

## MEET THE CAST

### Mitch

A computer science student who loves to make cool programs, he's passionate about movies and art, too! Mitch is an all-around good guy.

### The Cosmic Defenders: Gobo, Fabu, and Pele

The Cosmic Defenders are trans-dimensional space aliens who can travel through space and time. Formally deputized by the Galactic Council, the Cosmic Defender's duty is to maintain the balance of the universe.

### The Dark Wizard

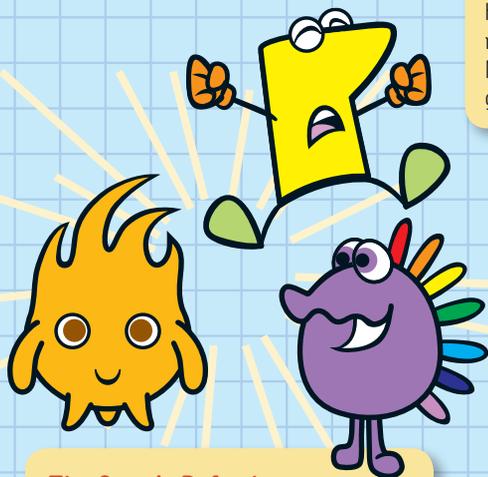
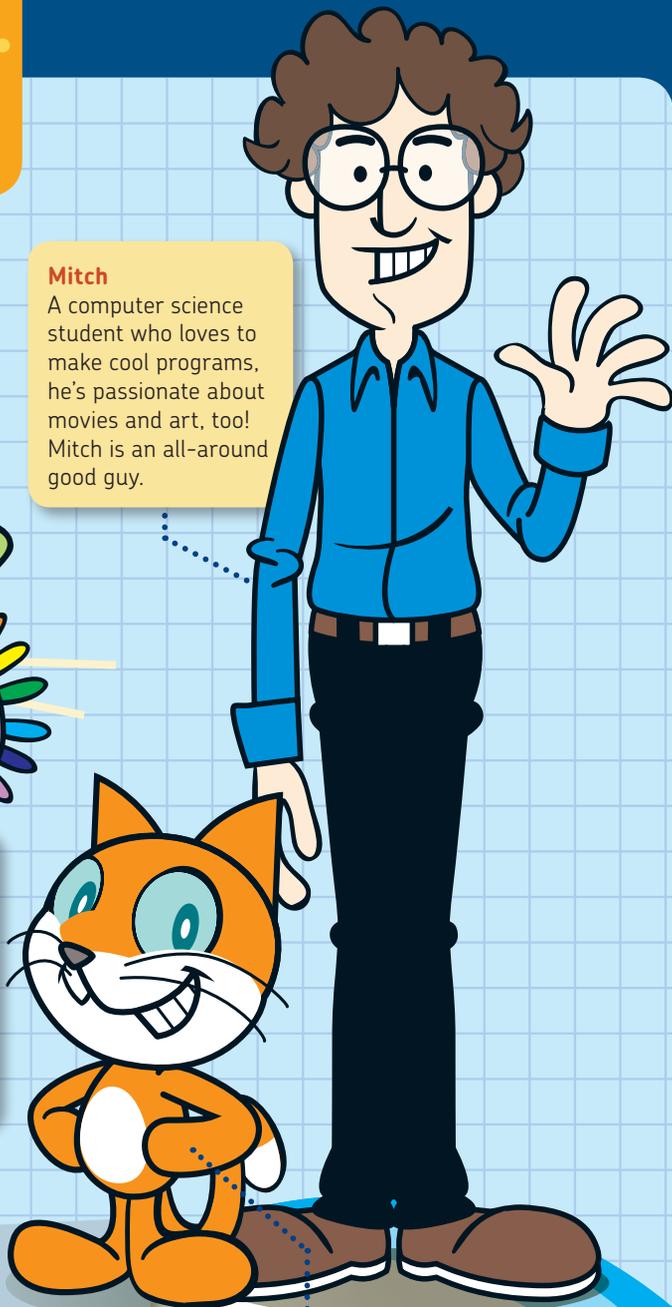
He is a shapeless yet powerful and vengeful spirit, whose origins are unknown. Nothing can stop his ambition of destroying the order of space and time.

### The Dark Minions

These pesky foes are Cosmic Defenders who have fallen to the dark side. They work for the Dark Wizard now.

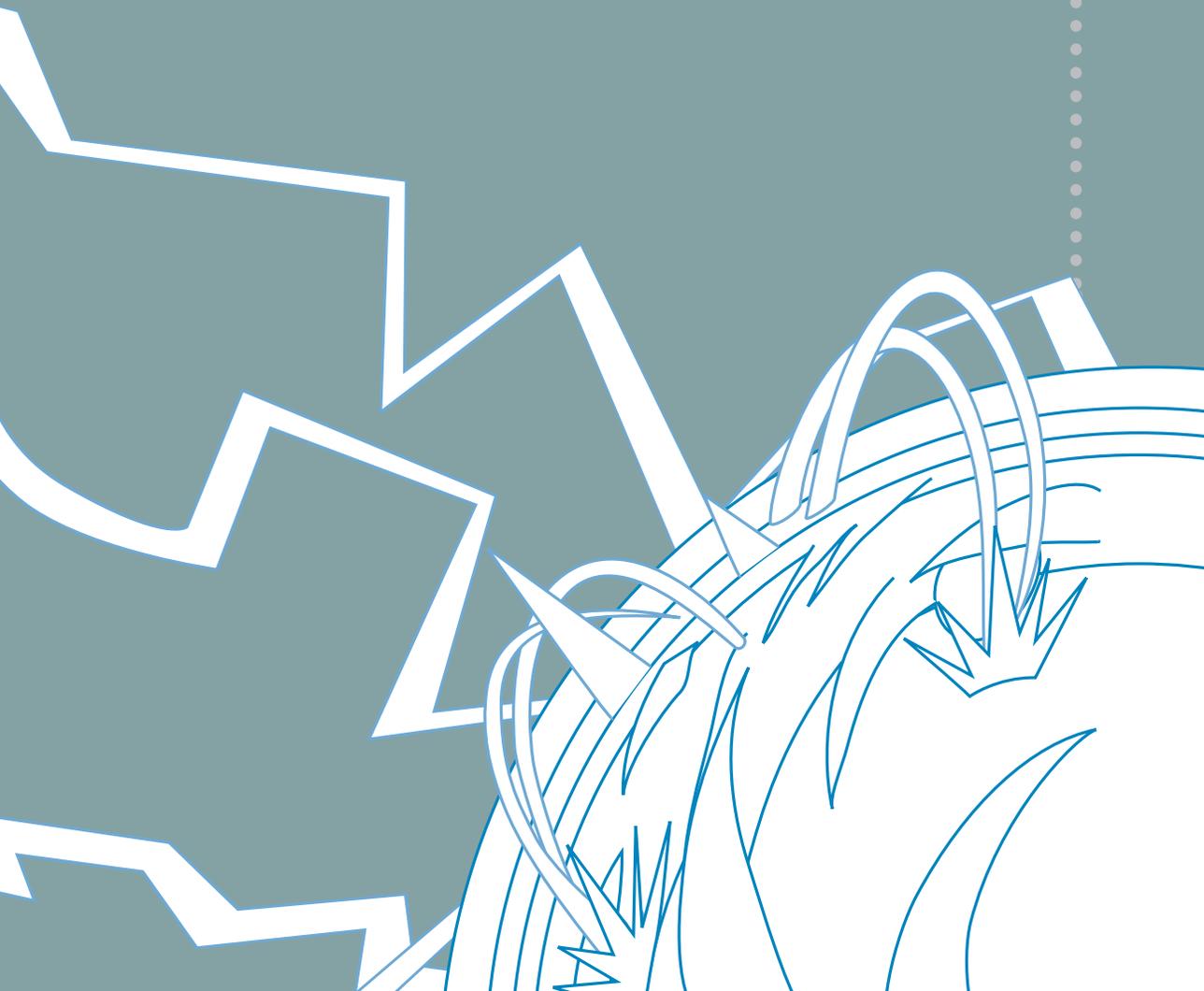
### Scratchy

An energetic cat living in cyberspace, Scratchy is exactly what you'd expect from a cat on the Internet. He's quite curious and impulsive.



# RIDING A FLARE FROM THE SUN

**1**  
STAGE



STAGE

1



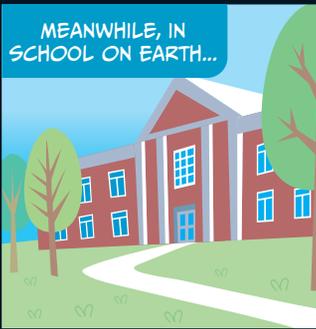
A SOLAR STORM RAGES ON THE SURFACE OF THE SUN....



A FLARE EXPLODES WITH A BURST OF ENERGY!



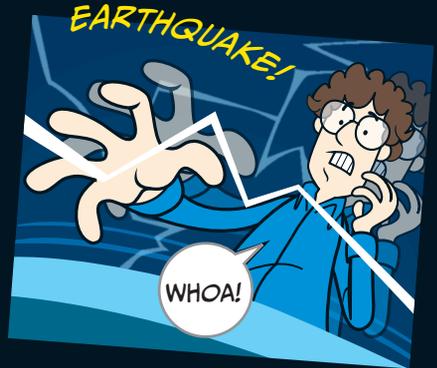
MEANWHILE, IN SCHOOL ON EARTH...



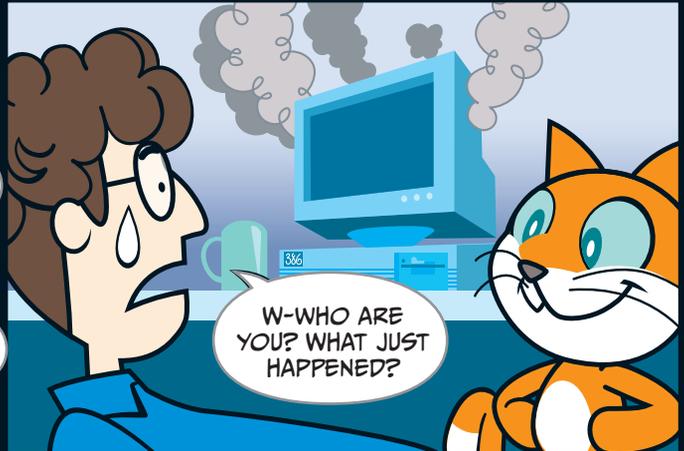
I SURE WISH PROGRAMMING WERE EASIER...

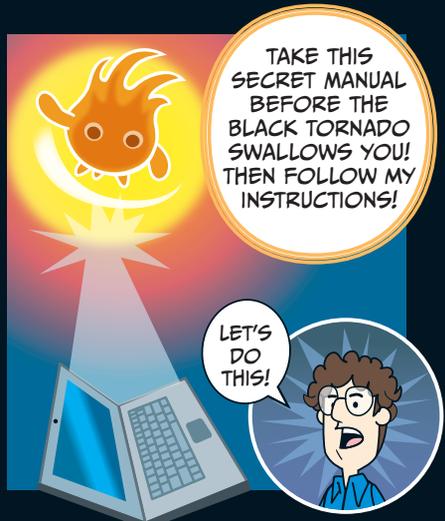


EARTHQUAKE!



CHIRP CHIRP





# 1 STAGE

## BREAKING THE SPELL!

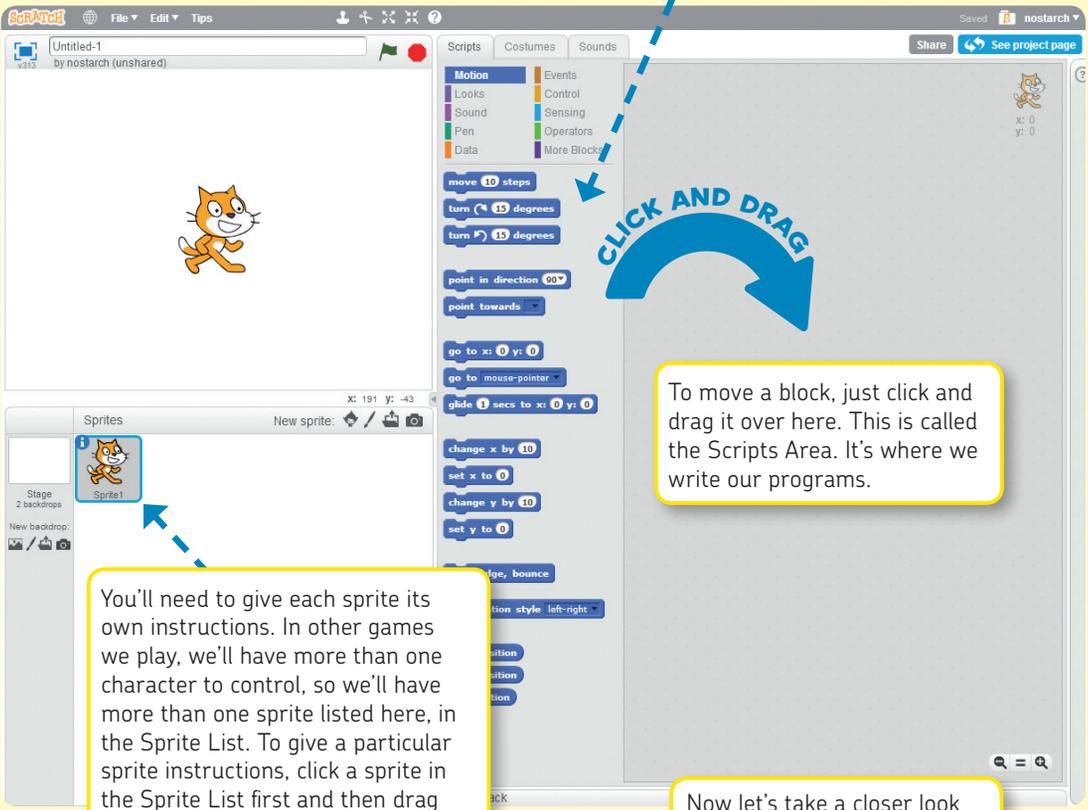
**+ Chapter Focus**  
Let's get to know Scratch!  
We'll also learn about *sprites*  
and *coordinates*.

**The Game**  
We need to get Scratchy the cat  
moving again. We'll make him  
dance across the Stage.



To follow along with the Secret Manual, you first need to open Scratch. Once you **Create** a new project, you'll see Scratchy the cat on a white backdrop. The cat doesn't do anything yet because he doesn't have any programs. Scratch calls Scratchy the cat—and all the other characters and objects we add to a project—a *sprite*. Soon, we'll start giving him directions to move by using the blue blocks in the middle of the screen.

The command blocks you can give a sprite are here. We'll stack these commands together to break the magic spell and get Scratchy back on his feet. The blocks here are all blue, as they're from the **Motion** palette.



You'll need to give each sprite its own instructions. In other games we play, we'll have more than one character to control, so we'll have more than one sprite listed here, in the Sprite List. To give a particular sprite instructions, click a sprite in the Sprite List first and then drag blocks into the Scripts Area.

To move a block, just click and drag it over here. This is called the Scripts Area. It's where we write our programs.

Now let's take a closer look at the rest of the interface...

## A Guided Tour of the Scratch Interface!

Play the game full screen.

Give your project a new name.

**Sprite Toolbar**  
Contains the Duplicate, Delete, Grow, Shrink, and Block Help tools

**Palette**  
Each of these ten buttons lets you choose the functions (called *blocks*) for programming your sprites. You can combine these command blocks in stacks to create programs that control objects on the screen.

**Stage**  
Displays your creation



The green flag starts the game and the red flag stops the game.

**Scripts Area**  
Here's where you build your programs. Stacking blocks together here lets you control the sprites in your project. Click one of the three tabs at the top to change to other functions:

**Scripts:** Allows you to drag command blocks from the Palette and put them together to write a program

**Costumes:** Allows you to draw, import, or edit images for a sprite

**Sounds:** Allows you to record or import sound files for a sprite to use

**Sprite List**  
Here are the characters and objects you've created, including the Stage itself. Click the icons to edit each sprite individually.

New sprite: [Library icon] [Draw icon] [Upload icon] [Webcam icon]

**New Sprite Buttons**  
There are four ways to add a sprite:

- Pick one from Scratch's built-in library
- Draw a new one
- Upload an image you already have
- Take a photo with your computer's webcam

# 1 STAGE

## Sprite Information

You might have noticed a little blue **i** in the corner of the box around Scratchy when you select his sprite in the Sprite List. Try clicking the **i**, and you'll get information about that sprite.

This section shows the sprite's name, position, and direction it is facing (the little blue line).

CLICK HERE



This is how you can rename the Scratchy sprite. Right now it's *Sprite1*. Don't you think that's a little boring? Try renaming this sprite.



Click this arrow when you're done with the Sprite Settings pane. We'll play with these other settings later.

## Rotation Settings

You can control how a sprite rotates in three ways:

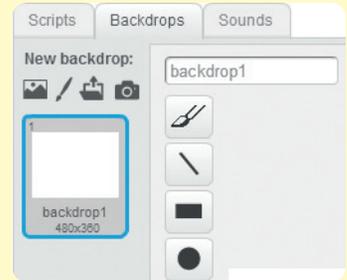
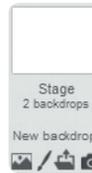
- Can rotate freely
- Can face only left or right
- No rotating allowed

Try clicking and dragging the little blue line—see what happens to Scratchy's orientation.

Now, onto the fun stuff. To use Scratch to program movements, you first have to understand how Scratch positions things.

Click the **Stage** icon in the Sprite List. Switch to the **Backdrops** tab in the Scripts Area and choose **Choose backdrop from library**.

Note: Sprites have *costumes* while the Stage has *backdrops*.



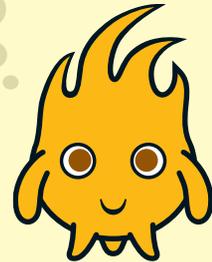
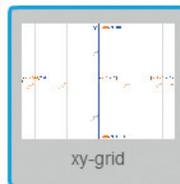
Choose the *xy-grid* backdrop and click **OK** to use it. It's in the "Other" category.

## Backdrop Library

Category

- All
- Indoors
- Outdoors
- Other

Theme



Now you can see exactly how Scratch positions objects. Everything is on a grid with two axes:

**y-axis:** A vertical line that marks up and down positions; ranges from -180 (lowest) to +180 (highest)

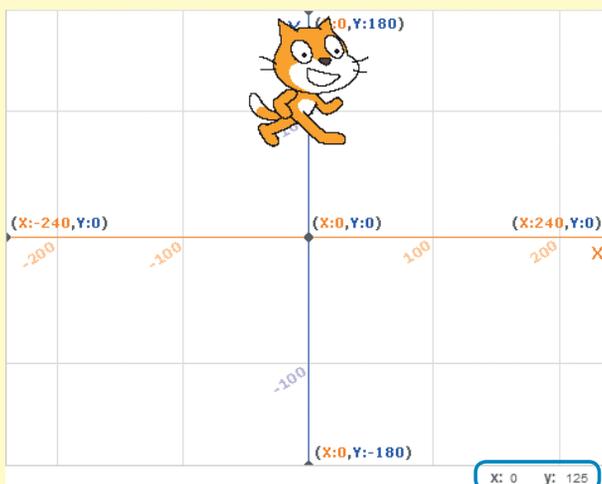
**x-axis:** A horizontal line that marks left and right positions; ranges from -240 (farthest left) to +240 (farthest right)

Scratch's default position is at the point where the x-axis and y-axis meet. His coordinates are (X: 0, Y: 0).

Now we can program movements for Scratchy the cat! But first, try dragging him to the top of the Stage, as shown on the right.

Note: The bottom-right corner displays the coordinates of your mouse. This will be really helpful when we start setting the positions of sprites!

The current coordinates of a sprite are shown in the upper-right corner of the Scripts Area, too.



To make sure we're giving Scratchy the cat instructions, click him in the Sprite List (the box at the bottom left of the screen). Switch to the **Scripts** tab in the Scripts Area and then click the **Motion** palette button. Click and drag out the command block `go to x:0 y:0` to the Scripts Area.



# 1 STAGE

Click the number of a coordinate to change it. Set x to **0** and set y to **125**. Now click the block to run it! Scratch goes right to that position. We've just written our first program! It's really that simple.

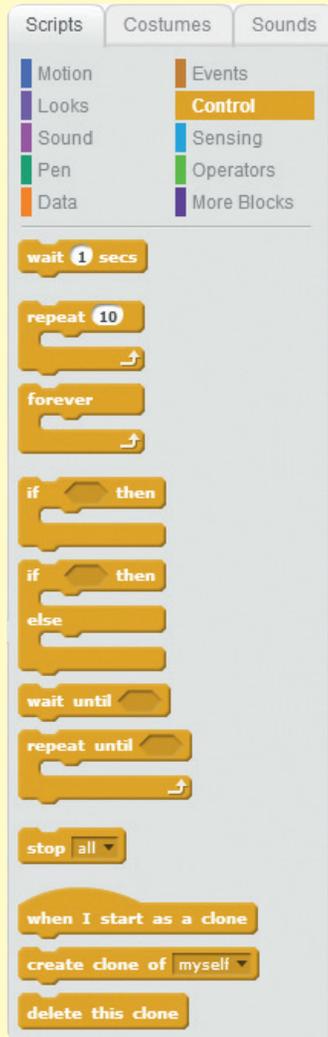


We want Scratchy to move around, but at the moment, he moves too fast for us to see! To make him move more slowly, click the **Control** palette and drag out the command **wait 1 secs** to the Scripts Area. Make sure to drag it under your blue command block. Wait for a white line to appear and then release the mouse.

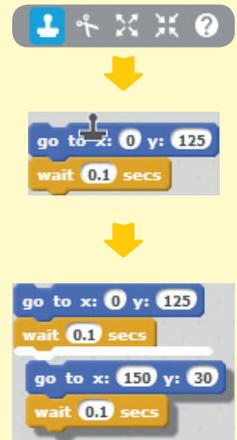


The two commands are joined together! Now change the time to **0.1** secs.

Tip: If you want to separate the commands, simply drag away the block. If you want to delete a block, simply drag it back to the palette. Give it a try. To move a big stack of blocks, click and drag the topmost block in the stack.



Next, select the **Duplicate** button on the Sprite Toolbar and stamp it on the commands to make five copies.



Type these coordinates in your own program, so it matches this picture. When you're finished, click the whole command block to make Scratchy jump around in a pentagon shape!

```

go to x: 150 y: 30
wait 0.1 secs
go to x: 100 y: -120
wait 0.1 secs
go to x: -100 y: -120
wait 0.1 secs
go to x: -150 y: 30
wait 0.1 secs
  
```

To make him move in a loop continuously, drag out the command block **forever** from the **Control** palette and place it at the top of the code. Click the block, and it will actually run! Click to stop Scratchy from moving around. You can test any program in this way—just click it with your mouse.

Tip: Whenever you're writing scripts, you'll want to test them every now and then to see if they work the way you expect.

```

forever
  go to x: 0 y: 125
  wait 0.1 secs
  go to x: 150 y: 30
  wait 0.1 secs
  go to x: 100 y: -120
  wait 0.1 secs
  go to x: -100 y: -120
  wait 0.1 secs
  go to x: -150 y: 30
  wait 0.1 secs
  
```

Now let's make Scratchy glide around instead of jumping from point to point. To do this, click the **Motion** palette, drag out five **glide** commands, and join them together. Follow the picture on the right, and copy the seconds and coordinates. Once you're finished, click the script to see the results!

```

glide 0.1 secs to x: 150 y: 30
glide 0.1 secs to x: -100 y: -120
glide 0.1 secs to x: 0 y: 125
glide 0.1 secs to x: 100 y: -120
glide 0.1 secs to x: -150 y: 30
  
```

Now we can join these two programs together! From the **Events** palette, drag out the **when green flag clicked** command and put it at the top of your two scripts.

Tip: We'll often need multiple scripts to start at the same time, and using the **when green flag clicked** command will help us do that.

```

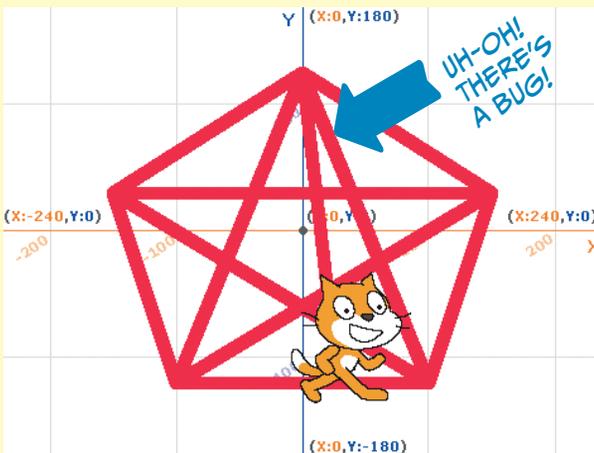
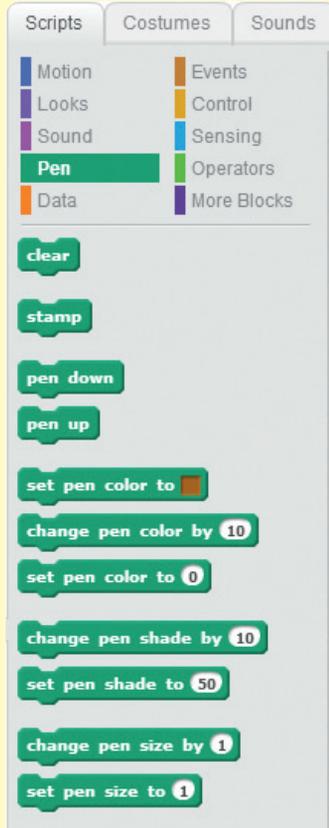
when green flag clicked
  forever
    go to x: 0 y: 125
    wait 0.1 secs
    go to x: 150 y: 30
    wait 0.1 secs
    go to x: 100 y: -120
    wait 0.1 secs
    go to x: -100 y: -120
    wait 0.1 secs
    go to x: -150 y: 30
    wait 0.1 secs
    glide 0.1 secs to x: 150 y: 30
    glide 0.1 secs to x: -100 y: -120
    glide 0.1 secs to x: 0 y: 125
    glide 0.1 secs to x: 100 y: -120
    glide 0.1 secs to x: -150 y: 30
  
```

# 1 STAGE

Because we used the `when green flag clicked` command, we can use these buttons above the Stage to start (🚩) and stop (●) the game.



Next, click the **Pen** palette and drag out the four green Pen blocks shown on the right. Now when Scratchy moves, he'll draw a *magic star web*!



Occasionally, when you run your program, there is a *software bug*. This is the most exciting part of computer programming: discovering an error in something you have made and then solving the problem. In this case, sometimes Scratchy will draw an odd line at the beginning of the program.

If we drag Scratchy anywhere else on the Stage and then press 🚩, he draws an extra line because he starts in the wrong place. Try doing this multiple times to see if you can spot the bug.

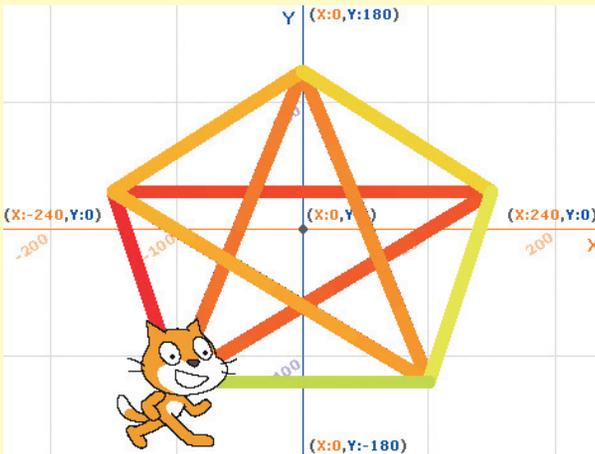
This software bug can be fixed by adding some more code—that is, new blocks—to your program. In this case, simply place a new `go to` block (from the blue **Motion** palette) above the green Pen blocks and below the `When clicked` block.

With this little correction, Scratchy will always begin drawing from the correct position in the grid. The bug is gone!



```

when clicked
  go to x: -150 y: 30
  clear
  set pen color to red
  set pen size to 10
  pen down
  forever
    go to x: 0 y: 125
    wait 0.1 secs
    go to x: 150 y: 30
    wait 0.1 secs
    go to x: 100 y: -120
    wait 0.1 secs
    go to x: -100 y: -120
    wait 0.1 secs
    go to x: -150 y: 30
    wait 0.1 secs
    glide 0.1 secs to x: 150 y: 30
    glide 0.1 secs to x: -100 y: -120
    glide 0.1 secs to x: 0 y: 125
    glide 0.1 secs to x: 100 y: -120
    glide 0.1 secs to x: -150 y: 30
  
```



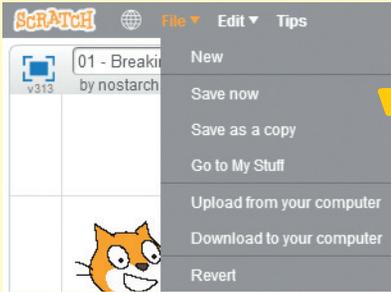
Let's add a whole new program to make a magic star web that changes colors. Build a second stack of blocks that uses the `change pen color by` command and see what happens.

Isn't that cool? You can give a single sprite more than one set of blocks! Scratchy now has two programs. This tiny second program sure makes a big difference in how the game looks.

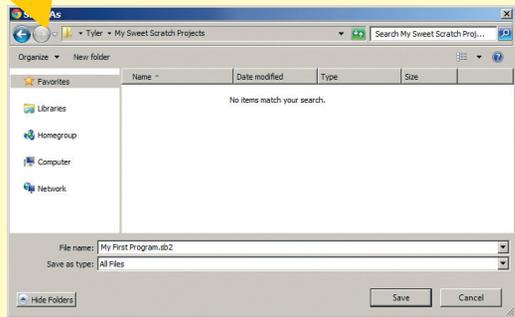
```

when clicked
  forever
    change pen color by 1
  
```

# STAGE



Remember to save this file so you can play with it later!



If you are logged into Scratch, the website stores all of your projects into **My Stuff** so you can easily find them. The website saves your progress every so often, but you can save manually too: **File ▶ Save Now**. You can also save different versions of your programs to make sure you don't lose older versions of your games and can safely experiment—**File ▶ Save Copy** creates a new version of your project in My Stuff. If you want to download a version for yourself, try **File ▶ Download to your computer**. Then save it in a safe spot!

## Scratchy's Challenge!!

Can you edit this program to make Scratchy draw different kinds of shapes? Give it a try!

