Projects

Snowball fight

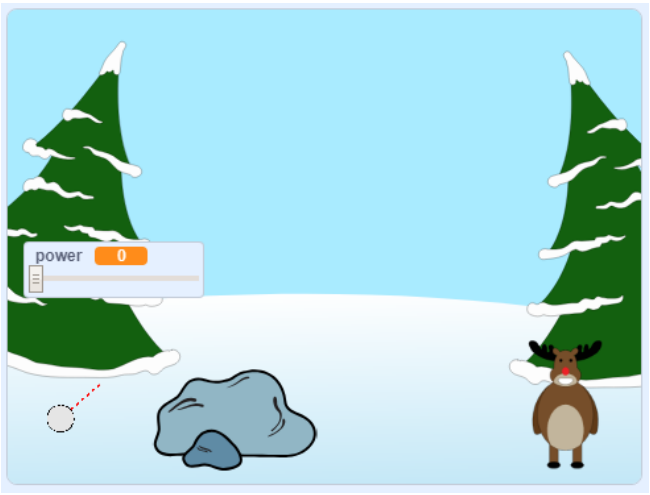
Make a game in which you have to throw snowballs at a target

Scratch

Step 1 Introduction

In this project you're going to make a game in which you have to throw snowballs at a target.

What you will make



What you will need

Hardware

- A computer capable of running Scratch

Software

- Scratch 3 (either **online** (http://rpf.io/scratchon) or **offline** (http://rpf.io/scratchoff))

Downloads

The starter project can be found **here** (http://rpf.io/p/en/snowball-fight-go).

What you will learn

- How to animated sprites
- How to react to mouse input
- how to use broadcasts

Additional information for educators

You can **find the solution for this project here** (http://rpf.io/p/en/snowball-fight-get).

Step 2 Making a snowball

Let's make a snowball, that you can throw around your stage.

Open the Scratch starter project.

Online: open the **starter project** (http://rpf.io/snowball-fight-on).

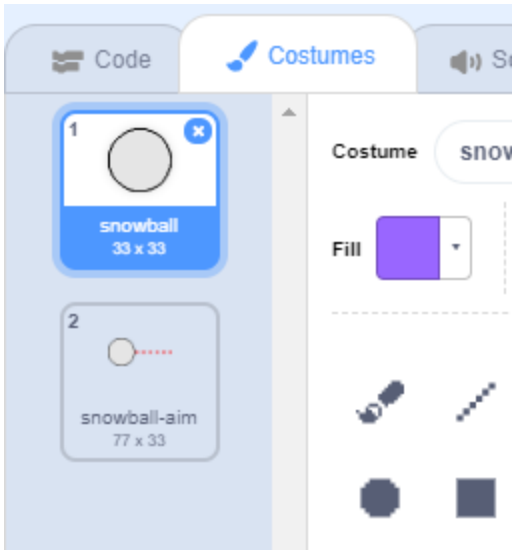
If you have a Scratch account you can make a copy by clicking **Remix**.

Offline: open the **starter project** (http://rpf.io/p/en/snowball-fight-go) in the offline editor.

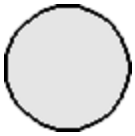
If you need to download and install the Scratch offline editor, you can find it at **rpf.io/scratchoff** (http://rpf.io/scratchoff).

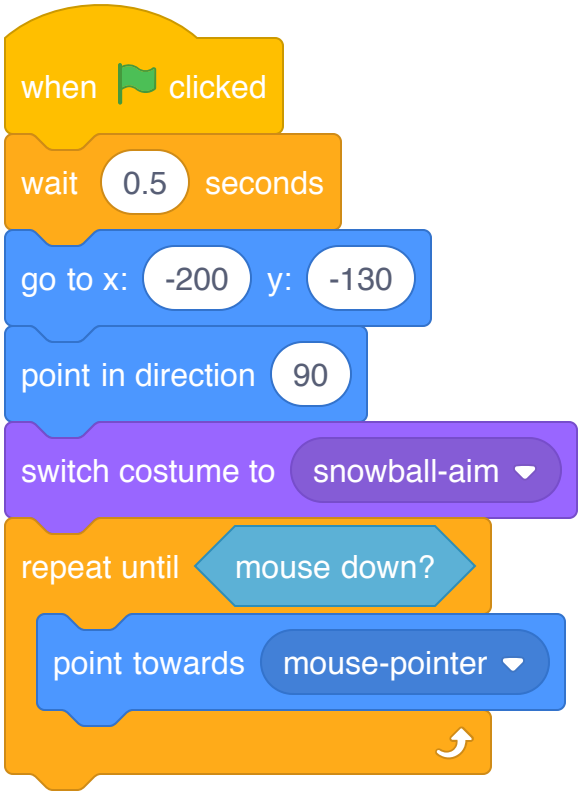
In the starter project, you should see a blank stage and snowball sprite.

The 'Snowball' sprite contains 2 costumes, a normal costume, and one that shows which direction the snowball is facing.

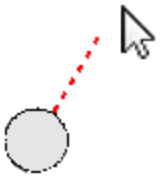


First, let's allow the player to change the angle of the snowball. Add this code to your snowball sprite:





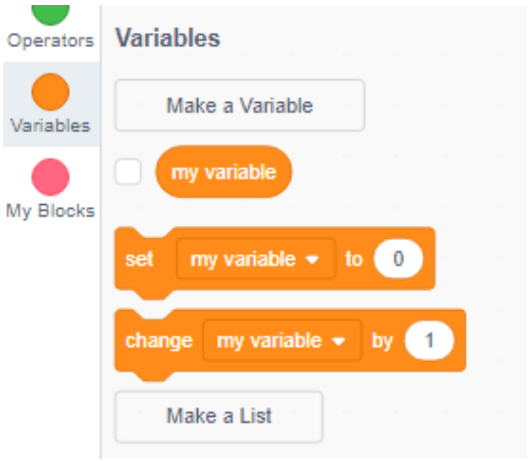
Test out your project by clicking the green flag. You should see that your snowball follows the mouse, until you press the mouse button.



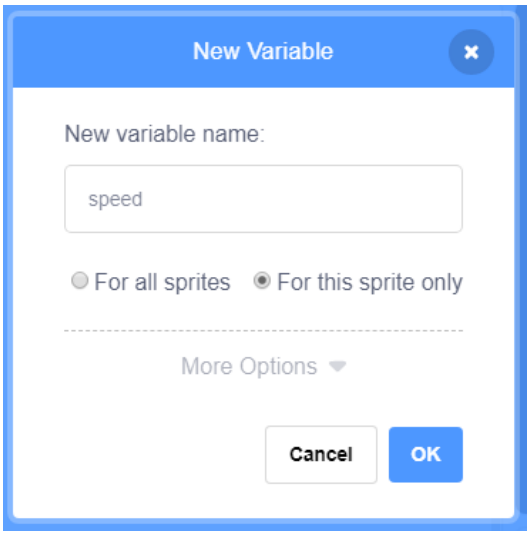
Let's also allow the player to decide on how powerful the snowball should be thrown. Create a new variable called power.

Add a variable in Scratch

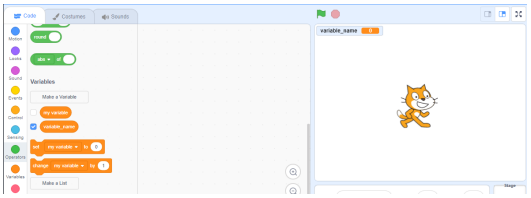
- Click on **Variables** in the Code tab, then click on **Make a Variable**.



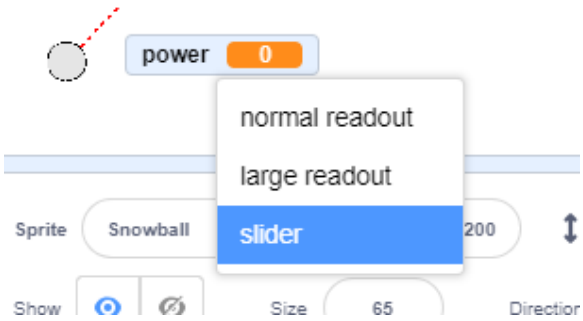
- Type in the name of your variable. You can choose whether you would like your variable to be available to all sprites, or to only this sprite. Press **OK**.



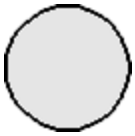
- Once you have created the variable, it will be displayed on the Stage, or you can untick the variable in the Scripts tab to hide it.

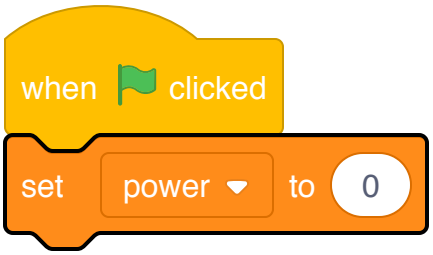


Drag your new variable display to the bottom of the stage, near the snowball. Right-click on the variable display and click 'slider'.

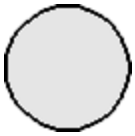


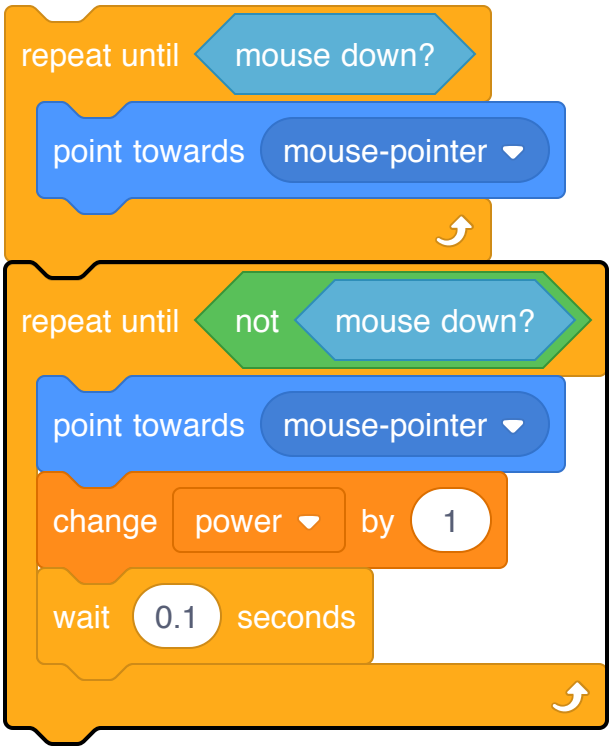
Add code to set your new power variable to 0 when the flag is clicked.





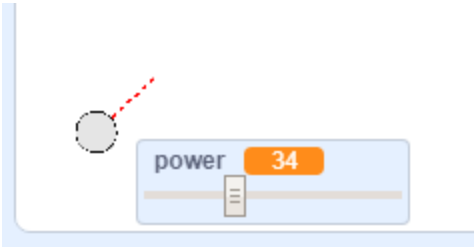
Now that you have a power variable, you can increase the power of the snowball *after* the direction has been chosen with this code:





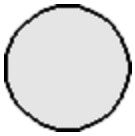
This code means that you have to *keep the mouse button held down* after choosing the direction, to choose the snowball's power.

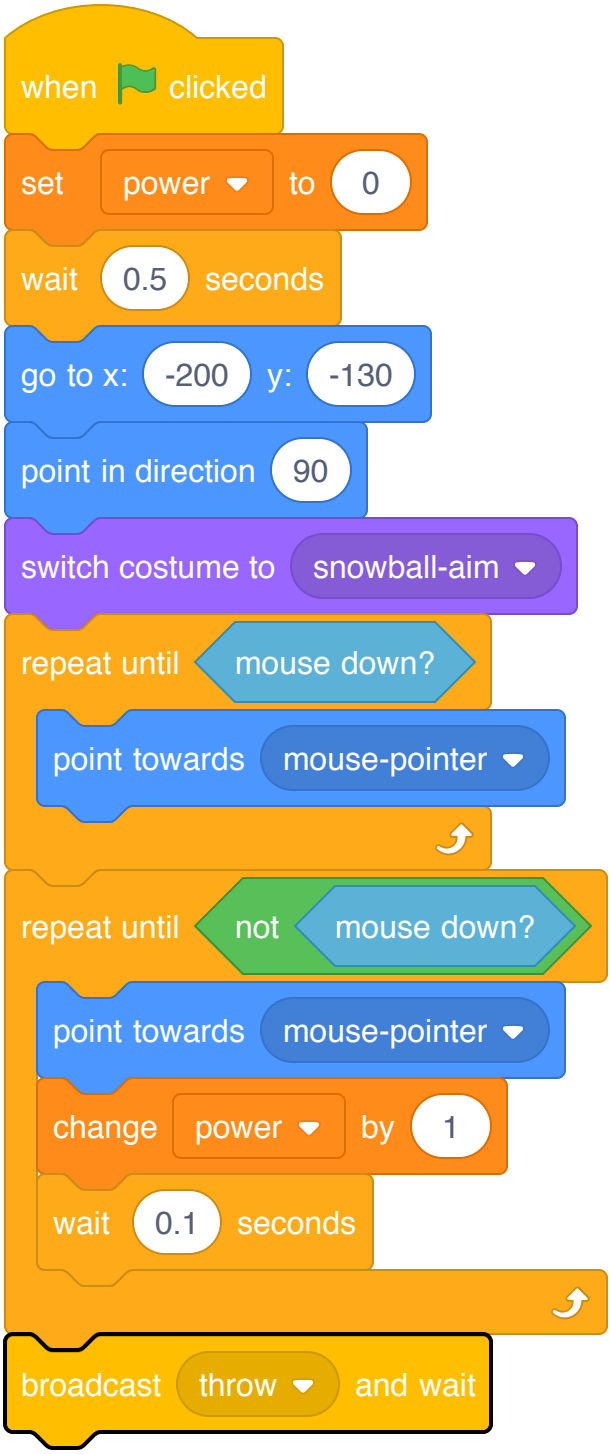
Test your snowball, to see if you can choose its angle and power.



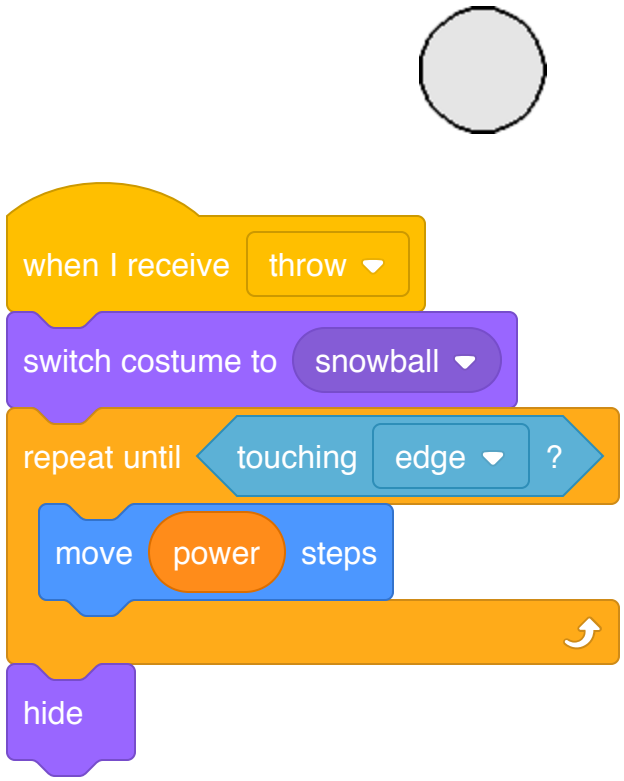
Step 3 Throwing a snowball

Add a block to the *end* of your snowball code, to `broadcast` that you're throwing a snowball:



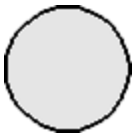


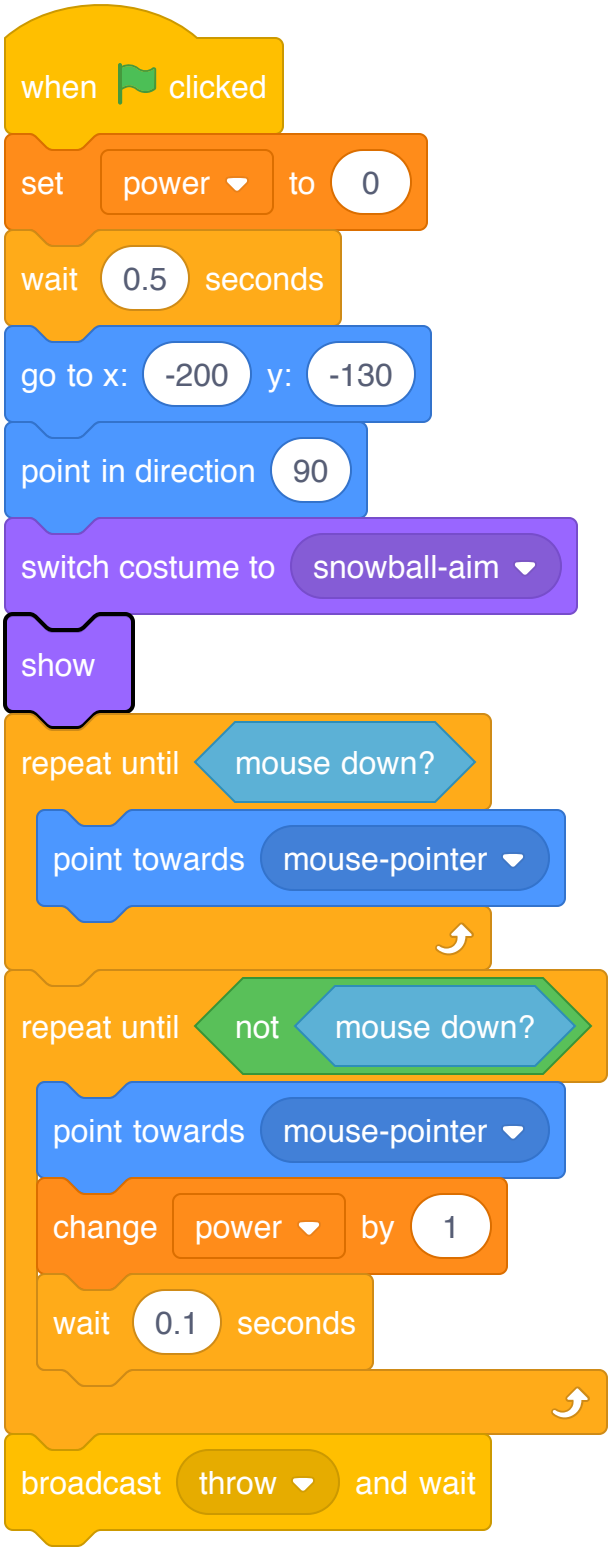
Add this code to your snowball, to move until it reaches the edge of the stage:



The code uses the `power` variable to decide how fast to move.

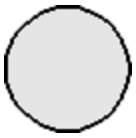
Now that you're hiding the snowball when it touches the edge, add code to `show` the snowball when the flag is clicked, *just* after the snowball switches to the `snowball-aim` costume.

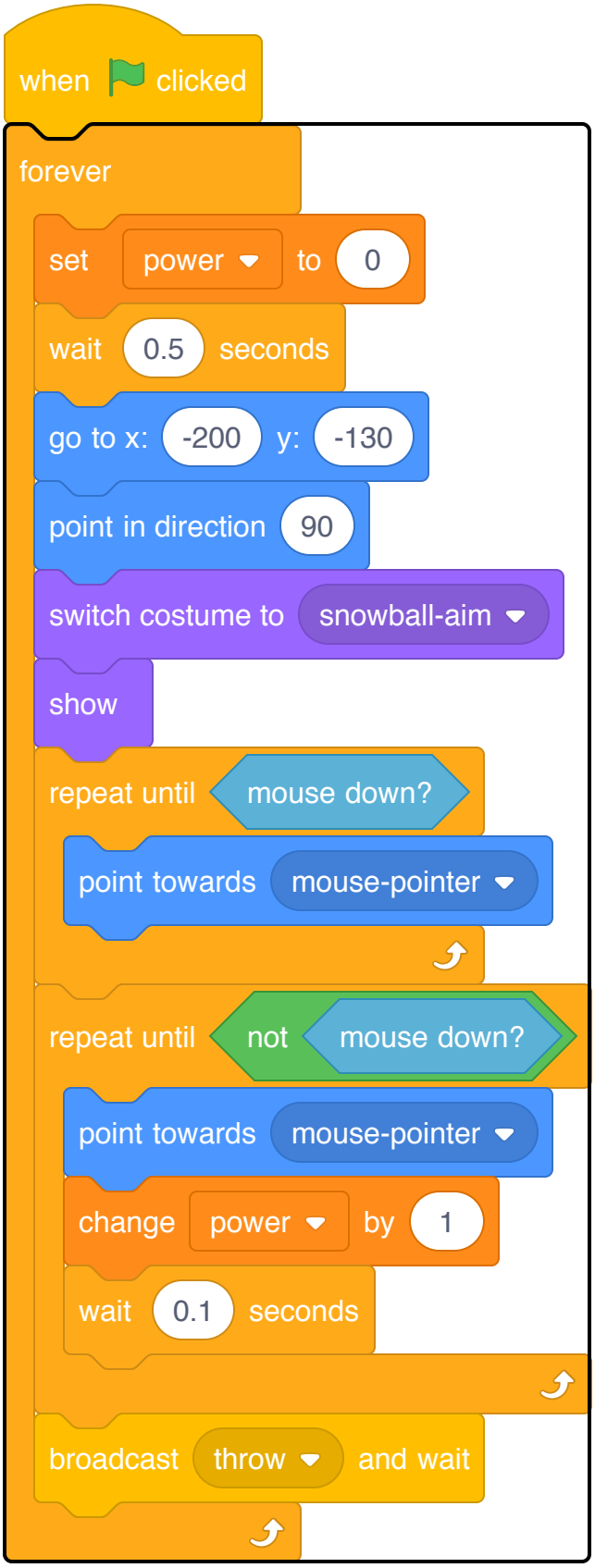




Test out your snowball a few times. Does it move at different angles and different speeds?

If you want to be able to throw your snowball lots of times, just add a `forever` loop around your snowball `when flag clicked` code.



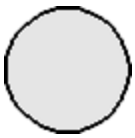

when clicked
forever
set power to 0
wait 0.5 seconds
go to x: -200 y: -130
point in direction 90
switch costume to snowball-aim
show
repeat until mouse down?
point towards mouse-pointer
repeat until not mouse down?
point towards mouse-pointer
change power by 1
wait 0.1 seconds
broadcast throw and wait

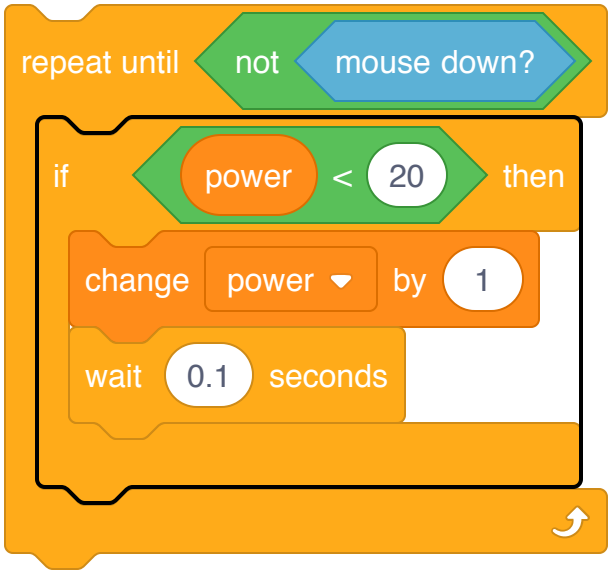
Step 4 Realistic movement

You now have a snowball, but let's make it move a bit more realistically.

First, let's set a maximum power level, so that the snowball can't be thrown too hard.

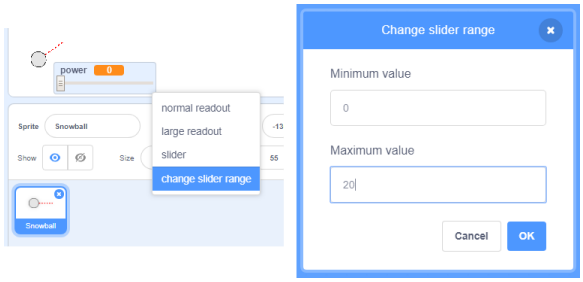
In your snowball's `when flag clicked` code, we need to increase the power only if it's less than 20. Change your code to:



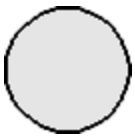


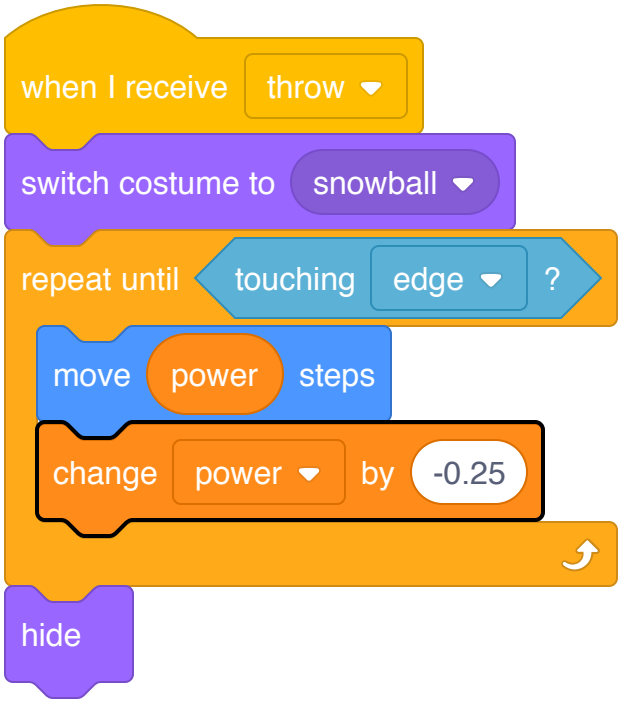
Test out your snowball again, and you'll see that the power never gets above 20.

Now that your snowball's maximum power is 20, you can set this as the maximum value for the variable's slider too. Right-click on your power variable, and click 'set slider min and max'.



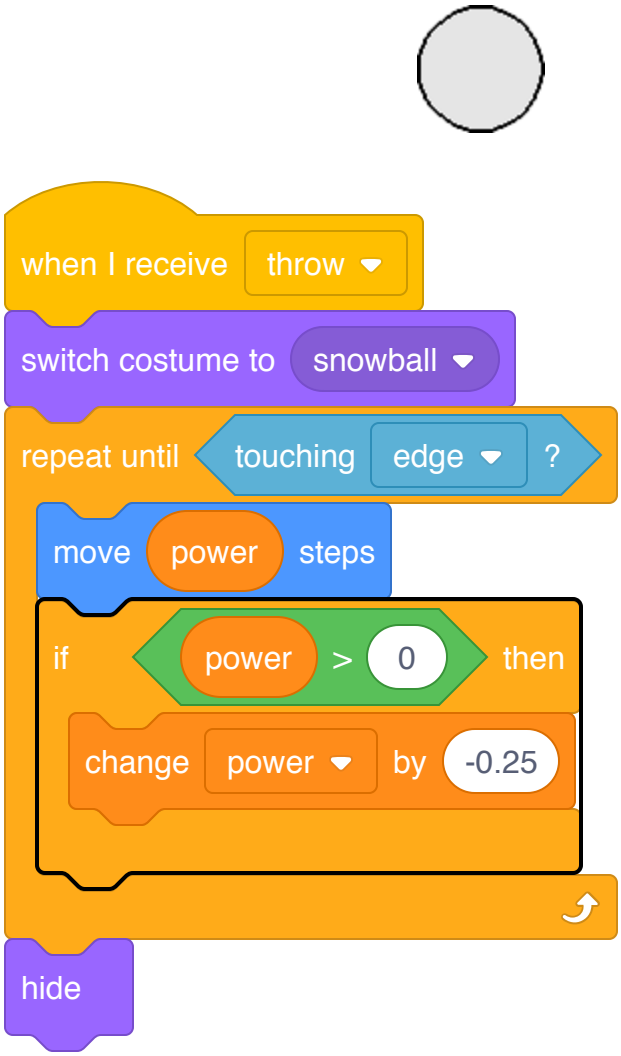
You can also slow down the snowball, by reducing the power slightly as it flies through the air. Add this code block to your snowball's `when I receive [throw]` code:



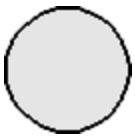


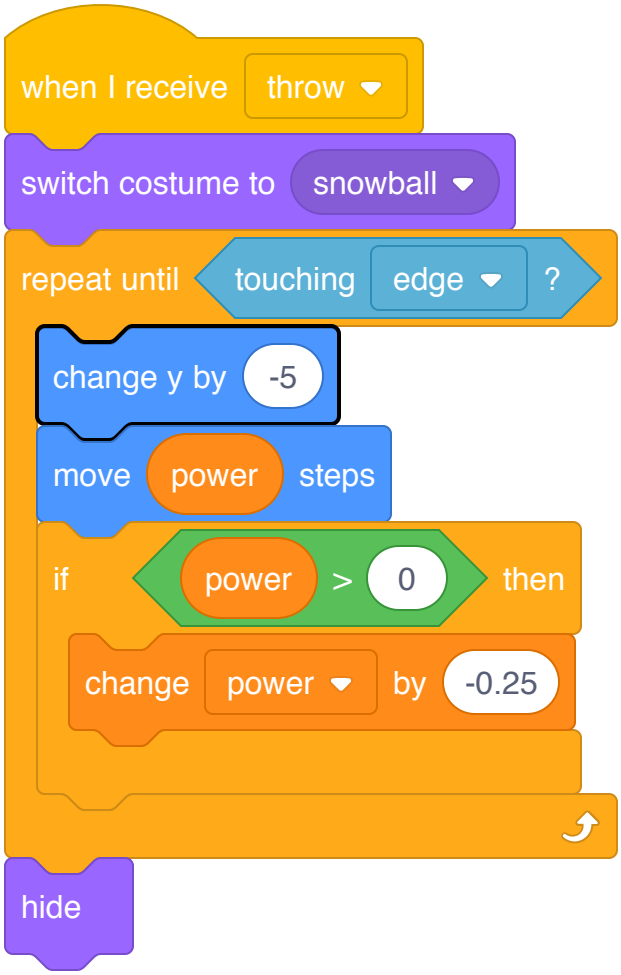
Test this new code - does it work as you expected? You may notice that the power keeps reducing, and eventually the snowball moves backwards!

To fix this, you can add an `if` block to your code, so that the power is only lowered if it is above 0:



You're nearly there, but you also need to add some gravity to your snowball, so that it falls to the ground. You can add gravity by just moving the snowball down continuously with this code:



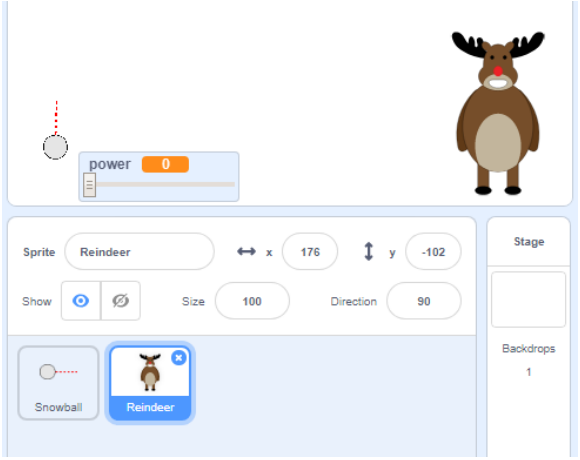


Test out your snowball again, and you should see that your snowball moves much more realistically.

Step 5 The target

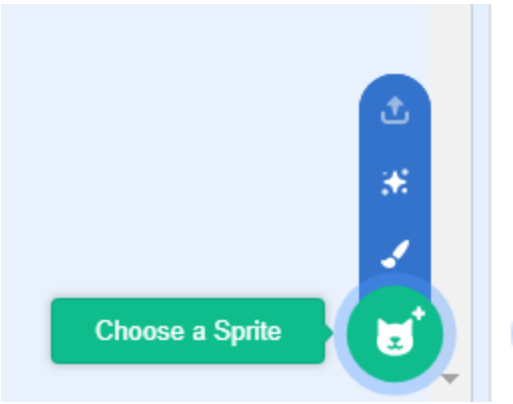
Let's add in a target for your snowballs!

Add in another sprite to your project.

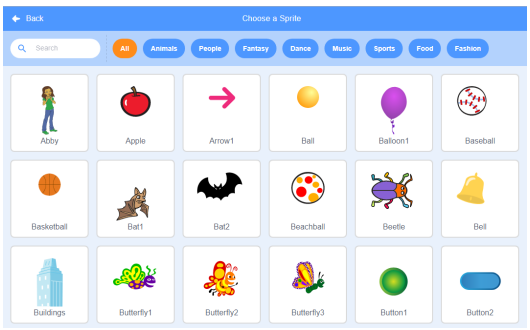


Adding a Scratch sprite from the Library

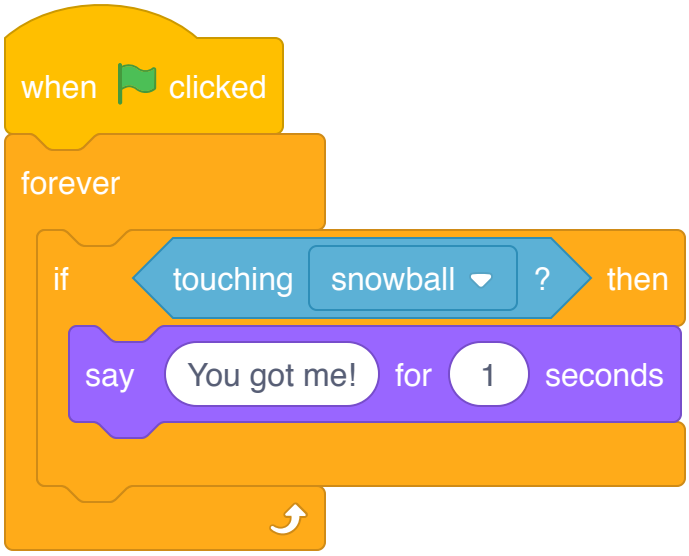
- Click **Choose a sprite** to see the library of all Scratch sprites.



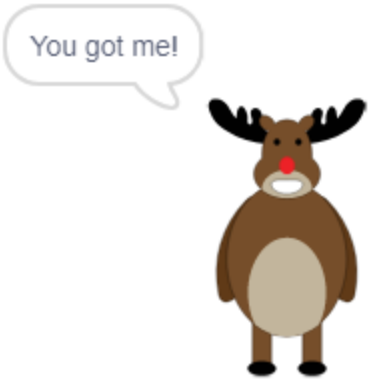
- You can search or browse sprites by theme. Click on a sprite to add it to your project.



Add this code to your new sprite, so that it says “You got me!” when it gets hit:

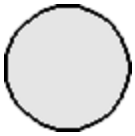


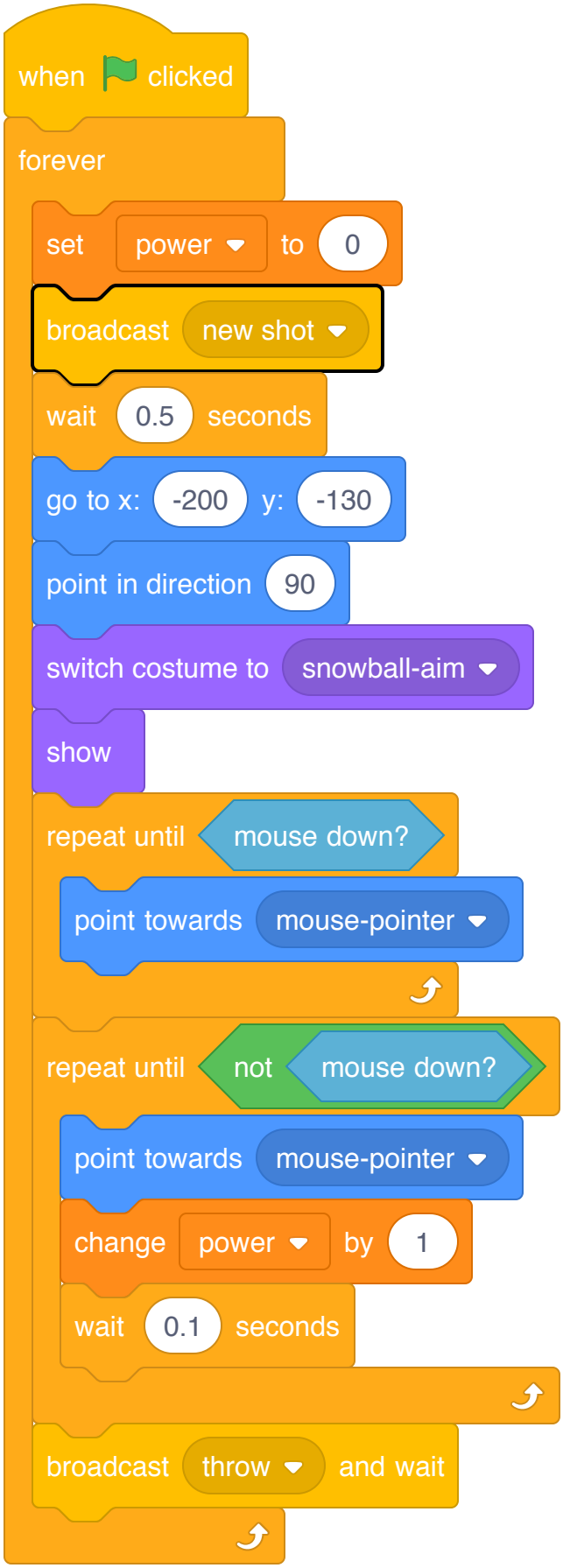
Test out your new code.



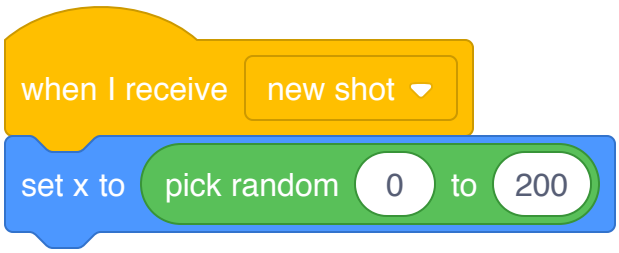
Let's do a couple of things to make the game harder. First, let's move the reindeer each time the player throws the snowball.

To do this, first add a `broadcast` to your snowball, near the top of your `forever` loop. This will let your reindeer know that a new shot is about to be taken.




when clicked
forever
set power to 0
broadcast new shot
wait 0.5 seconds
go to x: -200 y: -130
point in direction 90
switch costume to snowball-aim
show
repeat until mouse down?
point towards mouse-pointer
repeat until not mouse down?
point towards mouse-pointer
change power by 1
wait 0.1 seconds
broadcast throw and wait

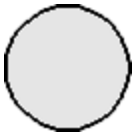
When your reindeer receives this message, move it to a new random position with this code:

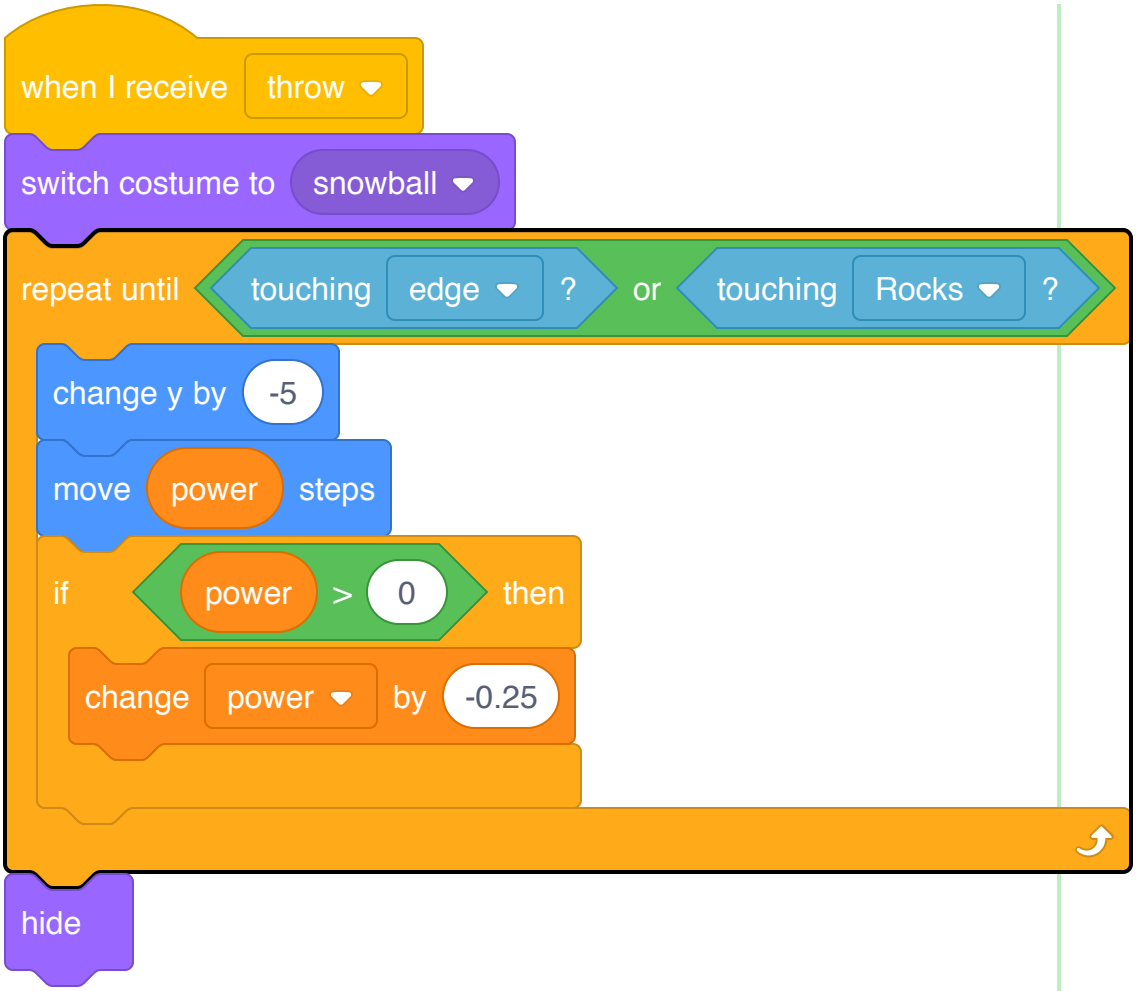


Test your project by throwing a few snowballs. Does your target move position each time?

You can also make your game harder by adding a rock in front of your snowball.

You can now change your snowball code, to stop when it touches the edge of the screen *or* when it touches the rock.





Finally, you can make your game harder by making your snowball and your reindeeer smaller.

Challenge!

Challenge: improve your game!

Now that you've made the basic game, see what you can do to improve it. Here are some ideas, but feel free to use your own ideas too.

- Add a winter backdrop to your project.
- Change the numbers in your code, to make the snowball move faster, higher or further
- Change the graphics
- Add music and sound effects
- Change sprite costumes when the target is hit
- Add a score and a high score
- The reindeer could move around so that it's harder to hit
- You could add snowflakes or birds that stop the snowball
- You could add a second player, so that you could both throw snowballs at the reindeer…or each other!

Step 6 What next?

Try these other projects to build you knowledge of other programming languages.

- **About me** (https://projects.raspberrypi.org/en/projects/about-me?utm_source=pathway&utm_medium=whatnext&utm_campaign=projects) is a great introduction to Python.
- **Happy birthday** (https://projects.raspberrypi.org/en/projects/happy-birthday?utm_source=pathway&utm_medium=whatnext&utm_campaign=projects) introduces HTML and CSS.