

## New Blocks

### What you will be doing :

You will be creating your own blocks to make the beetle draw shapes. The more unusual, the better!

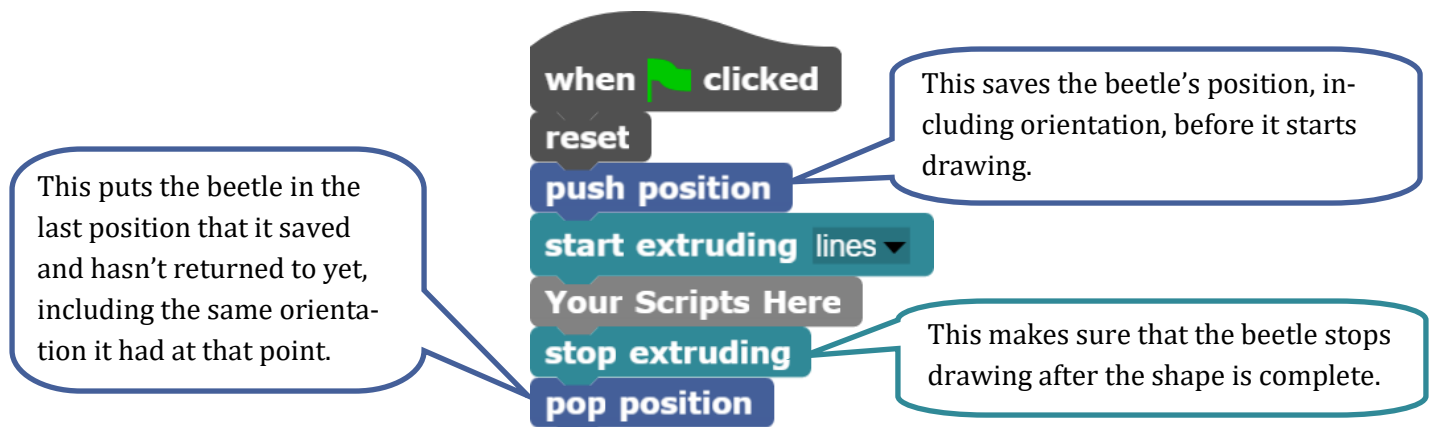
### Before you start

1. Navigate to the Beetle Blocks website at <http://beetleblocks.com>.
2. In the upper-right corner, click on **Run Beetle Blocks**.

### Make Your Own Blocks

First, you should make the beetle draw some shape, any shape. It could be a square, circle or any combination of lines and angles.

1. Create the script below and replace the **"Your Scripts Here"** block with scripts to draw your chosen shape. Pressing the green flag should make the beetle draw the shape then return to the start position.



Any sequence of actions you create for the beetle can be turned into a single block that does the same thing. This makes the script shorter and easier to understand.

2. Click **"Make a block"** in the "My Blocks" menu.
3. Name your block something related. Ours is called "Draw My Shape" to describe what it does.
4. Drag all of the blocks of your previous script (from below the **reset** block) into the **Block Editor** for your new block.

Congratulations, you made a block that draws your shape! Use it anywhere to make the beetle draw the shape.

## Draw a Ring

Now that you have this new block, you can easily use it wherever and your script will be easier to understand. So you could make a new shape, made of your shape! A good example is a ring.

1. Create a new script such that when you click the flag, the beetle will **repeatedly** draw your **shape, rotate** on the Z axis (we chose 15 degrees), then **move**. Since we want the beetle to draw a ring, we need it to repeat enough times to rotate 360 degrees in total (24 times in our case,  $360/15$ ).
2. Make a new block for this action, like you did before, and name it something relevant. We named ours "Draw Ring of My Shape". Now you can use this single block to make the beetle draw the entire ring!

But it doesn't always have to have the same size. In the same way that you enter your own value into the "move" and "rotate" blocks you can change your own block to take in values and change what it draws.

3. Open the Block Editor by right-clicking your new block and clicking "edit".
4. Click the rightmost "+" symbol on the block's name. Make sure you also select "**Input name**" instead of "Title text". Then type "rotation" into the box that appears. You can now drag the **rotation** block from the block title into the custom block's script as a placeholder for your later input.
5. Modify your script to repeat " $360/\text{rotation}$ " times, and rotate z by "rotation". Now, when you use the block you will be able to input how many degrees you want the beetle to rotate at each step. This means that the **rotation** is an **argument** of the block.
6. Can you create a new **argument**, called "step", that you can drag into the "move" block to use input for that value as well?

Congratulations, you can now make your beetle draw rings made of your own shape, and they can all have different sizes! You have also seen how you can use the **arguments** of a block. You can give your blocks as many input values as you would like to change how it behaves!

*If you were unable to come up with the scripts, check 'Figure 1' at the end of the worksheet to see our full solution*

## Use Any Shape

Changing some of the values by inputting them allows you to draw different looking shapes with the same block. But they are all similar, they are just rings made of the same shape. Fortunately, you can actually change the **shape** being used by having it as an **input**!

1. Create a new block and name it something relevant. We named ours "Draw Ring". In the Block Editor, add 2 arguments to your block (Rotation and Step, as before).
2. Add a new argument called "Shape" and, before clicking "ok", click the black arrow on the right and select the "**Command (C-Shape)**" option.

This means that the new "Shape" input will be a command or a series of commands. Therefore, you can use your first custom block, which draws your shape, or any other commands as input for this new block!

## Use Any Shape

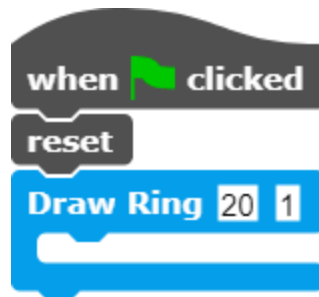
3. Inside of the block editor, recreate the “repeat”, “rotate” and “move” blocks, placing the Rotation and Step blocks in their previous places.
4. Where you would have previously placed your shape-drawing block, place the “**run**” block from the “Control” menu.
5. Drag the “Shape” input into the “run” block.
6. In the overall scripting area, create the script below. What do you think will happen when you press the green flag? Press it to check.

At the moment, there is no command for the “Draw Ring” block to **run**, so the beetle just moves in a circle. But you can fill this C-shaped block with anything.

7. Place the “Sphere Dia. 2” block or your custom block inside of your C-shaped block and run your script by clicking the green flag. Then place both of those blocks inside and run it again.
8. As you can see, all of the blocks inside of the C-shape are used to draw each step of the ring. What do you think would happen if you placed a “Draw Ring” block inside of another “Draw Ring” block? Create this combination, with some shape-drawing blocks inside of the inner C-shape.

[NB: you should make the input values of the two “Draw Ring” blocks different]

*If you were unable to come up with the scripts, check ‘Figure 2’ at the end of the worksheet to see our full solution*



Congratulations, you can now make your own custom blocks and use different types of inputs to change the way the beetle acts! In the same way that you changed the input type to “Command (C-shape)”, you can change it to plenty other types of input.

A few important things you have experienced are:

- Custom Blocks—you now know how to make and use custom blocks.
- Input—you used input arguments for your custom blocks and have tried out a few input types.
- Run—you have used the “run” block to run some commands that were given as input to a block.
- Push/Pop Position—you have used these commands to save and use past positions in order.

You can always access Beetle Blocks online at [beetleblocks.com](http://beetleblocks.com), and you should play around with turning and drawing to get unusual shapes. Don’t be afraid to just mix any block you find in whatever way.

It is worth making some more custom blocks using the different input types, to try any weird combinations that you can think of.

## About Beetle Blocks

[Beetle Blocks](#) is a project by [Eric Rosenbaum](#), [Duks Koschitz](#), and [Bernat Romagosa](#), with additional software development by [Jens Mönig](#). You can read more about it at [beetleblocks.com/about](http://beetleblocks.com/about).

This worksheet was inspired by Bernat Romagosa, and a workshop held by him at the Scratch Conference 2017 in Bordeaux. You can find plenty of information about the software and how to use it in the [Beetle Blocks Primer](#), as well as a few other exercises.

## Help

This is the script for a custom block which draws a ring made of whatever shape the “Draw My Shape” block would draw.

It must repeat this many times in order to rotate 360 degrees in total.

The two values should be written in the white boxes of the actual block when it is used.

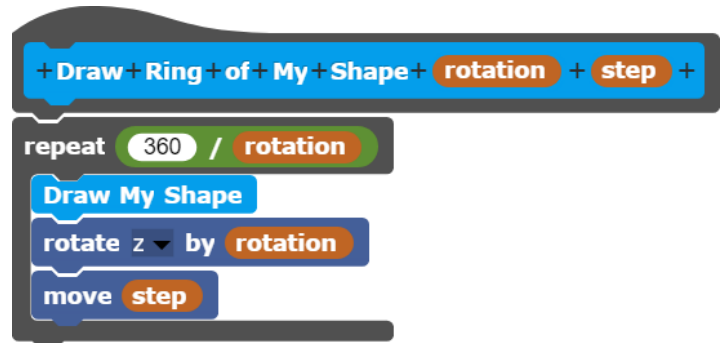


Figure 1: a custom block to draw a ring of custom shapes

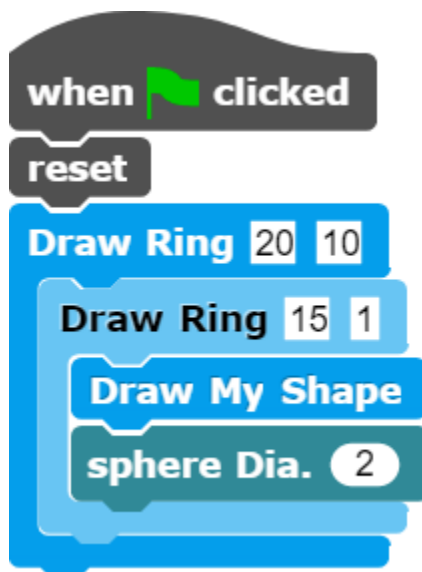


Figure 2: drawing a ring of rings, made of spheres and custom shapes

This makes the beetle draw a ring made of smaller rings. Each of the small rings is made from the custom shapes and spheres.

The values used can be anything, but each combination will generate a different ring. If the values are the same for each of the “Draw Ring” blocks, then all of the rings will overlap and the beetle will only draw one small ring, so make them different for each of the blocks.