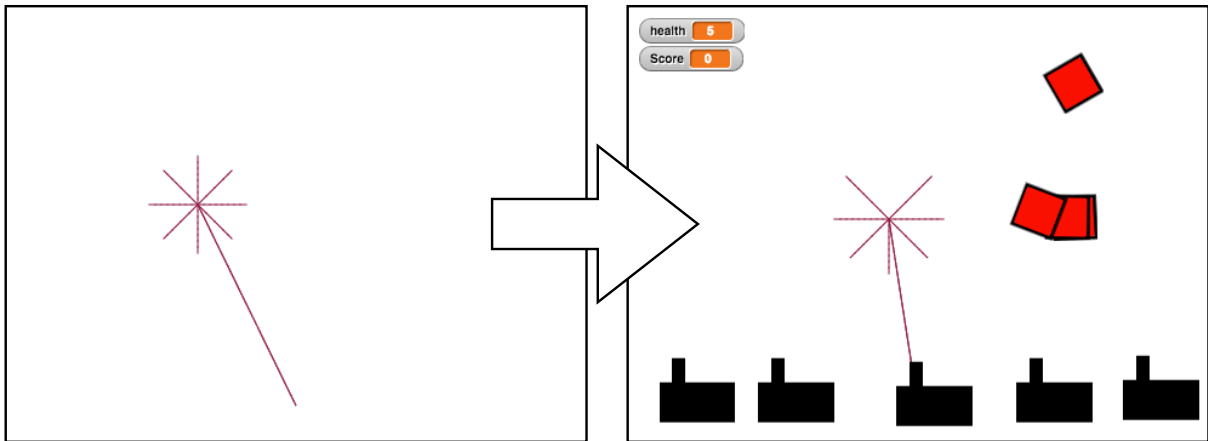
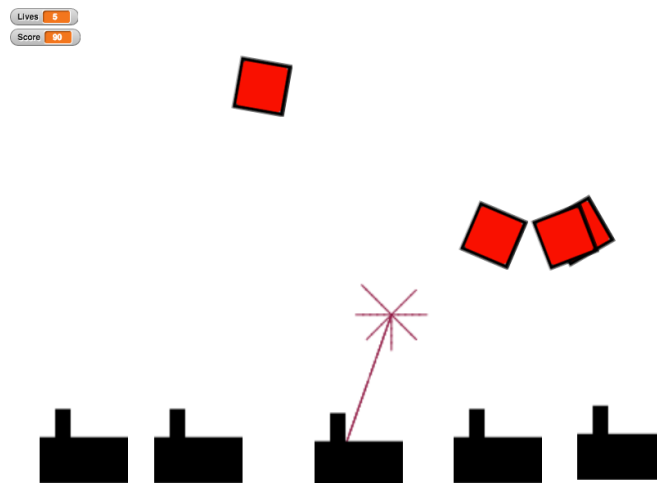


# Missile Command

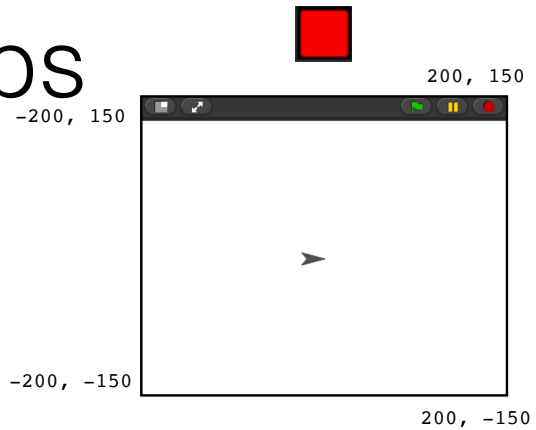


## The Plan

- Add falling bombs
- Allow for multiple bombs and missiles
- Add bases for the bombs to destroy
- Add life and score counters



# Bombs



Goal: Create a new bomb sprite which falls from the top of the stage to the bottom, while checking if it's been hit by a missile/firework

Pseudocode:

1. go to a **random** location above the stage (x: -200 to 200, y: 200)

• hint: use the **random** block



2. fall until to the bottom of the screen (until the **y position** is **less** than -150)

• hint: use a **repeat until** block



3. hide if hit by a **missile**/firework

• hint: use the **touching** block



# Bombs

Problem: we can only use 1 missile and create 1 bomb.

Solution: use clones to create more

Procedure:

1. change the **bomb** and **missile** code to run when it starts as a clone

• hint: use the "when I start as clone" block



2. update the missile control code in the stage to create a new **missile** clone

• hint: use the "create a clone of" block



3. use a "forever" loop to create a new **bomb** every second

• hint: use the "create a clone of" block

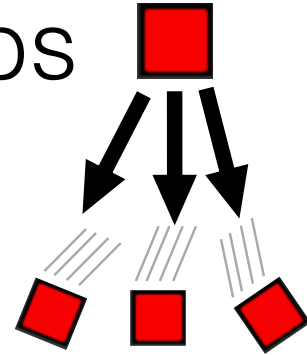


4. don't forget to clean up! make sure to **delete** your clones when you're done with them



• hint: use the "delete this clone" block

# Splitting Bombs



How did the bombs behave in missile command?

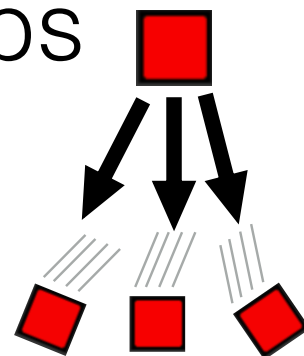
They split at a certain point.

When did we split a sprite before?

What block did we use?



# Splitting Bombs



Pseudocode

1. act normally until **bomb** reaches  $y=75$
  2. use **for each** to split into 3 bombs
  3. inside the **for each**
    - 3.1. face a **random** direction (between  $150^\circ$  and  $210^\circ$ )
    - 3.2. execute the normal falling code
    - 3.3. remember to **delete** your clones!
- hint: iterate over an empty **list**, and choose a random direction within the loop

A green Scratch 'pick random' block with the text 'pick random' on the left, '150' in a white oval, 'to' in the middle, and '210' in a white oval.

A yellow Scratch 'for each' loop block with the text 'for each' on the left, 'Item' in a red oval in the middle, and 'of' on the right with a small square icon and a right-pointing arrow.

A yellow Scratch 'delete this clone' block with the text 'delete this clone' in the center.

# Collision

Goal: Improve collision detection so bombs only disappear in the missile explosion

Procedure:

1. create a new sprite called "collider"

1.1. create a circle-shaped costume

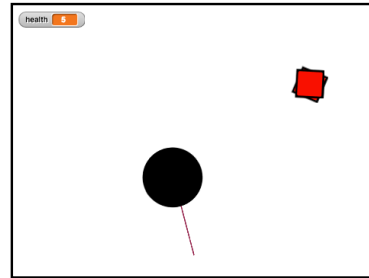
1.2. on game start, **hide** the **collider** and move it off screen

1.3. when it starts as a clone, **set size to 0%**

1.4. then increase the size over time

• hint: use a **repeat** loop and a **wait block** (0.05 seconds)

1.5. don't forget to **delete** the clone



# Collision

2. create 2 variables: **explosion x** and **explosion y**

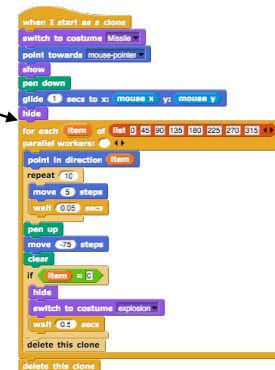
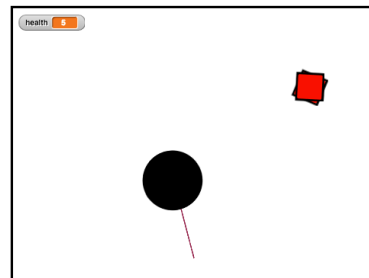
3. in the **missile** sprite, before the "for each" block

3.1. set **explosion x** and **explosion y** to the sprite **x position** and **y position**

3.2. "tell" the collider to go to **explosion x**, **explosion y**

3.3. create a **clone** of the collider

3.4. tell the collider to move back off stage



# Exercises

- Create a life counter that decrements every time a bomb reaches the bottom of the screen
- Add a points counter and award points for destroying bombs
- Create city sprites that change costume to illustrate the number of lives you have

# Solutions

# Solution - Bombs



Bomb

```
when clicked
  go to x: pick random -200 to 200 y: 150
  point in direction pick random 150 to 210
  repeat until y position < 150
    move 0.5 steps
    if touching Missile ?
      hide
  stop all
```

# Solution - Cloning



Bomb



Stage

```
when clicked
  point in direction 90
  hide
  go to x: -300 y: -300
  forever
    create a clone of myself
    wait 1 secs
  when I start as a clone
    go to x: pick random -200 to 200 y: 150
    point in direction pick random 150 to 210
    show
    repeat until y position < 150
      move 0.5 steps
      if touching Missile ?
        delete this clone
    delete this clone
```

```
when I am clicked
  create a clone of Missile
```



Missile

```
when I start as a clone
  point towards mouse-pointer
  show
  pen down
  glide 1 secs to x: mouse x y: mouse y
  hide
  for each item of list 45 90 135 180 225 270 315
    parallel workers:
      point in direction item
      repeat 10
        move 5 steps
        wait 0.05 secs
      pen up
      move 75 steps
      clear
      delete this clone
  delete this clone
```

# Solution - Splitting Bombs



Bomb

```
when I start as a clone
  go to x: pick random -200 to 200 y: 150
  point in direction pick random 150 to 210
  show
  repeat until y position < 75
    move 0.5 steps
    if touching Missile ?
      delete this clone
  for each angle of list [ ] parallel workers:
    show
    point in direction pick random 150 to 210
    repeat until y position < 150
      move 0.5 steps
      if touching Missile ?
        delete this clone
  delete this clone
delete this clone
```

# Solution - Collision

Missile

Bomb

Collider

```
when I start as a clone
  switch to costume Missile
  point towards mouse-pointer
  show
  pen down
  glide 1 secs to x: mouse x y: mouse y
  hide
  set explosion x to x position
  set explosion y to y position
  tell collider to
    go to x: explosion x y: explosion y
  create a clone of collider
  go to x: -200 y: 0
  for each item of list [ 45 90 135 180 225 270 315 ]
    parallel workers:
      point in direction item
      repeat 10
        move 5 steps
        wait 0.05 secs
      pen up
      move 75 steps
      clear
      delete this clone
  delete this clone
```

```
when I start as a clone
  go to x: pick random -200 to 200 y: 150
  point in direction pick random 150 to 210
  show
  repeat until y position < 75
    move 0.5 steps
    if touching collider ?
      delete this clone
  for each angle of list [ ] parallel workers:
    show
    point in direction pick random 150 to 210
    repeat until y position < 150
      move 0.5 steps
      if touching collider ?
        delete this clone
  change health by -1
  delete this clone
delete this clone
```

```
when clicked
  hide
  go to x: -400 y: 0
  when I start as a clone
    set size to 0 %
    repeat 10
      wait 0.05 secs
      change size by 10
    delete this clone
```

# Solution - Health + Score

Missile

```
when clicked
  set Score to 0
  set health to 5
  point in direction 90
  hide
  go to x: -300 y: -300
  forever
    create a clone of myself
    wait 1 secs
    if health < 0
      stop all

when I start as a clone
  go to x: pick random -200 to 200 y: 150
  point in direction pick random 150 to 210
  show
  repeat until y position < 75
    move 0.5 steps
    if touching collider?
      change Score by 10
      delete this clone
  for each angle of list parallel workers
    show
    point in direction pick random 150 to 210
    repeat until y position < -150
      move 0.5 steps
      if touching collider?
        change Score by 10
        delete this clone
  change health by -1
  delete this clone
delete this clone
```

# Solution - Cities

Bomb

City (x5)

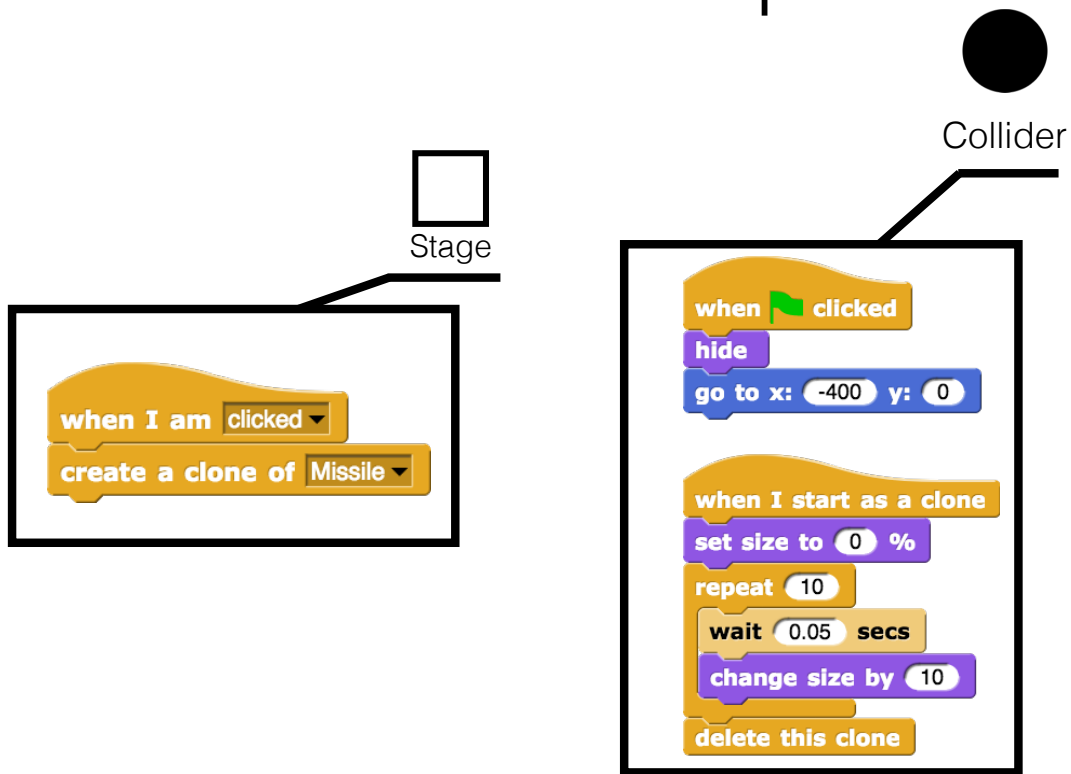
```
when clicked
  switch to costume costume1

when I receive hit
  if health < 5
    switch to costume costume1(2)
```

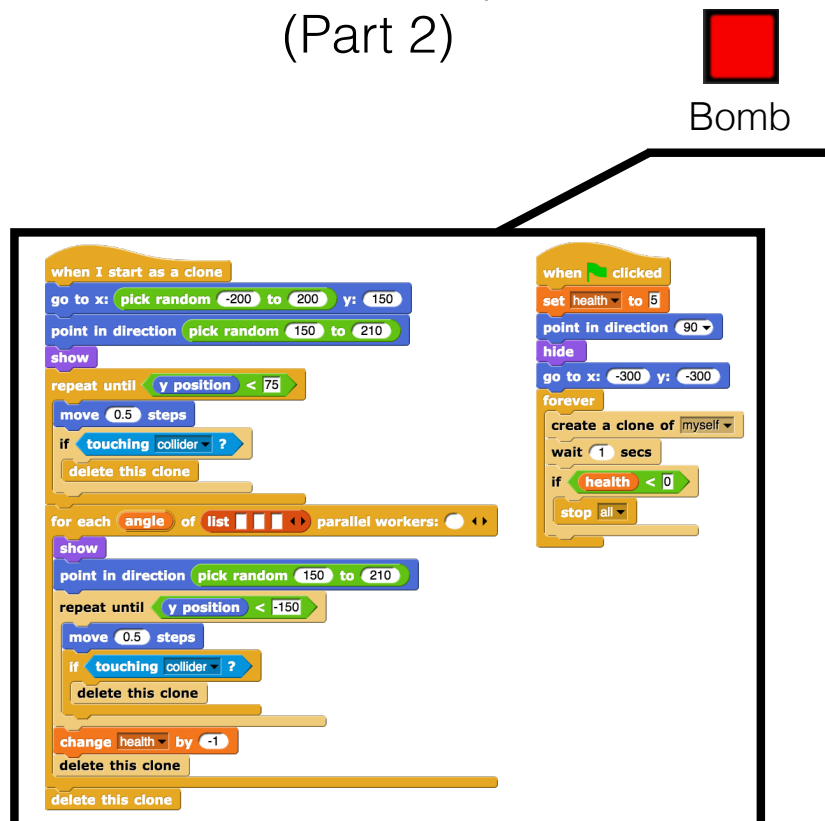
```
when I start as a clone
  go to x: pick random -200 to 200 y: 150
  point in direction pick random 150 to 210
  show
  repeat until y position < 75
    move 0.5 steps
    if touching collider?
      change Score by 10
      delete this clone
  for each angle of list parallel workers
    show
    point in direction pick random 150 to 210
    repeat until y position < -150
      move 0.5 steps
      if touching collider?
        change Score by 10
        delete this clone
  broadcast hit
  change health by -1
  delete this clone
delete this clone
```



# Solution - Complete



## Solution - Complete (Part 2)



# Solution - Complete (Part 3)

Missile

```
when I start as a clone
  switch to costume Missile
  point towards mouse-pointer
  show
  pen down
  glide 1 secs to x: mouse x y: mouse y
  hide
  set explosion x to x position
  set explosion y to y position
  tell collider to
    go to x: explosion x y: explosion y
  create a clone of collider
  tell collider to
    go to x: -4000 y: 0
  for each item of list 0 45 90 135 180 225 270 315
    parallel workers:
      point in direction item
      repeat 10
        move 5 steps
        wait 0.05 secs
      pen up
      move -75 steps
      clear
      delete this clone
  delete this clone

when clicked
  switch to costume Missile
  hide
  go to x: 0 y: -150
  point in direction 90
  clear
```