

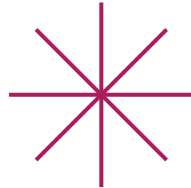
Module 2: Creating a Parallel Program

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Project: Exploding Fireworks



Algorithm: Drawing a Firework



Pseudocode:

1. Start in center
2. For each *direction*
3. Point in *direction*
4. Draw a line
5. Go back to center

What to know

- How many rays do you want?
8
- How long are they?
100 steps
- How fast is the animation?
Repeat 10 times
10 steps at a time
0.1s wait in between moves

Animating a Single Ray

Start with the basic script:

```
pen down
move 100 steps
pen up
```

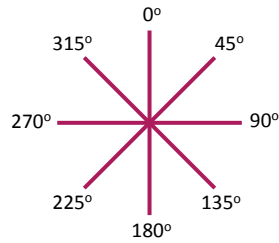


Animate it:

```
pen down
repeat 10
  move 100 steps
  wait 0.1 secs
pen up
```

Next: Draw all the rays along each direction starting from a common center

Directions and Lists



(, , , , , , ,)

```
list 0 45 90 135 180 225 270 315
```

“for each” Block

```
list 0 45 90 135 180 225 270 315 <>>  
for each item of list 0 45 90 135 180 225 270 315 <>>  
  point in direction item
```

Firework Script

```
for each item of list 0 45 90 135 180 225 270 315 <>>  
  point in direction item  
  pen down  
  repeat 10  
    move 10 steps  
    wait 0.1 secs  
  pen up  
  move -100 steps
```

Once a ray is drawn, pick up the pen and move back to center before drawing the next ray.

How can we draw all the rays at once to make it look like it's exploding?

Parallel “for each” Block

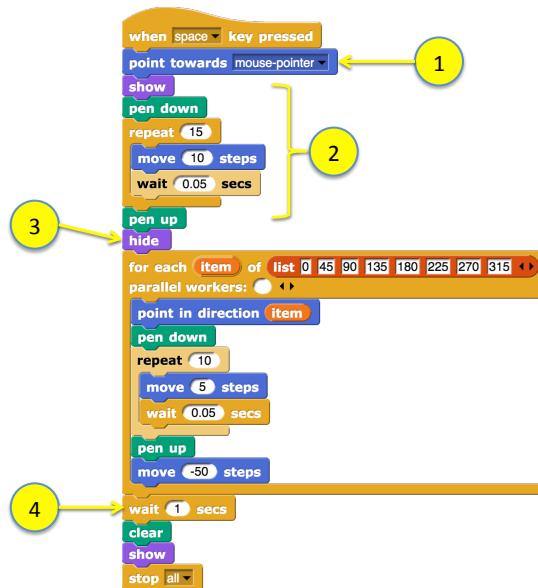
How can we make our Firework explode?

The image shows a Scratch code block for a parallel 'for each' loop. The block is titled 'for each item of list' and contains the following sub-blocks: 'parallel workers' (set to 1), 'point in direction item', 'pen down', 'repeat 10 steps' (containing 'move 10 steps' and 'wait 0.1 secs'), 'pen up 100 steps', and 'move -100 steps'. A 'stop all' block is attached to the bottom. Annotations include: 'Click on the rightmost arrow...' pointing to the right arrow of the 'for each' block; '...to enable parallel operation.' pointing to the 'parallel workers' field; 'Add a stop-all block to terminate clones.' pointing to the 'stop all' block; and 'To terminate clones you can also click the stop/halt button.' pointing to the 'stop all' block.

You Try: Shooting Firework

- Two phases: shooting and exploding
- Shoot in the direction of the mouse pointer 1
- Leave a trail behind Sprite as it shoots 2
- Hide the Sprite so it doesn't show as it explodes 3
- Have the firework linger before clearing it 4

Solution



You Try: Missiles

- Fire missiles from a fixed location or base
- Choose the target by clicking a location on the stage

Hints

- “Go to” your base coordinates before shooting missile
- How to tell when the mouse pointer clicks on the stage? **1**
 - Look at the control blocks
- Once clicked, how does the stage tell the missile to fire? **2**
 - It’s another control block
- How does the missile know when the stage sends a message? **3**
 - Yep, it’s yet another control block!
- How does the missile know where the target is? **4**
 - Nope! It’s not a control block!
 - Look at the sensing blocks instead

Your solution will have two separate scripts!

Missile Launch Code

Missile Script

```

when I receive the green flag clicked
  go to x: 100 y: 100
  point towards mousepointer
  pen down
  glide 100 secs to x: mouse x y: mouse y
  pen up
  hide
  for each item of list 10
    point in direction item
    pen down
    repeat 10
      move 50 steps
      wait 0.5 secs
      pen up
      move 50 steps
    wait 0.5 secs
  clear
  hide
  stop all
  
```

Stage Script

```

when I am clicked
  broadcast the green flag clicked
  
```

Stage Solution



Missile Solution

