

```
breed [beam sunlight]
globals [damage]
turtles-own [penetration chance-of-absorbing]
```

```
to setup
```

```
clear-patches
clear-turtles
clear-drawing
set damage 0
ask patches [
  if pycor > 12 [set pcolor sky]
  if pycor <= 12 [set pcolor 29]
  if pycor < 8 [set pcolor 127]
  if pycor < 2 [set pcolor 138]
  if pycor < -28 [set pcolor 28]
]
```

```
set-default-shape beam "beam"
```

```
create-beam number-of-UVA [
  set size 4
  set color 115
  setxy random-xcor 49
  set heading 210
  pen-down
  set penetration 3
]
```

```
create-beam number-of-UVB [
  set size 4
  set color 113
  setxy random-xcor 49
  set heading 210
  pen-down
  set penetration 2
]
```

```

create-beam number-of-UVC [
set size 4
set color 111
setxy random-xcor 49
set heading 210
pen-down
set penetration 1
]
end

to go
tick
ask turtles [
if penetration = 3 and [pcolor] of patch-ahead -0.1 = white [set chance-of-absorbing random 10 if chance-of-absorbing < 1[set heading 330]]
if penetration = 2 and [pcolor] of patch-ahead -0.1 = white [set chance-of-absorbing random 100 if chance-of-absorbing < 98 [set heading 330]]
if penetration = 1 and [pcolor] of patch-ahead -0.1 = white [set chance-of-absorbing random 1000 if chance-of-absorbing < 999 [set heading 330]]
if penetration = 3 and ycor < -24 [set chance-of-absorbing random 3
ifelse chance-of-absorbing < 2
[set damage damage + 1
die]
[set heading 330]]
if penetration = 2 and ycor < 8[set chance-of-absorbing random 10
ifelse chance-of-absorbing < 8
[set damage damage + 10
die]
[set heading 330]]
if penetration = 1 and ycor < 12[set chance-of-absorbing random 20
ifelse chance-of-absorbing < 2 and ycor < 12
[set damage damage + 100
die]
[set heading 330]]
fd 0.1
If ycor > 49 [stop]
]
end

```

```
to with-ozone
  set number-of-UVA 50
  set number-of-UVB 10
  set number-of-UVC 1
  setup
end

to without-ozone
  set number-of-UVA 100
  set number-of-UVB 100
  set number-of-UVC 100
  setup
end

to emit-gas
  if number-of-UVA < 100 [set number-of-UVA number-of-UVA + 5]
  if number-of-UVB < 100 [set number-of-UVB number-of-UVB + 2]
  if number-of-UVC < 100 [set number-of-UVC number-of-UVC + 1]
  setup
end

to reduce-gas
  if number-of-UVA > 0 [set number-of-UVA number-of-UVA - 1]
  if number-of-UVB > 0 [set number-of-UVB number-of-UVB - 1]
  if number-of-UVC > 0 [set number-of-UVC number-of-UVC - 1]
  setup
end

to apply-sunscreen
  ask patches[
    if pycor <= 14 and pycor > 12 [set pcolor white]
  ]
end
```