

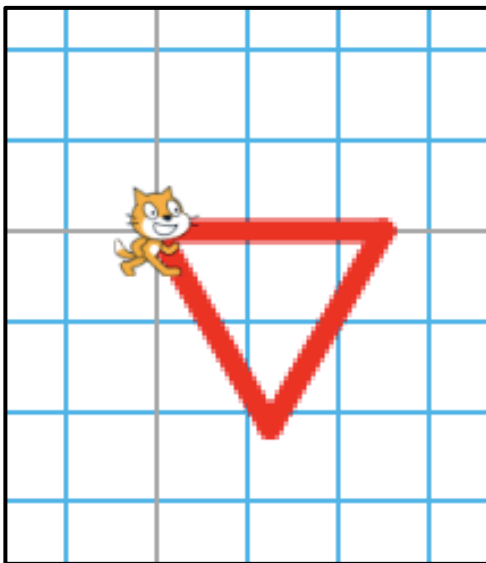
Transformations	Grades 3 & 4
Simplified Coding Guide	

We will be building our programs in Scratch. You can access the tool here: [scratch.mit.edu](https://scratch.mit.edu)

Scratch is a free, block-based coding tool. You do not need an account to access the tool; however, you may want to create accounts so that your students can save and revisit their work. To get started, refer to the *Coding Guide* document to set-up scratch. This document looks at an alternative simpler way to do transformations in Scratch.

### Step 1: Make a Triangle

To start, make a triangle. The first three blocks are used to set-up the pen. The next two blue movement blocks start the triangle in the centre of the grid and orient it at 90 degrees. To draw the triangle itself, the pen goes down and a side and corner get repeated three times. The pen comes up when done. The result is shown below.

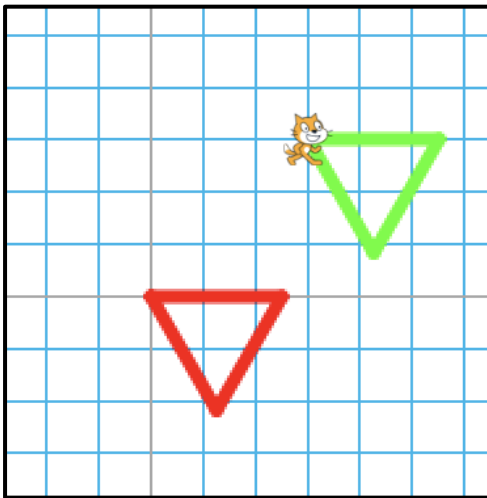


```

when green flag clicked
  erase all
  set pen color to red
  set pen size to 5
  go to x: 0 y: 0
  point in direction 90
  pen down
  repeat 3
    move 50 steps
    turn 120 degrees
  pen up
  
```

## Step 2: Translation

To translate the triangle, duplicate the original code for making the triangle. Replace the erase all with a wait, so the second triangle is better shown. For the translation, change the x and y coordinates from (0,0). In this case the coordinates are (60,60) but any coordinates could be picked.



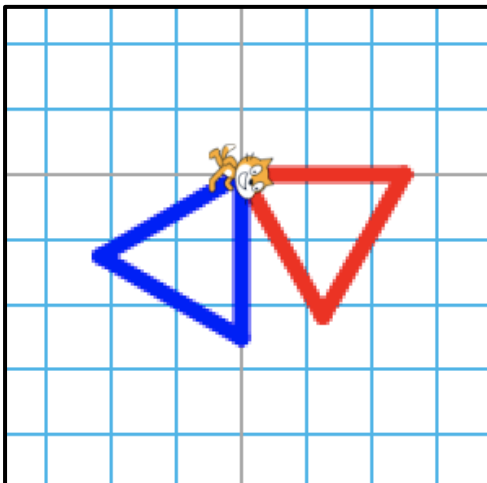
```

when clicked
wait 2 seconds
set pen color to green
set pen size to 5
go to x: 60 y: 60
point in direction 90
pen down
repeat 3
  move 50 steps
  turn 120 degrees
pen up
  
```

### Step 3: Rotation

To rotate the triangle, duplicate the original code for making the triangle. Replace the erase all with a wait, so the second triangle is better shown.

For the rotation, change the block 'point in direction' to something different. In this example we rotated the triangle by 90 degrees around the middle, so it points towards 180 degrees.

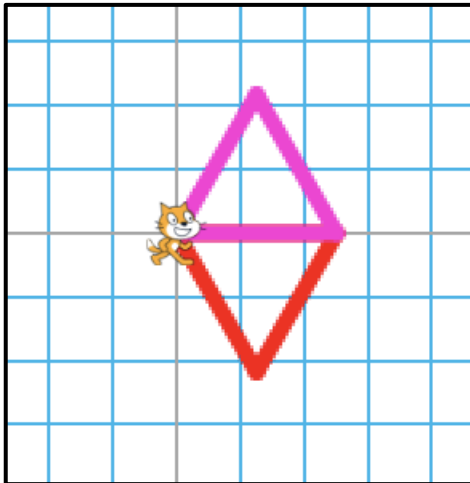


```

when clicked
wait 4 seconds
set pen color to blue
set pen size to 5
go to x: 0 y: 0
point in direction 180
pen down
repeat 3
  move 50 steps
  turn 120 degrees
pen up
  
```

### Step 4: Reflection

To reflect the triangle, duplicate the original code for making the triangle. Replace the erase all with a wait, so the second triangle is better shown. For the rotation, everything stays the same but instead of rotating clockwise, the turn is counter-clockwise. The degrees turned are still the same.



```

when clicked
  wait 6 seconds
  set pen color to pink
  set pen size to 5
  go to x: 0 y: 0
  point in direction 90
  pen down
  repeat 3
    move 50 steps
    turn 120 degrees
  pen up
  
```

The end result is that there will be four triangles. The original and then one that is translated, one that is rotated and one that is reflected:

<pre> when green flag clicked   erase all   set pen color to red   set pen size to 5   go to x: 0 y: 0   point in direction 90   pen down   repeat 3     move 50 steps     turn 120 degrees   pen up  when green flag clicked   wait 2 seconds   set pen color to green   set pen size to 5   go to x: 60 y: 60   point in direction 90   pen down   repeat 3     move 50 steps     turn 120 degrees   pen up  when green flag clicked   wait 4 seconds   set pen color to blue   set pen size to 5   go to x: 0 y: 0   point in direction 180   pen down   repeat 3     move 50 steps     turn 120 degrees   pen up  when green flag clicked   wait 6 seconds   set pen color to pink   set pen size to 5   go to x: 0 y: 0   point in direction 90   pen down   repeat 3     move 50 steps     turn 120 degrees   pen up </pre>	
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