

## More on POV-Ray Scripting



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## Let's build a diamond



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## Simple Diamond Program

```
#declare diamond = sphere { <0,0,0>, 1}

#declare counter = 0;
#while (counter < 7)
  #declare diamond = intersection {
    object {diamond}
    object {plane {<0,0,1>,0}
      rotate <45,0,0>
      translate <0,-1,0>
      rotate <0, counter*360/7,0>
    }
  }
  #declare counter = counter + 1;
#end
```

What about remaining facets?



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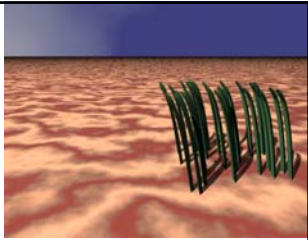
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## Example: Grass



```
#declare counter = 0 ;  
  
#while ( counter < 30 )  
  #declare rx = rand(rpos);  
  #declare rz = rand(rpos);  
  object {Blade translate <rx,0,rz> }  
  #declare counter = counter + 1;  
#end
```

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## What about:



```
#declare rx = rand(rpos);  
#declare rz = rand(rpos);  
#declare RandomBlade =  
  object {Blade translate <rx,0,rz>}  
  
#declare counter = 0 ;  
  
#while ( counter < 30 )  
  object {RandomBlade }  
  #declare counter = counter + 1;  
#end
```

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## Repetition of similar code: Macros



```
#macro ( parameters )  
  
  body of macro  
  
#end
```

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## Example: Grass



```
#declare rpos = seed(1);
#macro MakeBlade ()
  #declare rx = rand(rpos);
  #declare rz = rand(rpos);
  object {Blade translate <rx,0,rz> }
#end

#declare counter = 0 ;
#while ( counter < 30 )
  MakeBlade ()
  #declare counter = counter + 1;
#end
```

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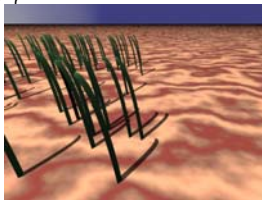
## With Parameters



```
#macro MakeBlade (x1,z1,x2,z2)
  #declare rx = x1+(x2-x1)*rand(rpos);
  #declare rz = z1+(z2-z1)*rand(rpos);
  object {Blade translate <rx,0,rz> }
#end

#declare counter = 0 ;

#while ( counter < 100 )
  MakeBlade (0,0,-5,5)
  #declare counter = counter + 1;
#end
```



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## Exercises



### Blade

- modify density distribution

### Create lawn

- make\_blade(x,y): create blade at x,y
- create blades at regular intervals in a given area x1,y1, x2,y2
- add positional jitter to blades
- add random rotation
- change color randomly

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## Exercises: Diamond



Write macro that takes as input

- Cutting Angle
- Number of revolutions
- Distance from center

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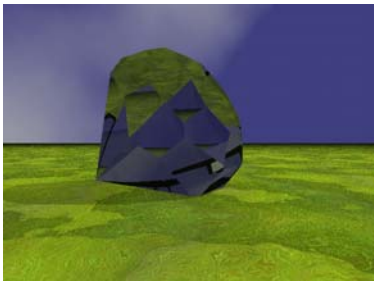
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## Diamond



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## What about Recursion?



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**What about Recursion?**



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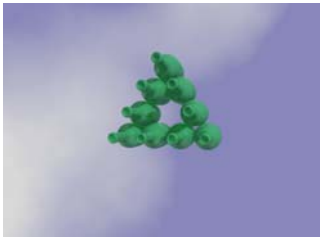
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**What about Recursion?**



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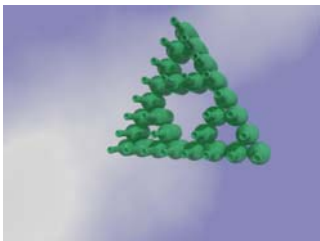
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**What about Recursion?**



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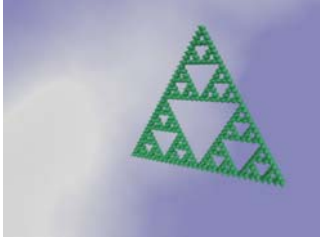
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## What about Recursion?



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## Fractal Nature



<http://www.clarku.edu/research/access/physics/blatt/blattD2.shtml>

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## Fractal Nature



<http://solomonsmusic.net/fracmus.htm>

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## Fractal Nature



<http://nodens.physics.ox.ac.uk/~oi/Album2/Oxford/treefract.jpg>




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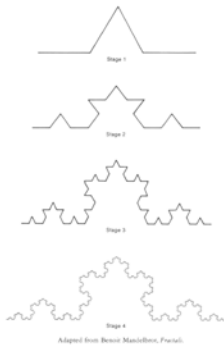
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## Fractals



Adapted from Benoit Mandelbrot, Fractal.

<http://abyss.uoregon.edu/~js/cosmo/lectures/lec18.html>




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## Fractal Dimensio



unit length	total length	D <sub>ind=1</sub>
300.00	1.099.00	
100.00	1.740.00	1.2084
100.00	1.621.00	1.1428
50.00	2.031.00	1.0900
25.00	2.291.731	1.1381
		fractal dimension = 1.1394

depends on the ruler length!

<http://www.iemar.tuwien.ac.at/modul23/Fractals/pages/221rugged.html>




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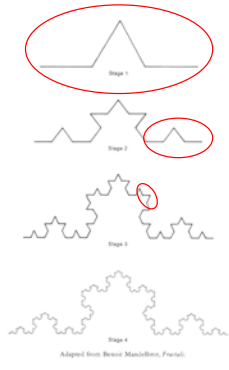
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# Fractals

Self-similarity



<http://abyss.uoregon.edu/~js/cosmo/lectures/lec18.html>



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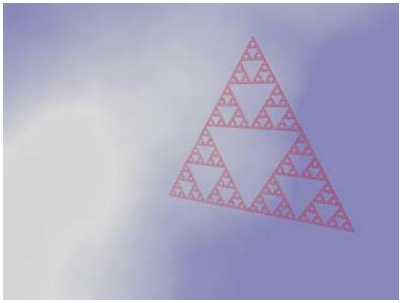
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# Exercise: Sierpinski Gasket



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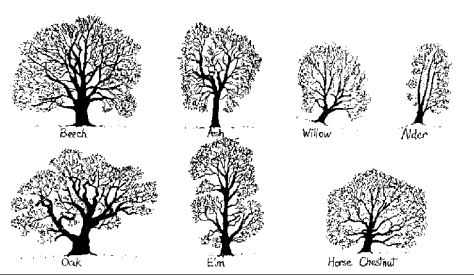
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# Trees



<http://www.mveneman.demon.nl/mcorner/trees/trees.htm>



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## Recursive Tree



```
make_tree
  build trunk
  make_tree
  make_tree
  ...
  make_tree
  scale/position trees as branches of trunk
```

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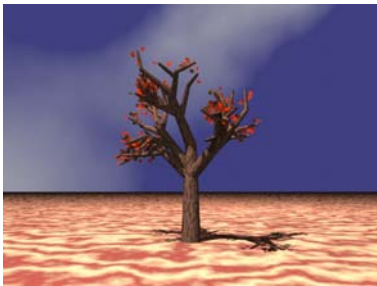
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## Our Tree



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## others: splinetree



Dave Green, Fall 2003 splinetree at: <http://povplace.addr.com/files/>

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**others: POV-tree**



Sybil Santos, Fall 2003 <http://home.covad.net/~gobukhov/povtree.html>

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**others: maketree**



Wengqian Wu, Fall 2003 <http://www.ovonale.com/ressources/english/sources01.htm>

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