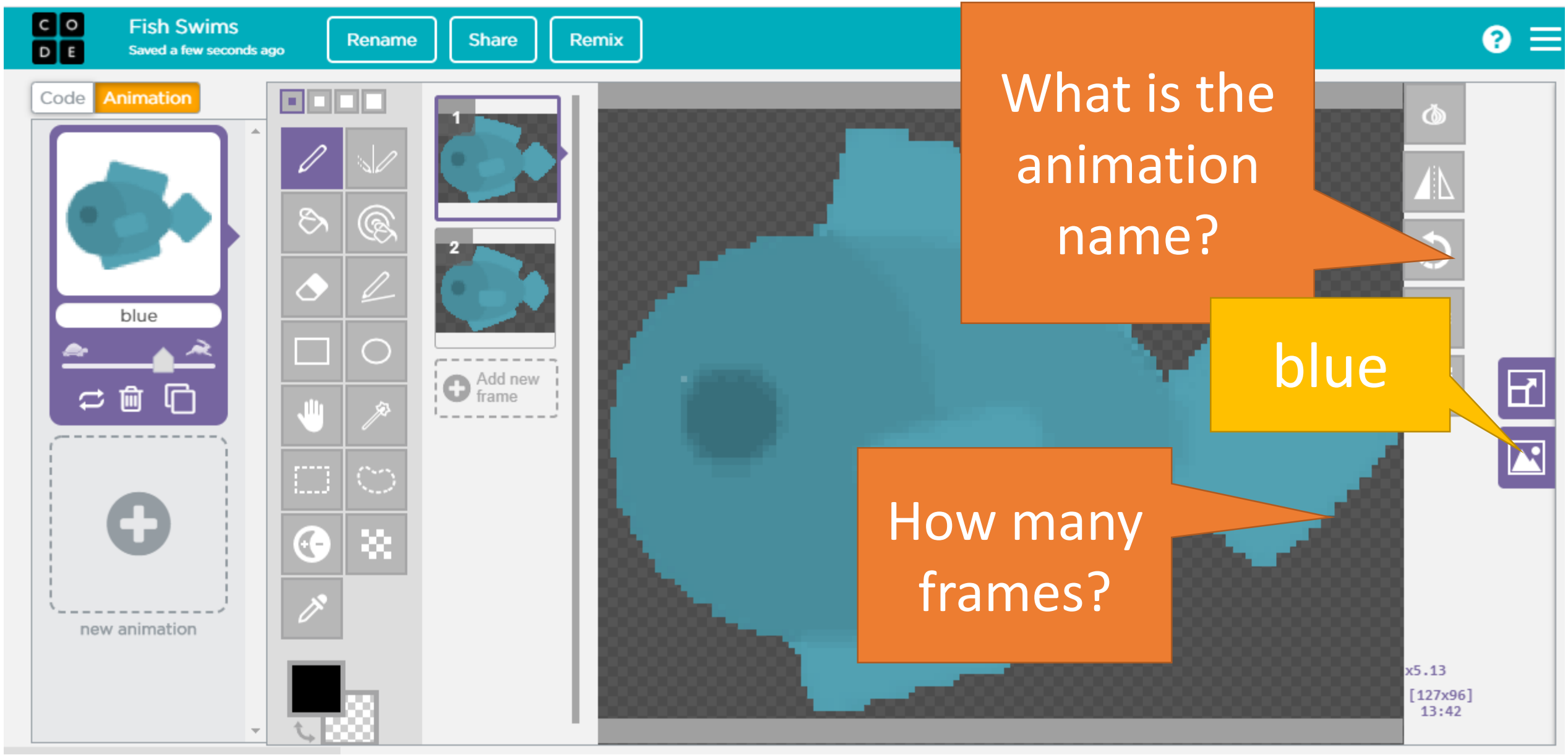
The Counter Pattern

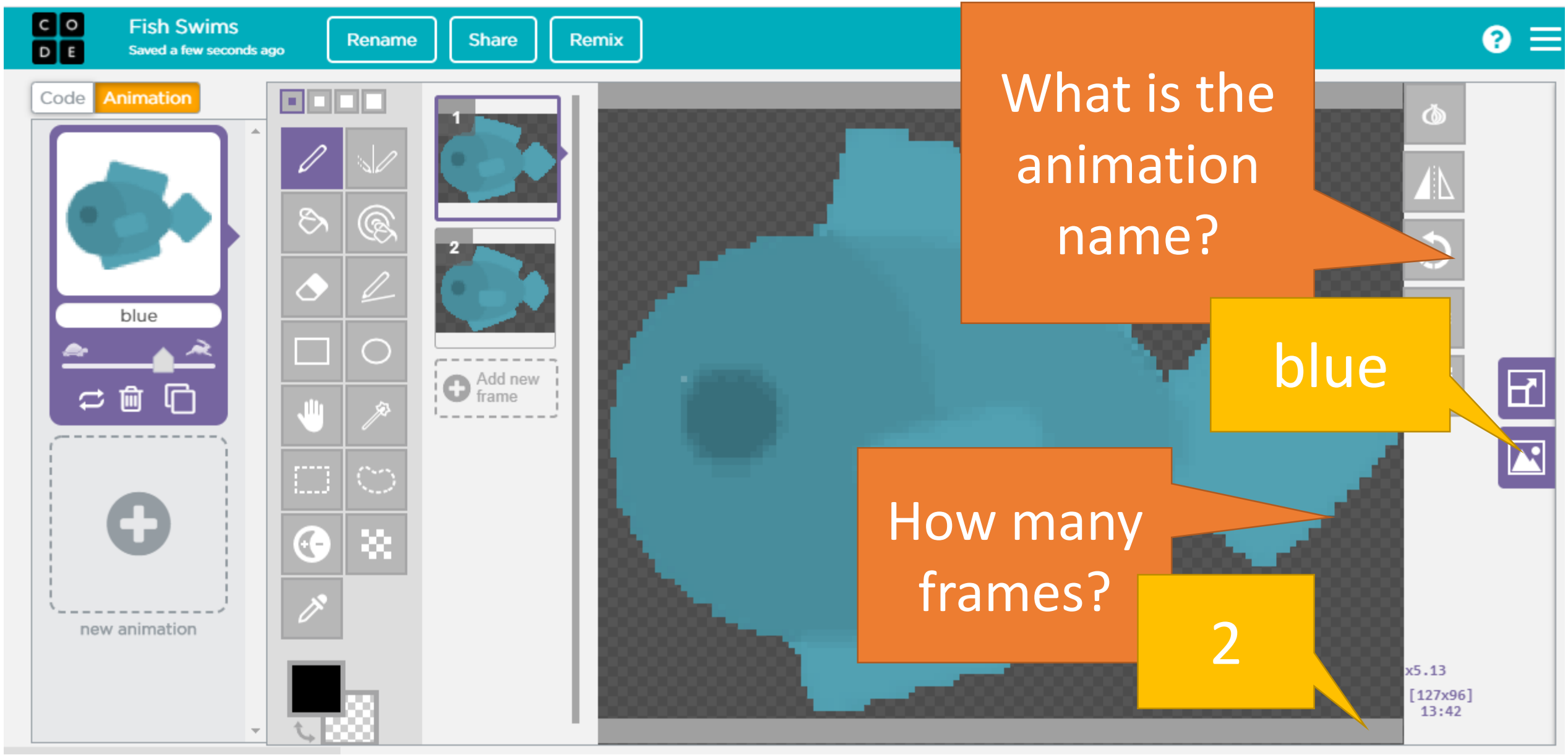



Fish Swims
Saved a few seconds ago
Rename
Share
Remix
Code
Animation
blue
new animation
1
2
Add new frame
x5.13
[127x96]
13:42


Fish Swims
Saved a few seconds ago
Rename
Share
Remix
Code
Animation
blue
new animation
Add new frame
What is the animation name?
x5.13
[127x96]
13:42


Fish Swims
Saved a few seconds ago
Rename
Share
Remix
Code
Animation
blue
new animation
Add new frame
What is the animation name?
blue
x5.13
[127x96]
13:42


Fish Swims
Saved a few seconds ago
Rename
Share
Remix
Code
Animation
blue
new animation
Add new frame
What is the animation name?
blue
How many frames?
x5.13
[127x96]
13:42


Fish Swims
Saved a few seconds ago
Rename
Share
Remix
Code
Animation
blue
new animation
Add new frame
What is the animation name?
blue
How many frames?
2
x5.13
[127x96]
13:42

Fish Swims

Saved a few seconds ago

Rename | Share | Remix

Code | Animation

Reset

Show Toolbox | Workspace: | Version History | Show Text

```
1  var fish = createSprite(300, 200);
2  fish.setAnimation("blue");
3  function draw() {
4    background("white");
5    drawSprites();
6  }
7
```

Fish Swims
Saved a few seconds ago

Rename | Share | Remix

Code | Animation

Show Toolbox | Workspace: | Version History | Show Text

```
1  var fish = createSprite(300, 200);
2  fish.setAnimation("blue");
3  function draw() {
4    background("white");
5    drawSprites();
6  }
7
```

Reset

What is Animation's name?

Fish Swims
Saved a few seconds ago

Rename | Share | Remix

Code | Animation

Show Toolbox | Workspace: | Version History | Show Text

```
1  var fish = createSprite(300, 200);
2  fish.setAnimation("blue");
3  function draw() {
4    background("white");
5    drawSprites();
6  }
7
```

Reset

What is Animation's name?

blue

Fish Swims
Saved a few seconds ago

Rename | Share | Remix

Code | Animation

Show Toolbox | Workspace: | Version History | Show Text

```
1  var fish = createSprite(300, 200);
2  fish.setAnimation("blue");
3  function draw() {
4    background("white");
5    drawSprites();
6  }
7
```

Reset

What is Animation's name?

blue

What is the Sprite's name?

Fish Swims
Saved a few seconds ago

Rename | Share | Remix

Code | Animation

Show Toolbox | Workspace: | Version History | Show Text

```
1  var fish = createSprite(300, 200);
2  fish.setAnimation("blue");
3  function draw() {
4    background("white");
5    drawSprites();
6  }
7
```

Reset

What is Animation's name?

blue

What is the Sprite's name?

fish

Fish Swims
Saved a few seconds ago

Rename | Share | Remix

Code | Animation

Show Toolbox | Workspace: | Version History | Show Text

```
1  var fish = createSprite(300, 200);
2  fish.setAnimation("blue");
3  function draw() {
4    background("white");
5    drawSprites();
6  }
7
```

Reset

What code links the sprite to an animation?

Fish Swims
Saved a few seconds ago

Rename | Share | Remix

Code | Animation

Show Toolbox | Workspace: | Version History | Show Text

```
1  var fish = createSprite(300, 200);
2  fish.setAnimation("blue");
3  function draw() {
4    background("white");
5    drawSprites();
6  }
7
```

Reset

What code links the sprite to an animation?

.setAnimation

Fish Swims
Saved a few seconds ago

Rename | Share | Remix

Code | Animation

Show Toolbox | Workspace: | Version History | Show Text

```
1  var fish = createSprite(300, 200);
2  fish.setAnimation("blue");
3  function draw() {
4    background("white");
5    drawSprites();
6  }
7
```

Reset

What code links the sprite to an animation?

.setAnimation

What is the initial position?

Fish Swims
Saved a few seconds ago

Rename | Share | Remix

Code | Animation

Show Toolbox | Workspace: | Version History | Show Text

```
1  var fish = createSprite(300, 200);
2  fish.setAnimation("blue");
3  function draw() {
4    background("white");
5    drawSprites();
6  }
7
```

Reset

What code links the sprite to an animation?

.setAnimation

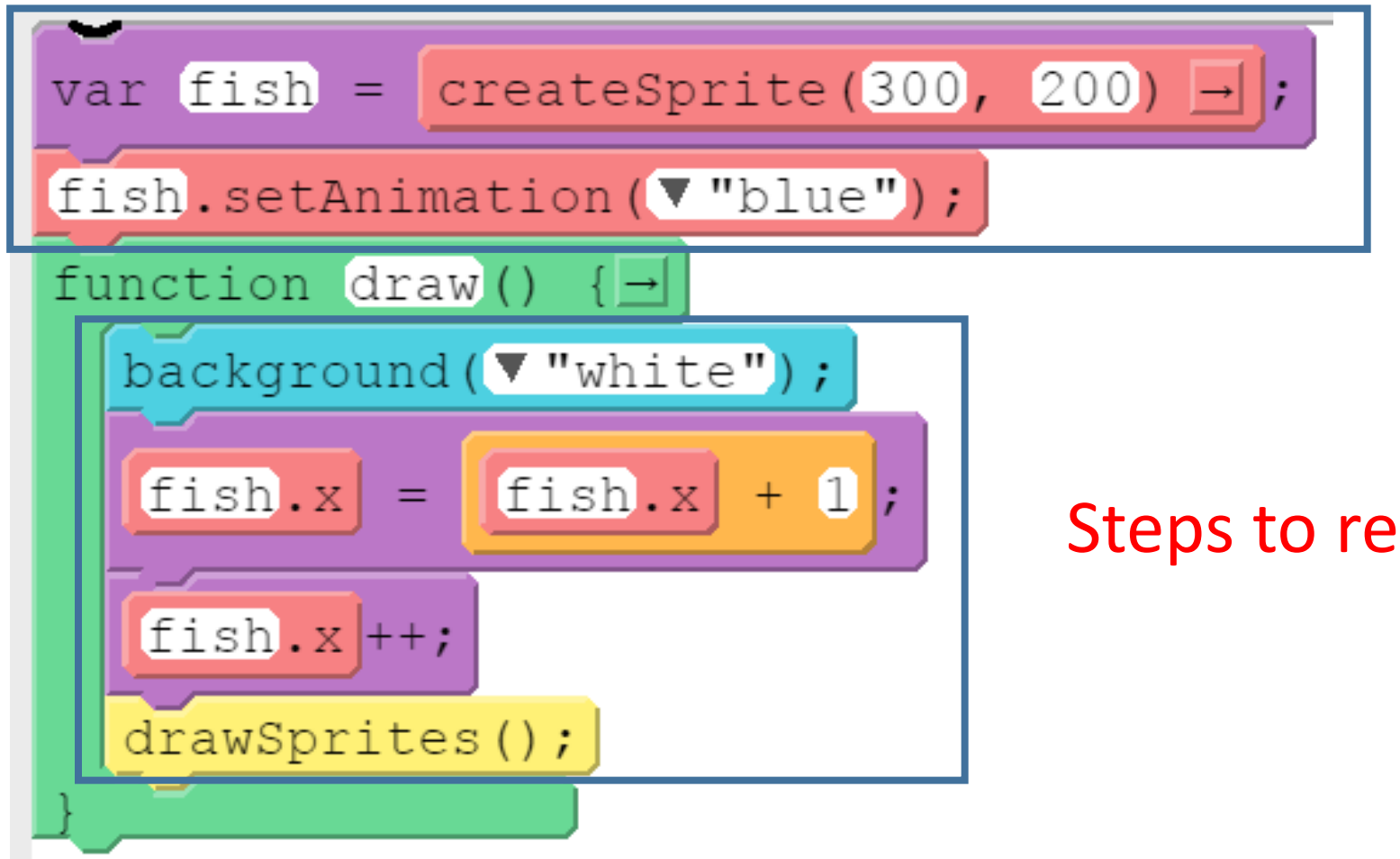
What is the initial position?

300, 200

```
var fish = createSprite(300, 200);
fish.setAnimation("blue");
function draw() {
  background("white");
  fish.x = fish.x + 1;
  fish.x++;
  drawSprites();
}
```

```
var fish = createSprite(300, 200);
fish.setAnimation("blue");
function draw() {
  background("white");
  fish.x = fish.x + 1;
  fish.x++;
  drawSprites();
}
```

Set up sprites



Set up sprites

Steps to repeat

1. Initialize loop stopping variables

1. Initialize loop stopping variables

2. Test loop stopping condition

1. Initialize loop stopping variables

2. Test loop stopping condition

3. Steps to repeat

1. Initialize loop stopping variables

2. Test loop stopping condition

3. Steps to repeat

4. Progress to the loop stopping condition.

1. Initialize loop stopping variables

```
var fish = createSprite(300, 200);
fish.setAnimation("blue");
```

2. Test loop stopping condition

3. Steps to repeat

4. Progress to the loop stopping condition.

1. Initialize loop stopping variables

```
var fish = createSprite(300, 200);
fish.setAnimation("blue");
```

2. Test loop stopping condition

Was  Pressed?

3. Steps to repeat

4. Progress to the loop stopping condition.

1. Initialize loop stopping variables

```
var fish = createSprite(300, 200);
fish.setAnimation("blue");
```

2. Test loop stopping condition

Was 

Pressed?

3. Steps to repeat

```
function draw() {
  background("white");
  fish.x = fish.x + 1;
  fish.x++;
  drawSprites();
}
```

4. Progress to the loop stopping condition.

1. Initialize loop stopping variables

```
var fish = createSprite(300, 200);
fish.setAnimation("blue");
```

Run

2. Test loop stopping condition

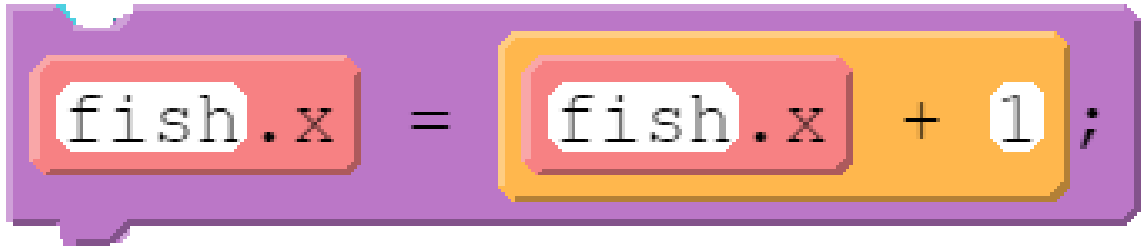
Was Reset Pressed?

3. Steps to repeat

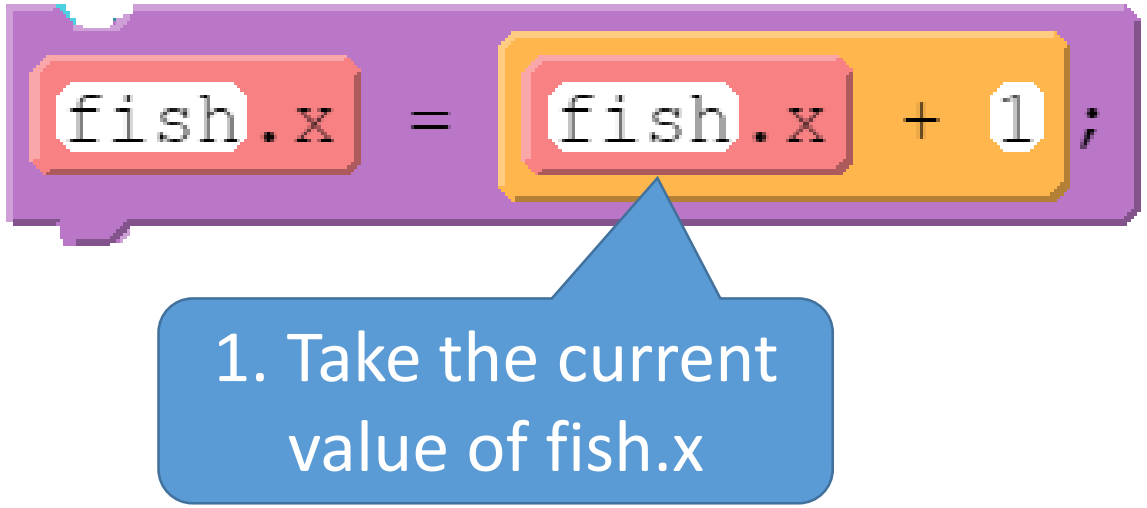
```
function draw() {
  background("white");
  fish.x = fish.x + 1;
  fish.x++;
  drawSprites();
}
```

4. Progress to the loop stopping condition.

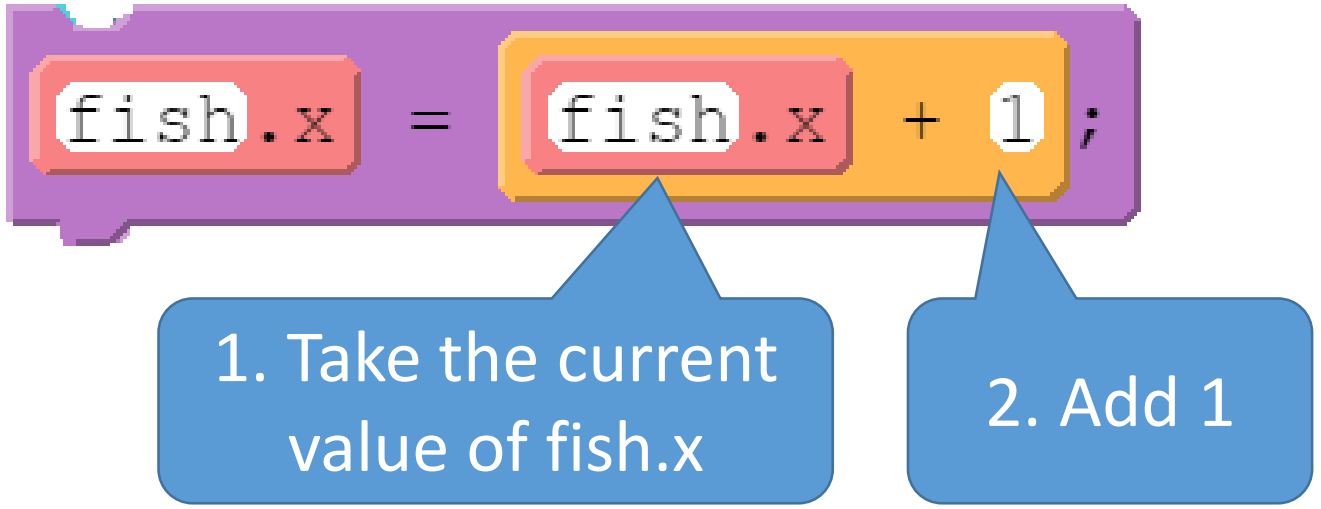
The Counter Pattern



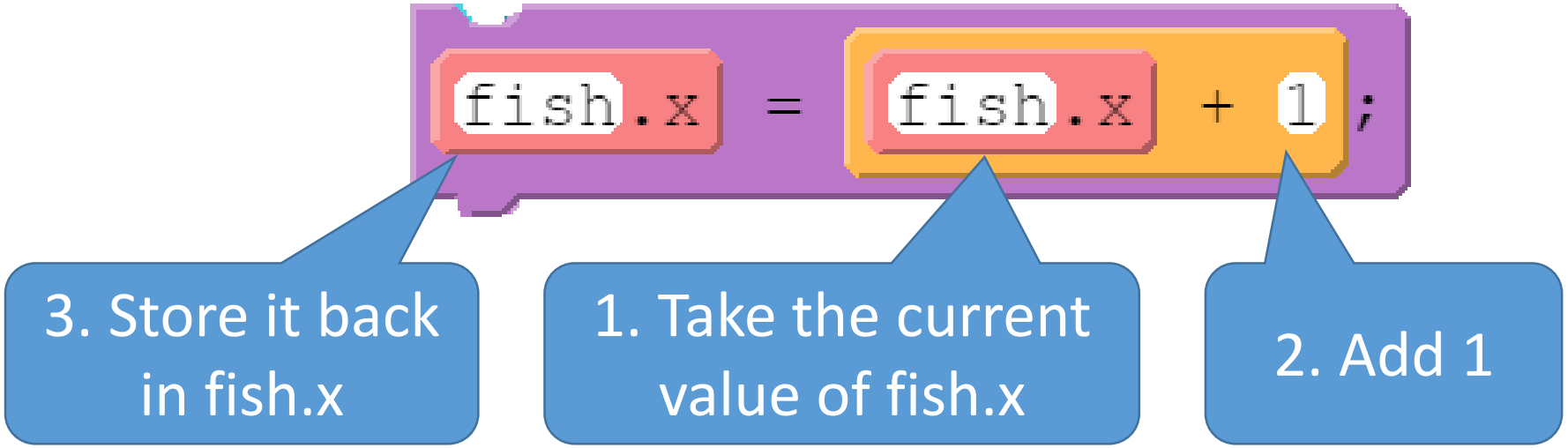
The Counter Pattern



The Counter Pattern

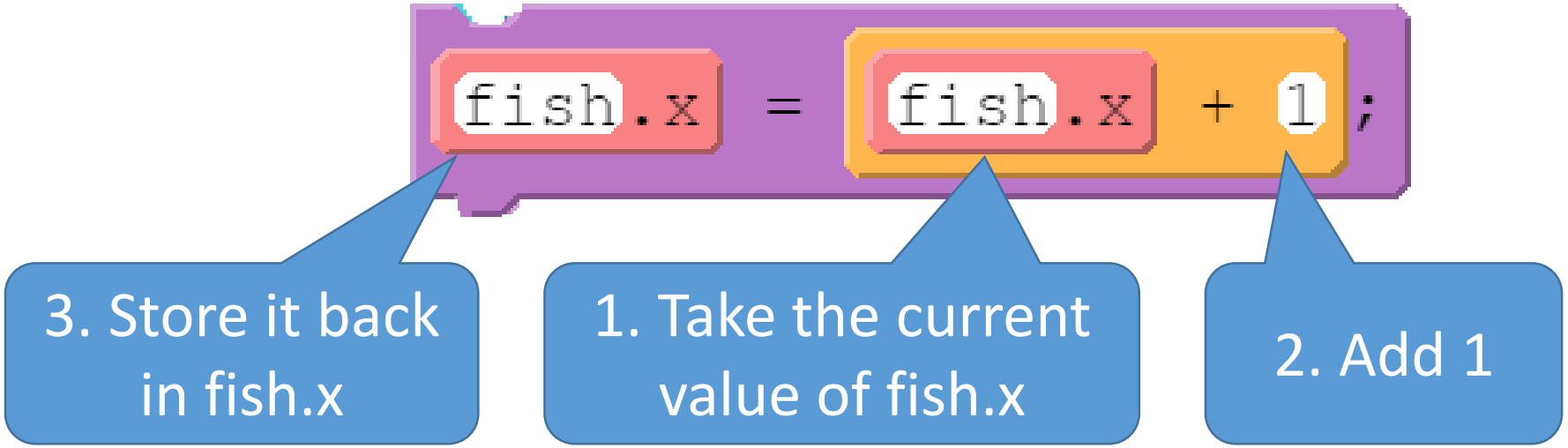


The Counter Pattern



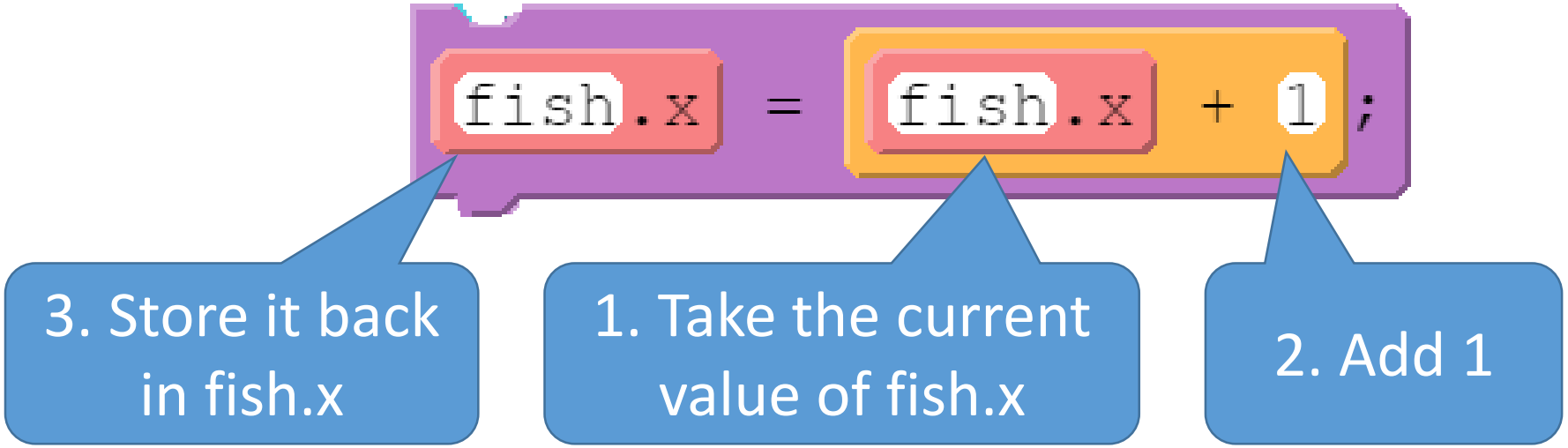
The Counter Pattern

Makes the variable increase by 1.



The Counter Pattern

Makes the variable increase by 1.




```
fish.x++;
```

Untitled Project
Saved less than a minute ago

Rename | Share | Remix | Create New

Code | Animation

Reset

Show grid

Show Toolbox

Workspace:

```
1  var apple = createSprite(200, 200);
2  apple.setAnimation("apple_pic");
3  apple.velocityX = 2;
4  createEdgeSprites();
5  function draw() {
6    background("white");
7    apple.bounceOff(edges);
8    drawSprites();
9  }
10
```

Untitled Project
Saved less than a minute ago

Rename | Share | Remix | Create New

Code | Animation

(0,0) (400,0)

(0,400) (400,400)

Reset

Show grid

Show Toolbox

Workspace:

```
1  var apple = createSprite(200, 200);
2  apple.setAnimation("apple_pic");
3  apple.velocityX = 2;
4  createEdgeSprites();
5  function draw() {
6    background("white");
7    apple.bounceOff(edges);
8    drawSprites();
9  }
10
```

Untitled Project
Saved less than a minute ago

Rename | Share | Remix | Create New

Code | Animation

(0,0) (400,0)

(0,400) (400,400)

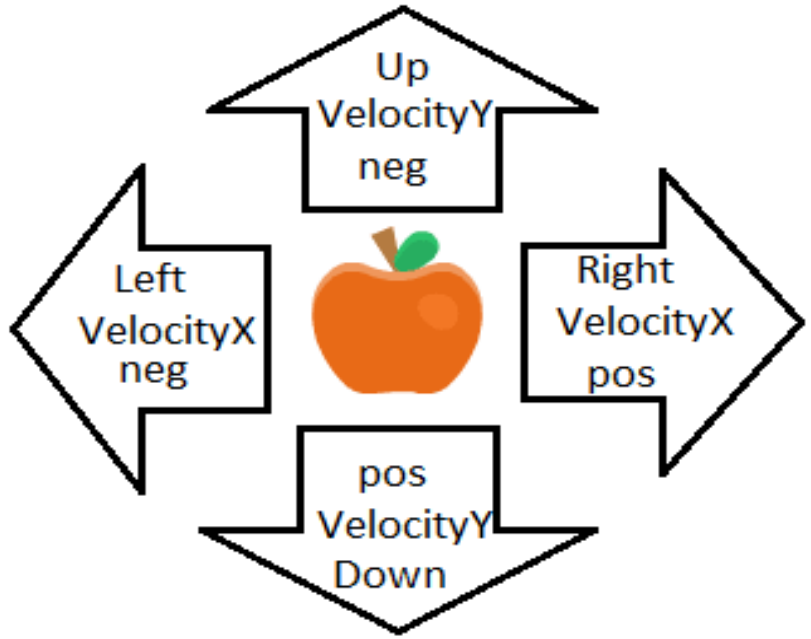
Reset

Show grid

Show Toolbox

Workspace:

```
1  var apple = createSprite(200, 200);
2  apple.setAnimation("apple_pic");
3  apple.velocityX = 2;
4  createEdgeSprites();
5  function draw() {
6    background("white");
7    apple.bounceOff(edges);
8    drawSprites();
9  }
10
```



Untitled Project
Saved less than a minute ago

Rename | Share | Remix | Create New

Code | Animation

(0,0) (400,0)

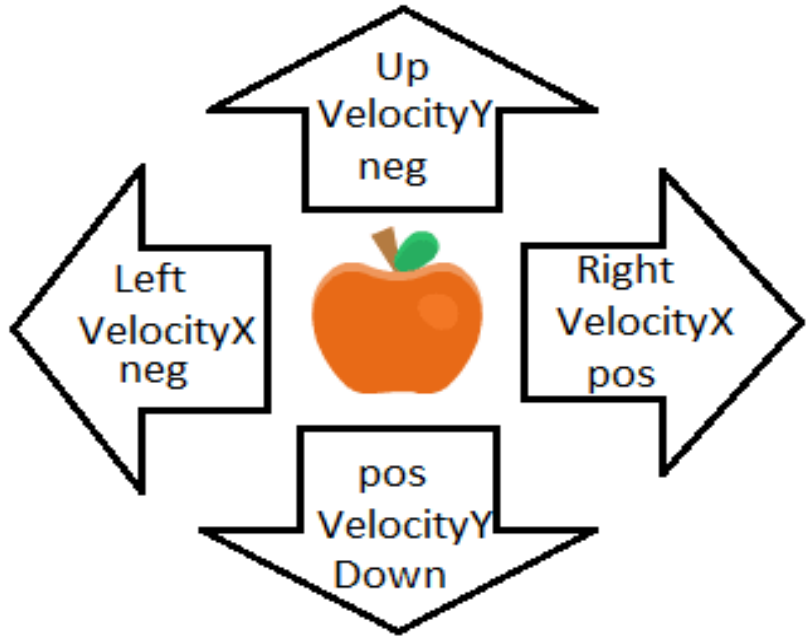
(0,400) (400,400)

Reset

Show grid

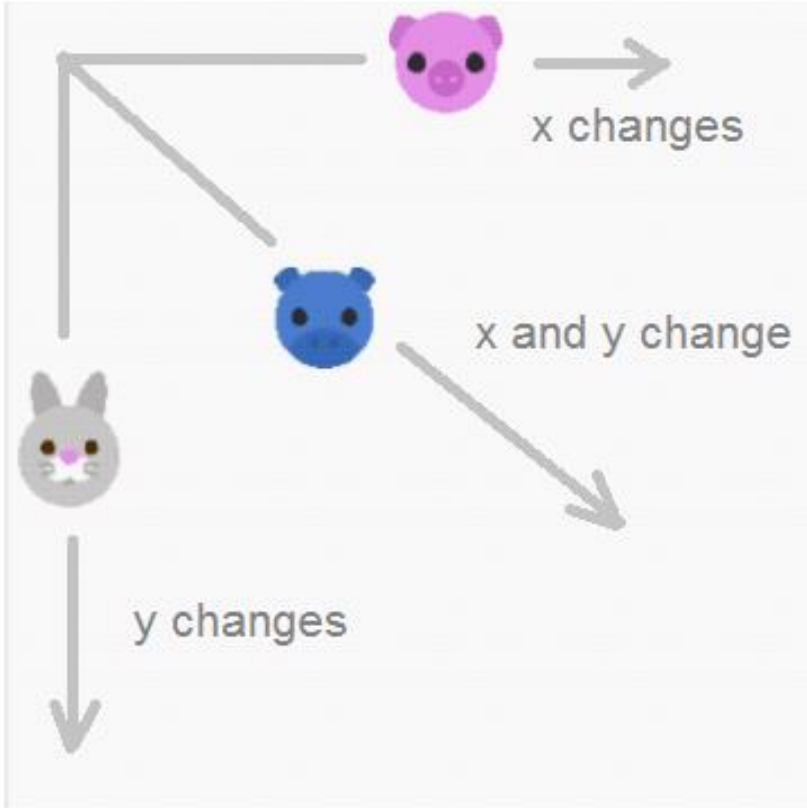
Show Toolbox | Workspace:

```
1  var apple = createSprite(200, 200);
2  apple.setAnimation("apple_pic");
3  apple.velocityX = 2;
4  createEdgeSprites();
5  function draw() {
6    background("white");
7    apple.bounceOff(edges);
8    drawSprites();
9  }
10
```

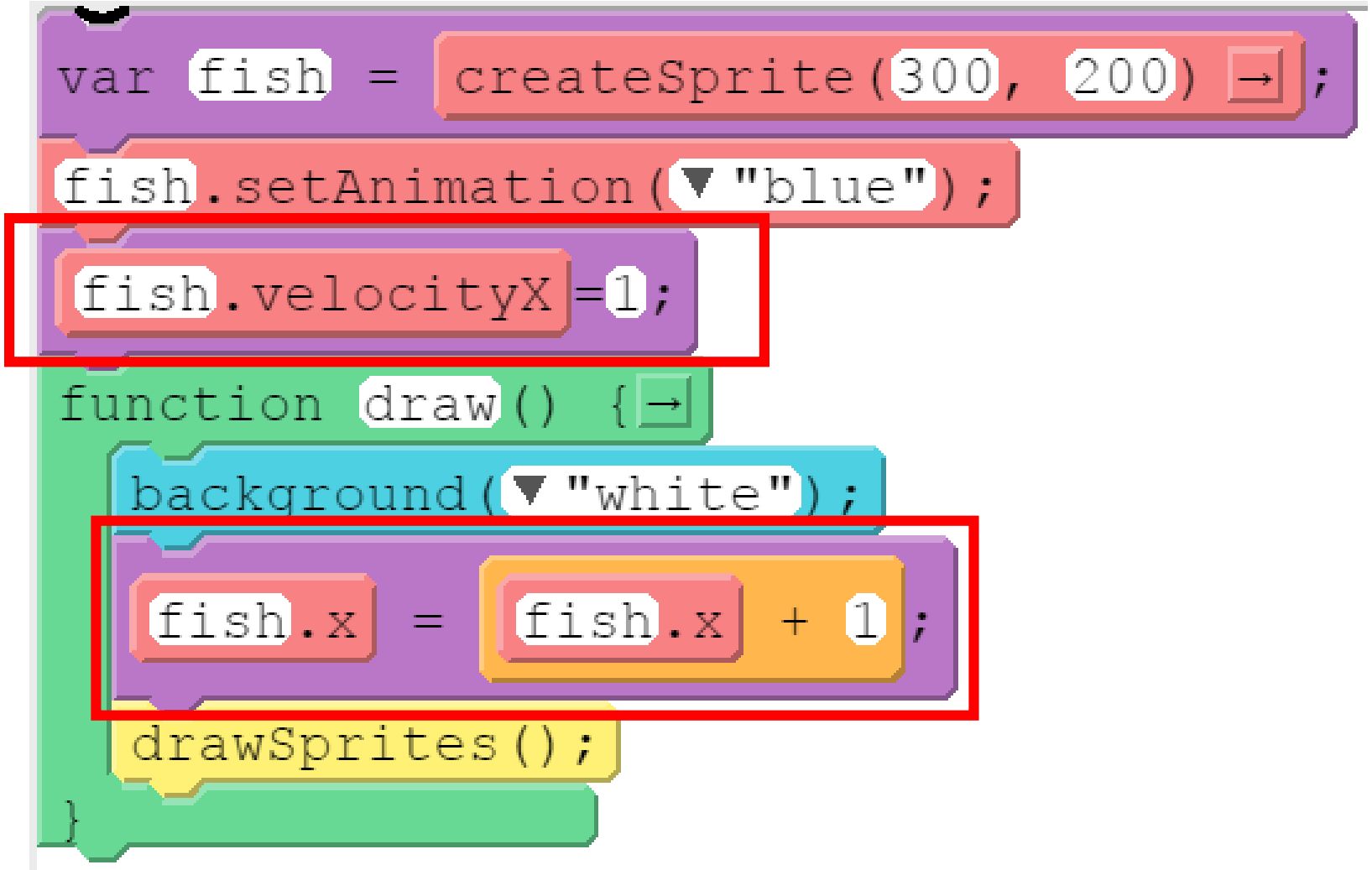


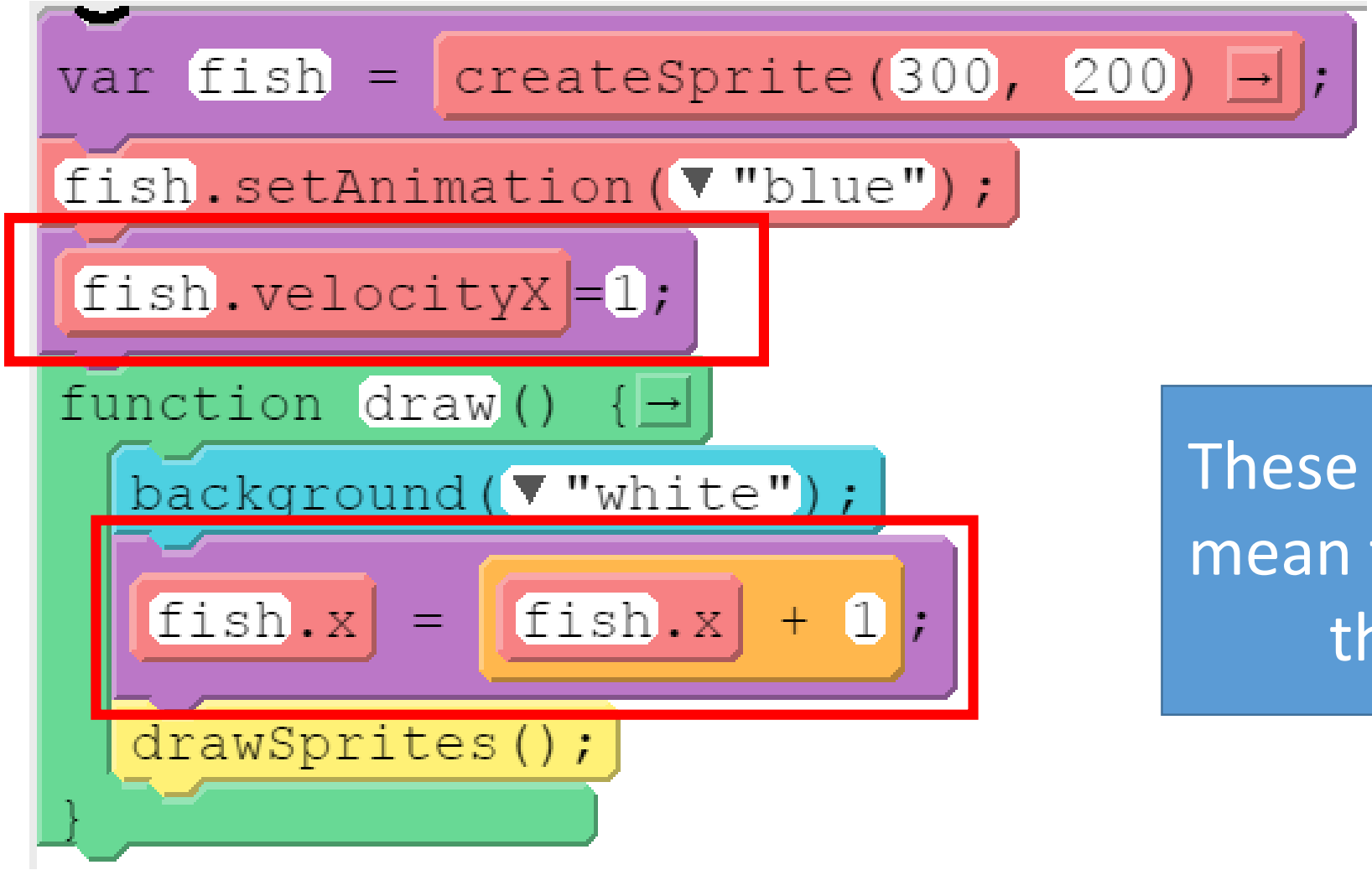
Movement with the Counter Pattern

```
var hippo = createSprite(30, 30);
hippo.setAnimation("hippo");
var rabbit = createSprite(30, 90);
rabbit.setAnimation("rabbit");
var pig = createSprite(90, 30);
pig.setAnimation("pig");

function draw() {
  background("white");
  // Move the hippo down and to the right
  hippo.x = hippo.x + 2;
  hippo.y = hippo.y + 2;
  // Move the rabbit down
  rabbit.y = rabbit.y + 2;
  //Move the pig to the right
  pig.x = pig.x + 2;
  drawSprites();
}
```



The above code uses the counter pattern in the draw loop to move three sprites. Notice that each of the three sprites moves differently depending on whether you update the sprite's `x`, `y`, or both.


var fish = createSprite(300, 200);
fish.setAnimation("blue");
fish.velocityX=1;
function draw() {
background("white");
fish.x = fish.x + 1;
drawSprites();
}



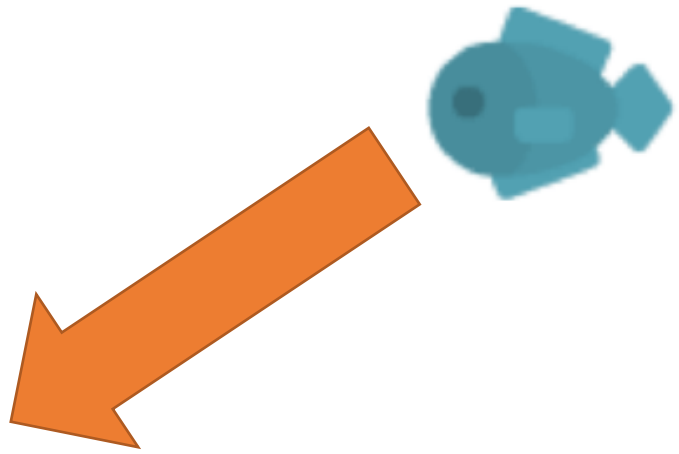
These two lines mean the same thing.

Code | Animation

Show Toolbox | Workspace: | Version Histo

```
1  var fish = createSprite(300, 200) →;
2  fish.setAnimation("blue");
3  fish.velocityY =1;
4  function draw() {→
5    background("white");
6    fish.x = fish.x - 1;
7    drawSprites();
8  }
```

Code | Animation



Show Toolbox | Workspace: | Version Histo

```
1  var fish = createSprite(300, 200);
2  fish.setAnimation("blue");
3  fish.velocityY=1;
4  function draw() {
5    background("white");
6    fish.x = fish.x - 1;
7    drawSprites();
8  }
```

Code | Animation

Reset

Show grid

Toolbox

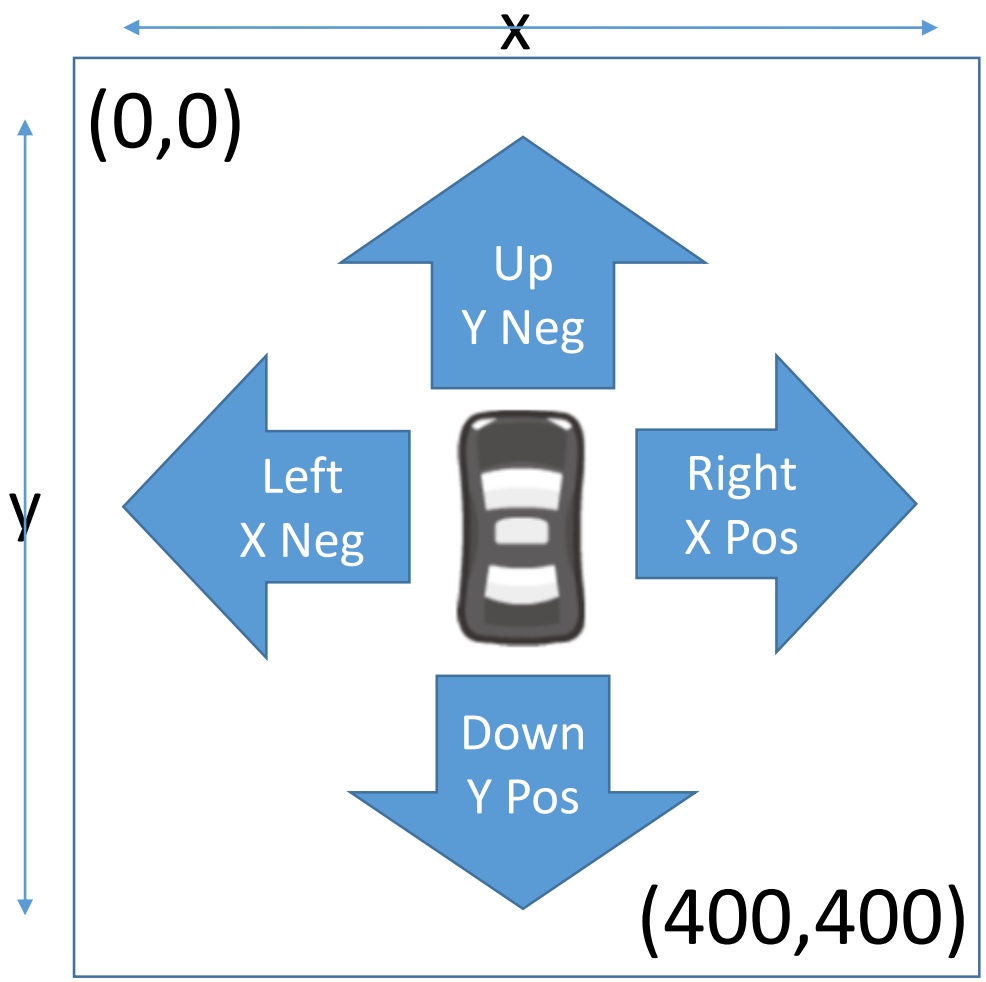
World | Sprites
Groups | Drawing
Control | Math
Variables | Functions

```
function draw() {}
drawSprites()
playSound(url, loop)
stopSound(url)
keyDown(code)
keyWentDown(code)
keyWentUp(code)
mouseDidMove()
mouseDown(button)
mouseWentDown(button)
mouseWentUp(button)
mouseIsOver(sprite)
mousePressedOver(sprite)
showMobileControls(spaceBut
```

Workspace:

```
1  var car = createSprite(200, 200);
2  car.setAnimation("car_black_1");
3  car.velocityX = 3;
4  car.velocityY = 5;
5  function draw() {
6    background("white");
7    if (car.x > 360) {
8      car.velocityX = -3;
9    } else if (car.x < 40) {
10     car.velocityX = 3;
11   } else if (car.y > 330) {
12     car.velocityY = -5;
13   } else if (car.y < 70) {
14     car.velocityY = 5;
15   }
16   drawSprites();
17 }
```

Show Debug Commands | Debug Console | Debug Sprites


x
(0,0)
y
Up
Y Neg
Left
X Neg
Right
X Pos
Down
Y Pos
(400,400)

Code | Animation

Reset

Show grid

Toolbox

World | Sprites
Groups | Drawing
Control | Math
Variables | Functions

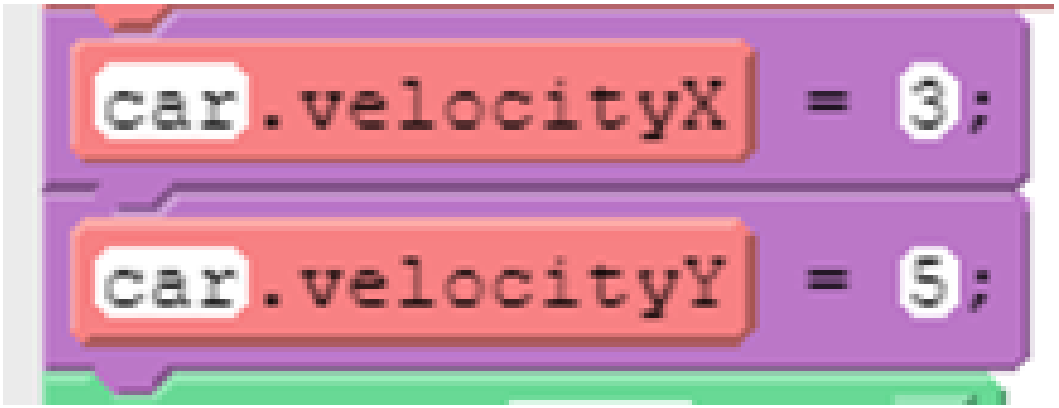
```
function draw() {}
drawSprites()
playSound(url, loop)
stopSound(url)
keyDown(code)
keyWentDown(code)
keyWentUp(code)
mouseDidMove()
mouseDown(button)
mouseWentDown(button)
mouseWentUp(button)
mouseIsOver(sprite)
mousePressedOver(sprite)
showMobileControls(spaceBut
```

Workspace:

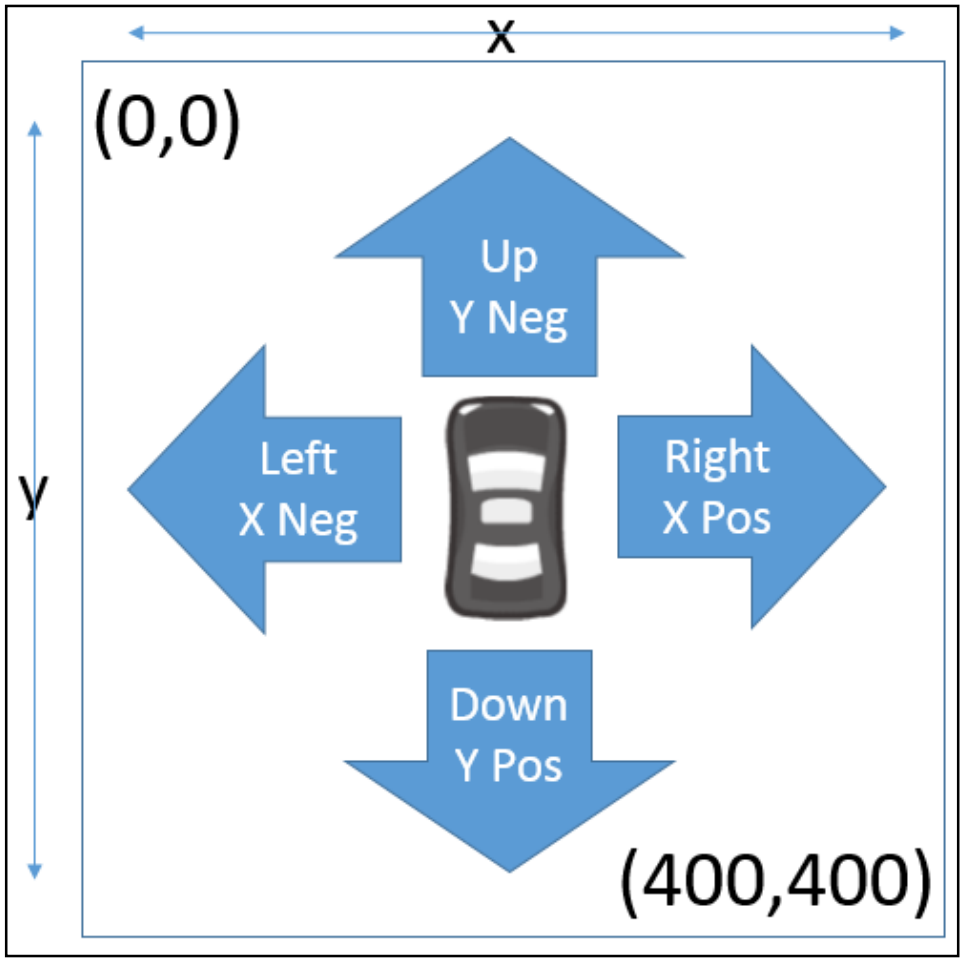
```
1  var car = createSprite(200, 200);
2  car.setAnimation("car_black_1");
3  car.velocityX = 3;
4  car.velocityY = 5;
5  function draw() {
6    background("white");
7    if (car.x > 360) {
8      car.velocityX = -3;
9    } else if (car.x < 40) {
10     car.velocityX = 3;
11   } else if (car.y > 330) {
12     car.velocityY = -5;
13   } else if (car.y < 70) {
14     car.velocityY = 5;
15   }
16   drawSprites();
17 }
```

Show Debug Commands | Debug Console | Debug Sprites

The Car's Initial Direction

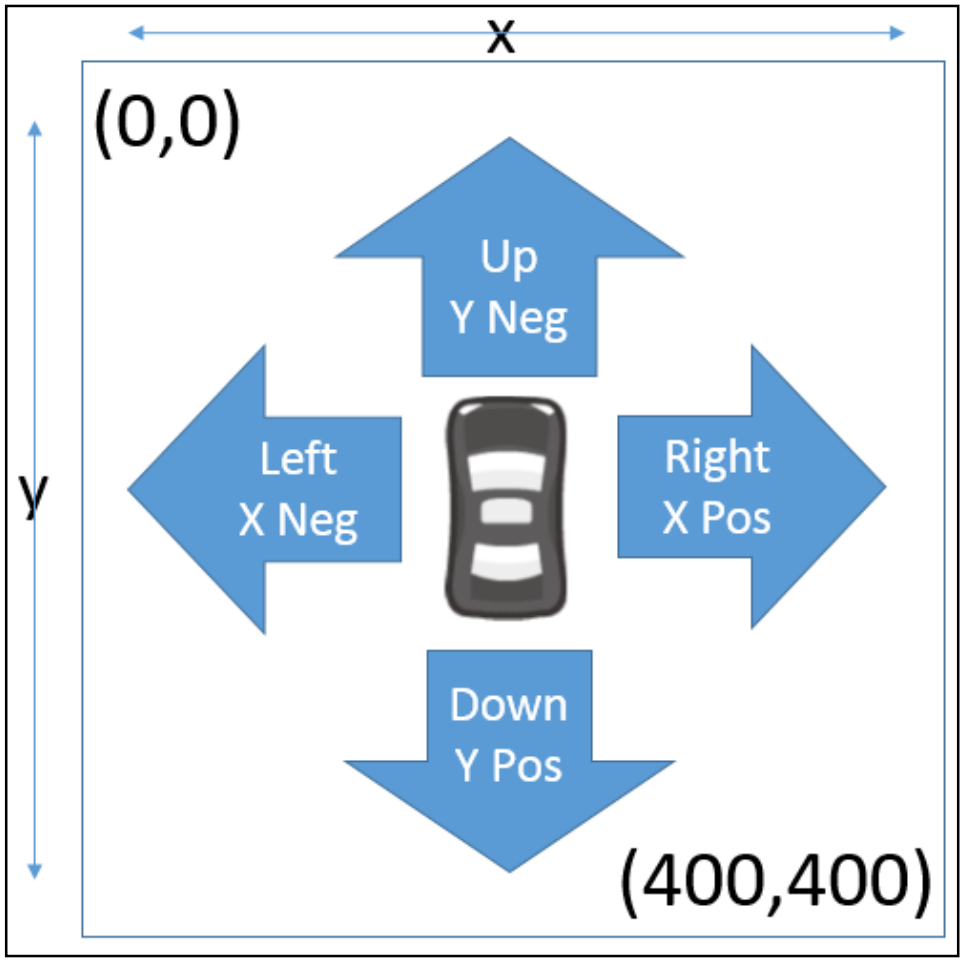


The Car's Initial Direction



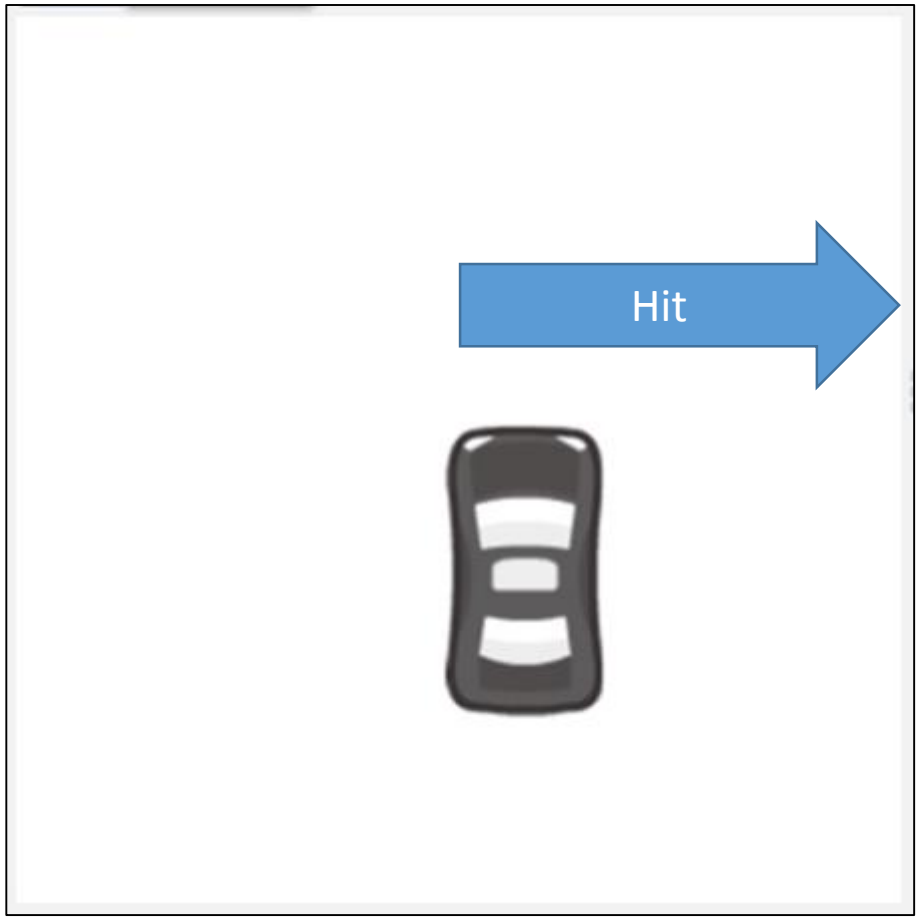

```
car.velocityX = 3;
car.velocityY = 5;
```

The Car's Initial Direction

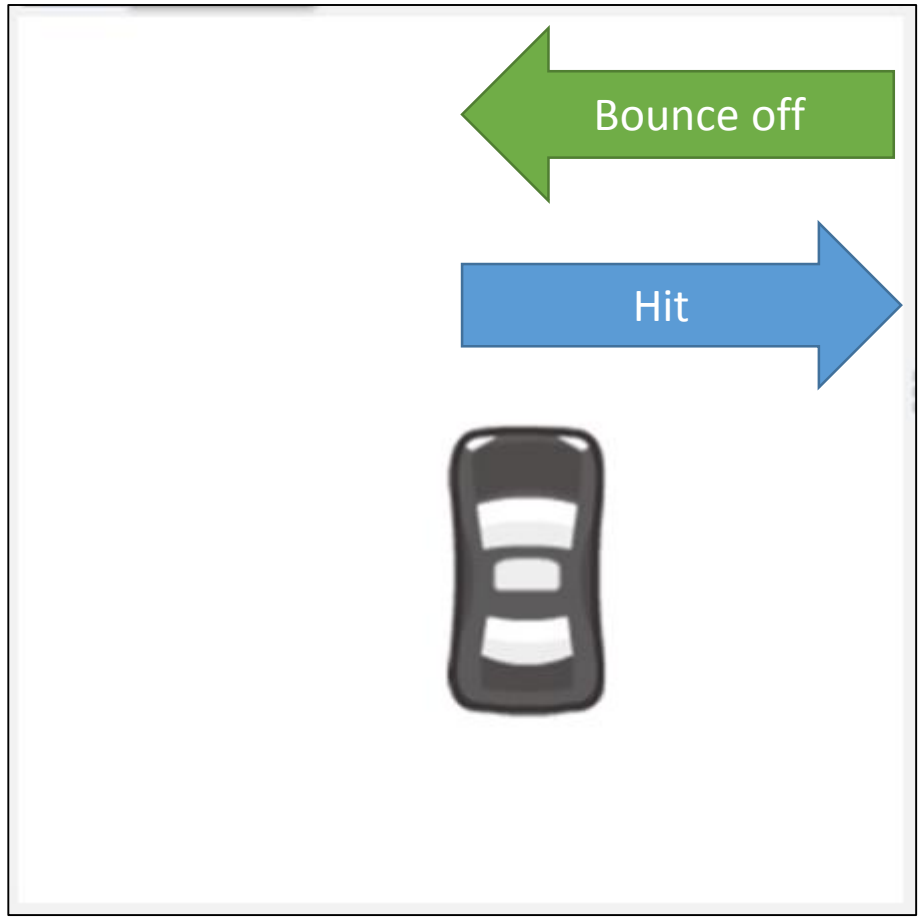



```
car.velocityX = 3;
car.velocityY = 5;
```

```
if ( car.x > 360 ) {
    car.velocityX = -3;
```

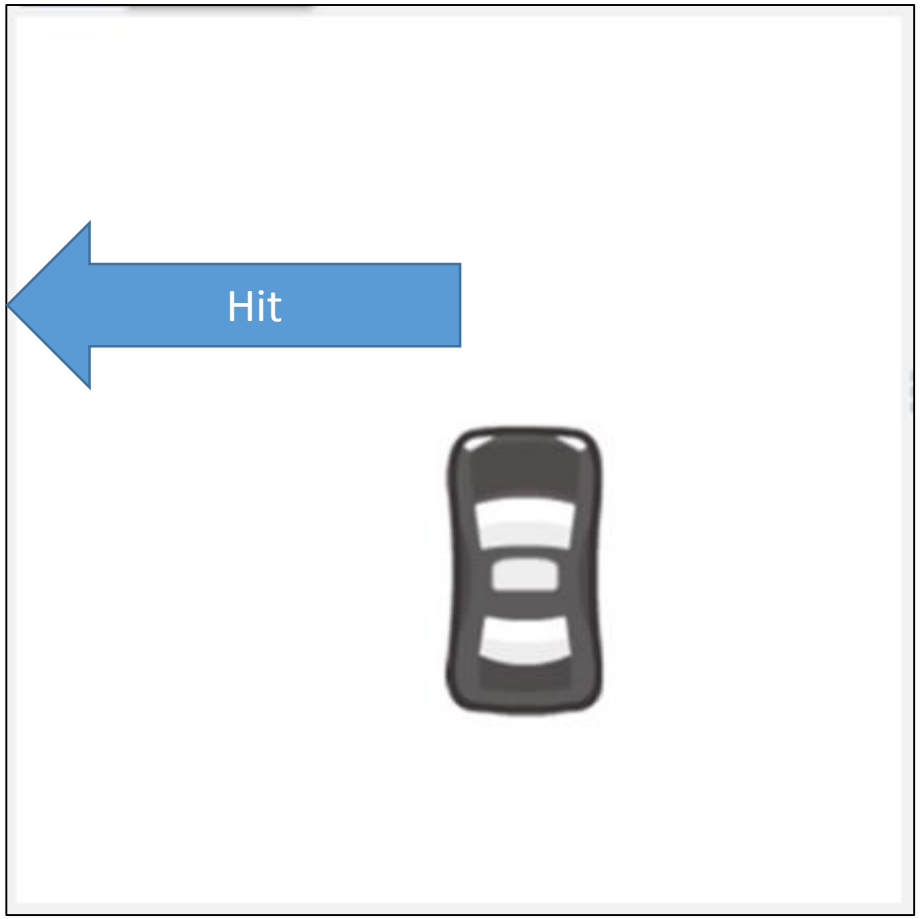



```
if ( car.x > 360 ) {
    car.velocityX = -3;
```

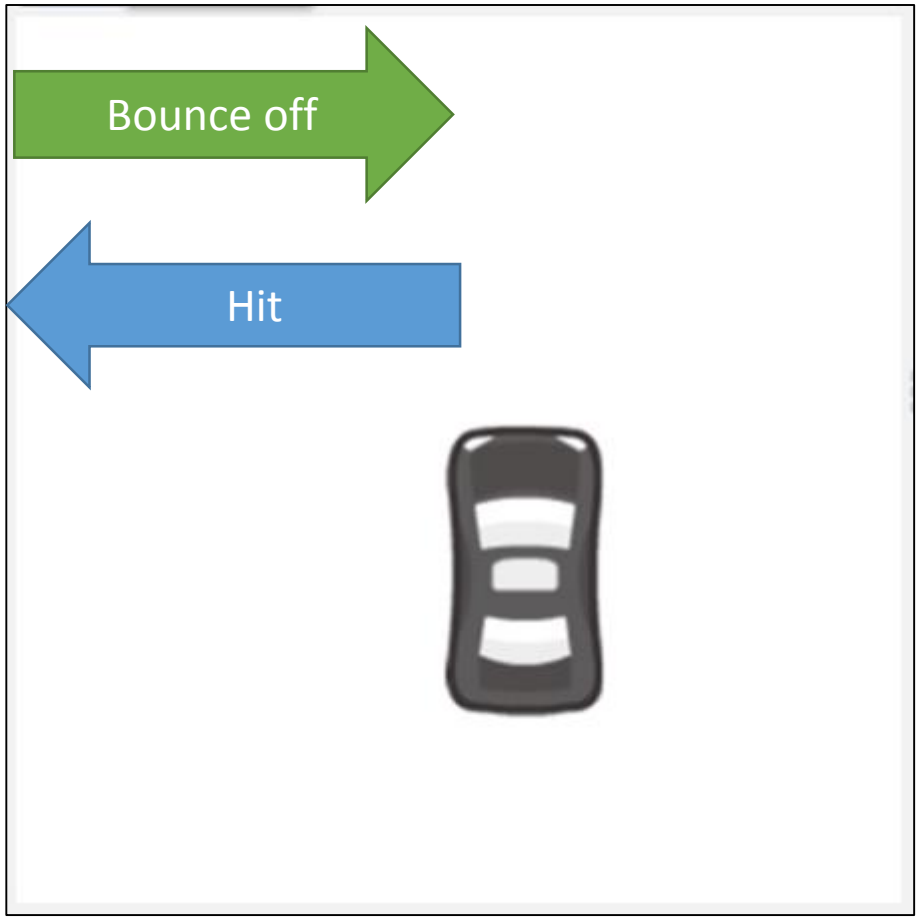



```
if ( car.x > 360 ) {
    car.velocityX = -3;
```

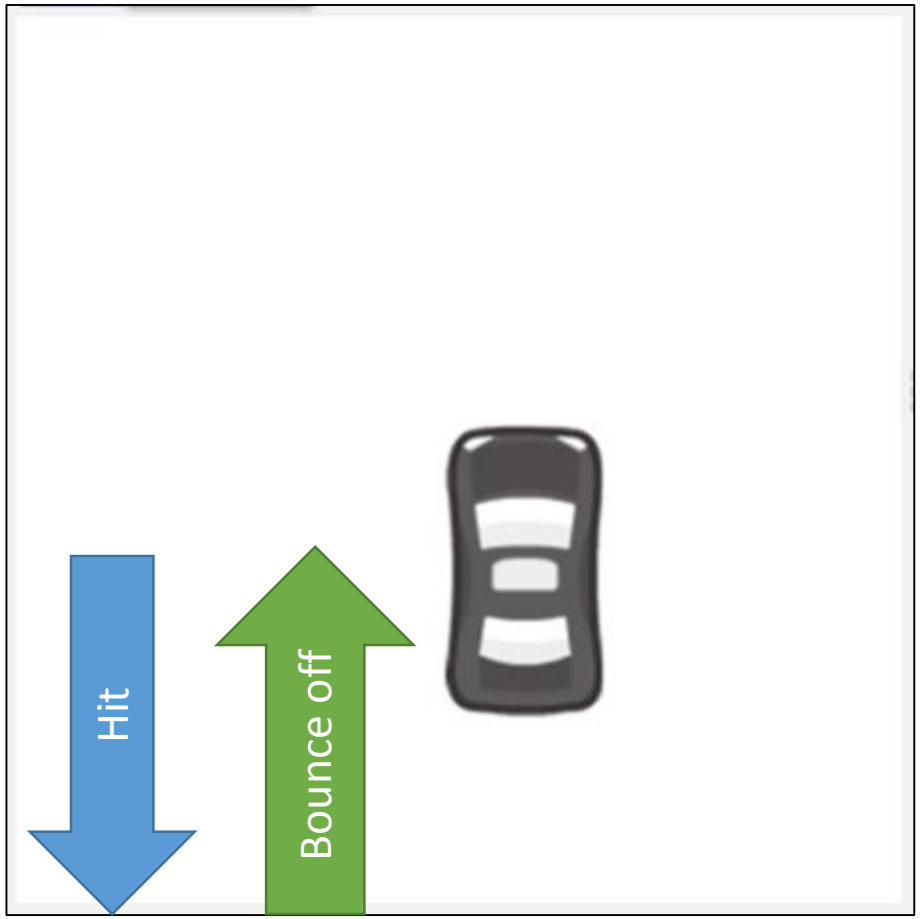
```
} else if ( car.x < 40 ) {
    car.velocityX = 3;
```



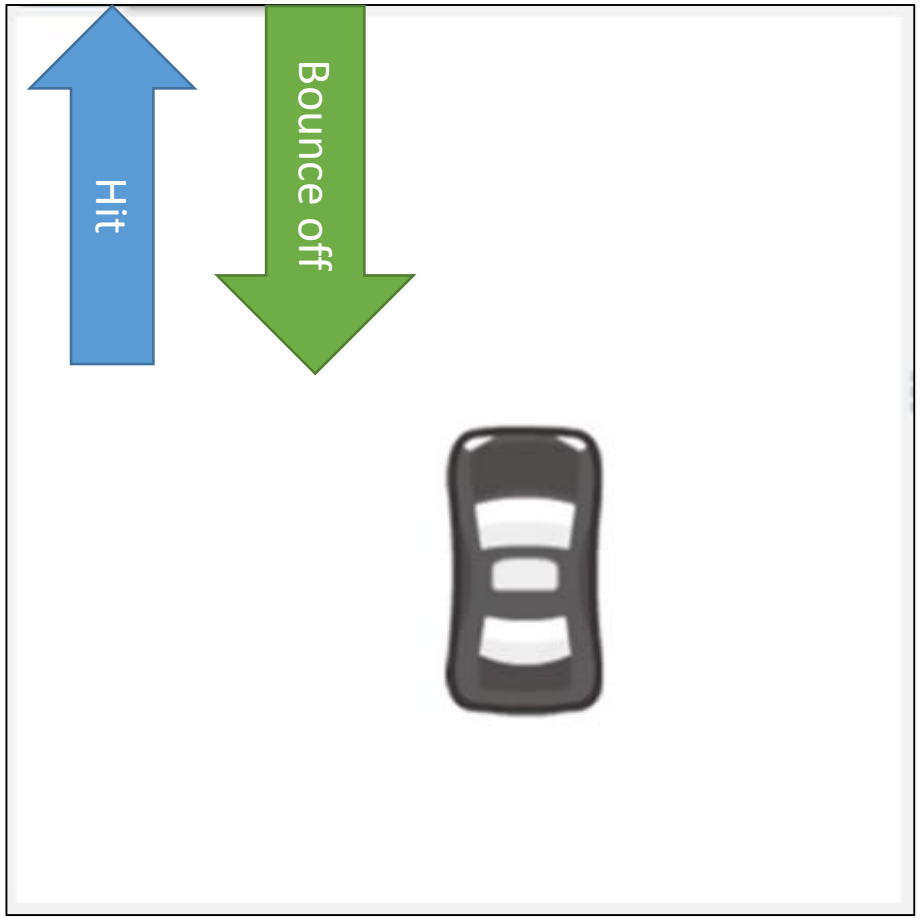

```
} else if ( car.x < 40 ) {
    car.velocityX = 3;
```




```
} else if ( car.x < 40 ) {
    car.velocityX = 3;
```




```
} else if ( car.y > 330 ) {
    car.velocityY = -5;
```




```
} else if ( car.y < 70 ) {
    car.velocityY = 5;
}
```

Movement with Velocity

The code that uses the counter pattern is on the left, and the code that uses the velocity blocks is on the right.

```
var hippo = createSprite(30, 30);
hippo.setAnimation("hippo");
var rabbit = createSprite(30, 90);
rabbit.setAnimation("rabbit");
var pig = createSprite(90, 30);
pig.setAnimation("pig");

function draw() {
  background("white");
  // Move the hippo down and to the right
  hippo.x = hippo.x + 2;
  hippo.y = hippo.y + 2;
  // Move the rabbit down
  rabbit.y = rabbit.y + 2;
  //Move the pig to the right
  pig.x = pig.x + 2;
  drawSprites();
}
```

```
var hippo = createSprite(30, 30);
hippo.setAnimation("hippo");
hippo.velocityX = 2;
hippo.velocityY = 2;
var rabbit = createSprite(30, 90);
rabbit.setAnimation("rabbit");
rabbit.velocityY = 2;
var pig = createSprite(90, 30);
pig.setAnimation("pig");
pig.velocityX = 2;

function draw() {
  background("white");
  drawSprites();
}
```

With `velocityX` and `velocityY`, you can set the sprites' velocities when you first create them, but both programs will make the sprites move as in the picture below.

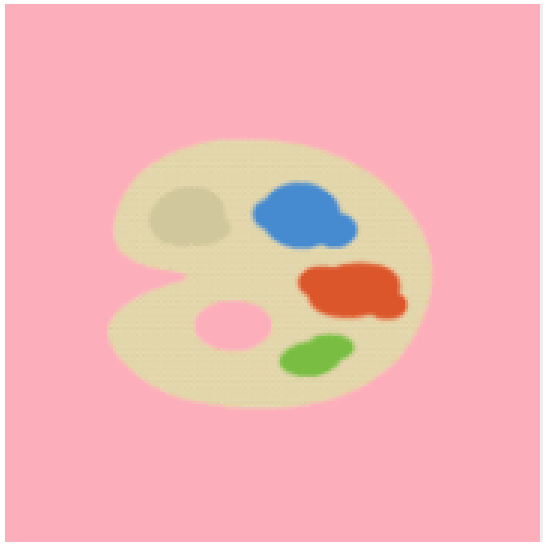
Velocity

The velocity blocks (`velocityX` and `velocityY`), tell sprites how fast to move in a particular direction, just as the counter pattern did before. By hiding the counter pattern code inside a block, you can build even more complex programs.

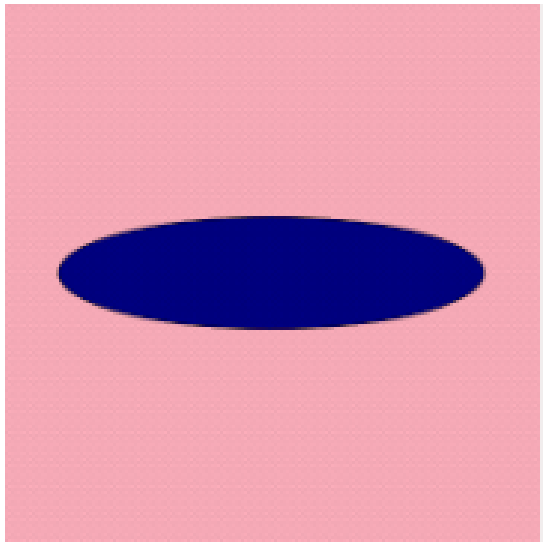
Other Uses for the Counter Pattern

Any block that takes a number as input could be animated using the counter pattern in the draw loop. Take a look at the three following examples, each of which uses the counter pattern to animate a different aspect of the image. Below each image is an example of the code that was used *inside the Draw Loop* to produce the animation.

```
rite.rotation = sprite.rotation - 1;
```



```
sprite.scale = sprite.scale + 0.1;
```



```
width = width + 1;
height = height - 1;
ellipse(200, 200, width, height);
```

Velocity and the Counter Pattern

You can use a sprite's velocity properties with the counter pattern to change a sprite's velocity during the program. This makes the sprite speed up or slow down.

Speeding Up

To speed up a sprite that has a **positive** velocity, you need to **add** to the velocity inside the counter pattern. To speed up a sprite with a **negative** velocity, you need to **subtract** from the velocity inside the counter pattern.

Going Up

```
flybot.velocityY = -1;

function draw() {
  background("black");
  flybot.velocityY = flybot.velocityY - 1;
  drawSprites();
}
```

Going Down

```
bone.velocityY = 1;

function draw() {
  background("black");
  bone.velocityY = bone.velocityY + 1;
  drawSprites();
}
```

Slowing Down

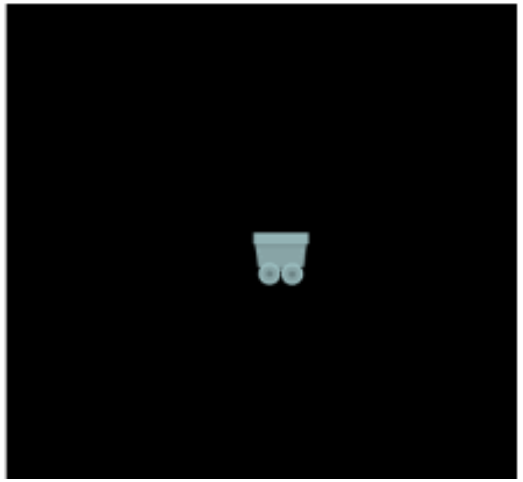
To slow down a sprite that has a **positive** velocity, you need to **subtract** from the velocity inside the counter pattern. To slow down a sprite with a **positive** velocity, you need to **add** to the velocity inside the counter pattern. Once a sprite has slowed down to a stop, it will start speeding in the other direction. This can make it look like your sprite is jumping or has been thrown in the air.

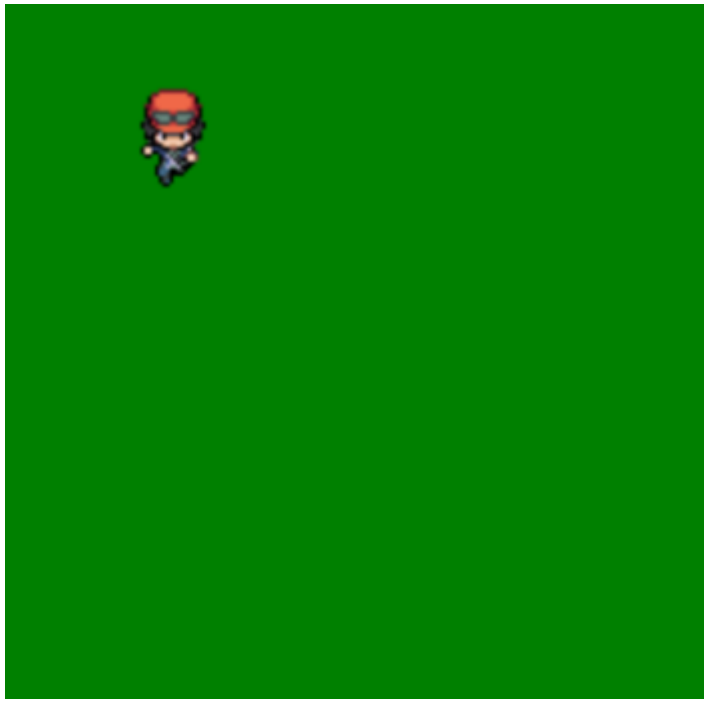
Going Up

```
bone.velocityY = -25;

function draw() {
  background("black");
  bone.velocityY = bone.velocityY + 1;
  drawSprites();
}
```

Going Right

```
cart.velocityX = 25;

function draw() {
  background("black");
  cart.velocityX = cart.velocityX - 1;
  drawSprites();
}
```





```
var amount = 5;
var sprite = createSprite(100, 300);
sprite.setAnimation("Up");
sprite.velocityY=-amount;

function draw() {
  background("green");
  drawSprites();
  if ( keyDown("w") || sprite.y>380 ) {
    sprite.setAnimation("Up");
    sprite.y -= amount;
    sprite.velocityX=0;
    sprite.velocityY=-amount;
  }
  else if ( keyDown("s") || sprite.y<20 ) {
    sprite.setAnimation("Down");
    sprite.y += amount;
    sprite.velocityX=0;
    sprite.velocityY=amount;
  }
}
```