Example 14.nb 1

```
(* Rendering 3-D Depth in an RGB Image Using Nested Subsets and Permutations *)
(* Copyright, April 18,
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(* permute n different numbers in groups of
  three yielding the complexity of uniquely ordered sets *)

For[n = 4, n ≤ 10, n++, c = n! / (n - 3)!; Print["n=  ", n, "     ", "c=  ", c] ];
```

```
n=  4     c=  24

n=  5     c=  60

n=  6     c=  120

n=  7     c=  210

n=  8     c=  336

n=  9     c=  504

n=  10     c=  720
```
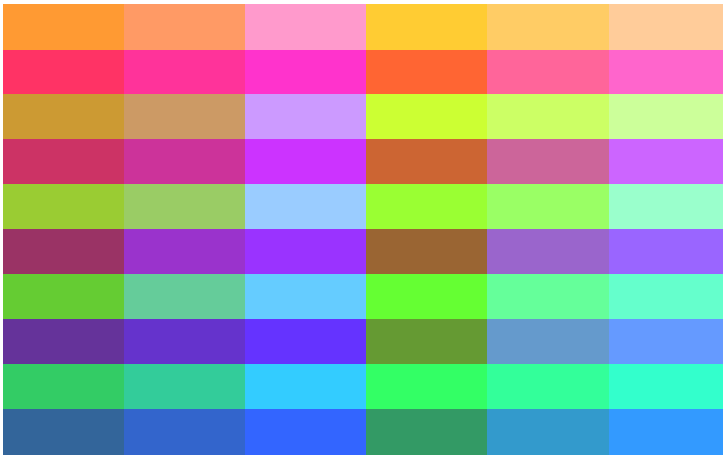
Example 14.nb 2

```
(* nest 5 grayscale values into all possible (60) uniquely ordered RGB sets *)

val = Table[{0, 0, 0}, {60}];
n = 5;
c = 0;
(* k=3 because of the three indices: r,g,b *)
For[r = 1, r ≤ n, r++,
  For[g = 1, g ≤ n, g++,
   For[b = 1, b ≤ n, b++,
    If[r ≠ g ≠ b, c = c + 1; val[[c]] = {r / n, g / n, b / n}]
    ]]];

g5 = Partition[val, 6];
Show[Graphics[RasterArray[Apply[RGBColor, g5 , {2}]]],  ImageSize → {360, 360}]
```

Example 14.nb 3

```
(* permute 5 grayscale values into all possible
   (60) uniquely ordered sets with presorting of grayscale *)

permsfive = Join[
    Permutations[{0.00, 0.25, 0.50}],
    Permutations[{0.00, 0.25, 0.75}],
    Permutations[{0.00, 0.25, 1.00}],
    Permutations[{0.00, 0.50, 0.75}],
    Permutations[{0.00, 0.50, 1.00}],
    Permutations[{0.00, 0.75, 1.00}],
    Permutations[{0.25, 0.50, 0.75}],
    Permutations[{0.25, 0.50, 1.00}],
    Permutations[{0.25, 0.75, 1.00}],
    Permutations[{0.50, 0.75, 1.00}]
   ];

g5 = Partition[permsfive, 6];
Show[Graphics[RasterArray[Apply[RGBColor, g5 , {2}]]],  ImageSize → {360, 360}]
```
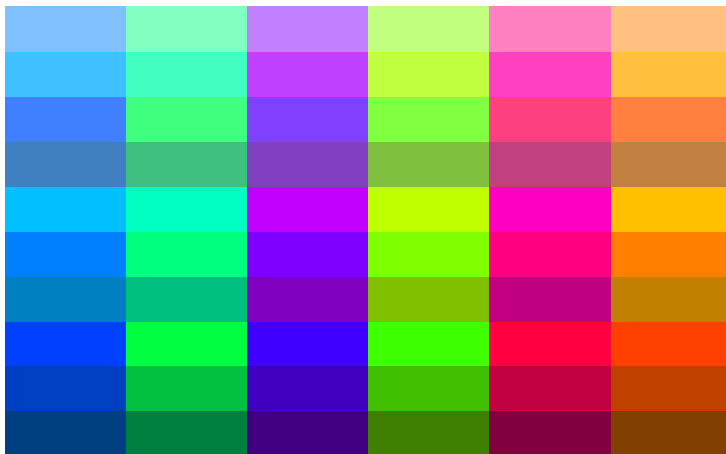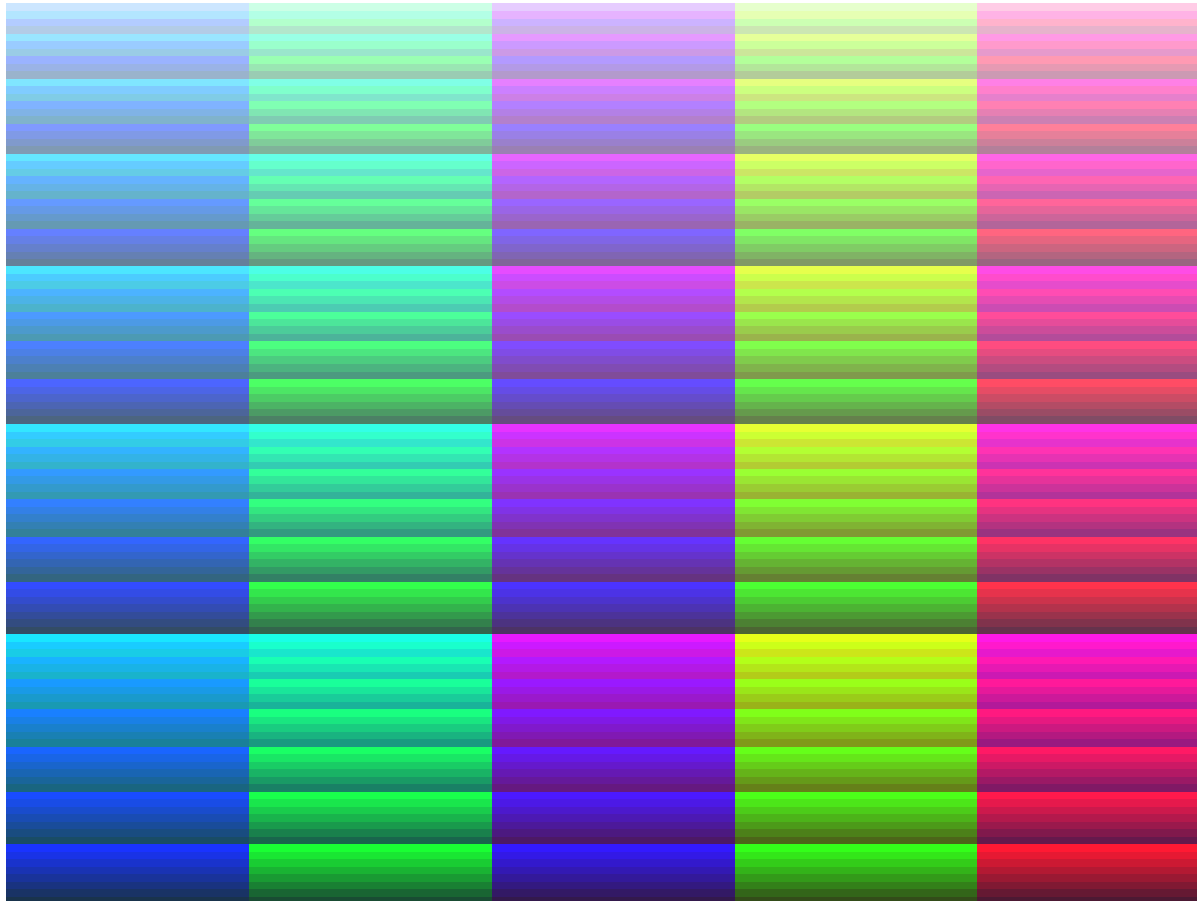
Example 14.nb 4

```
(* Display the palette generated above in a Schroedinger cube *)

Show[
  Graphics3D[
   Line[
    Append[permsfive, First[permsfive] (* Append needs to be
        fixed so that the first and last points are not connected *)
    ]]],
  ImageSize → {256, 256},
  AxesStyle → RGBColor[0, 1, 0], BoxStyle → RGBColor[0, 1, 0]];
```

Example 14.nb 5
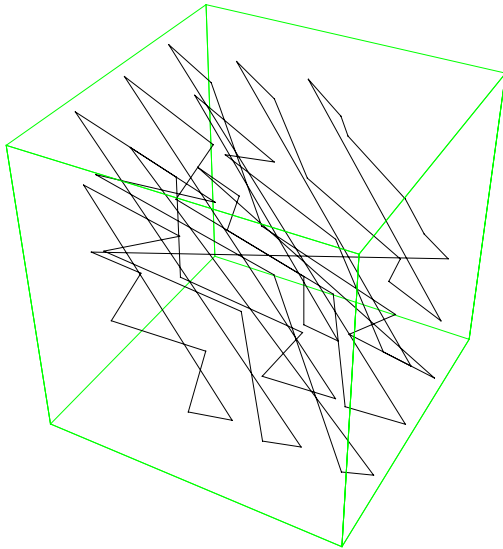
```
In[1]:= (* automatically generate

           120 presorts of 10 grayscale values;

         permute into all possible (720) uniquely ordered sets *)


       grayset = {0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0};

       jointsub = Subsets[grayset, {3}, {1}];

       For[x = 2, x <= 120, x++,

           subsub = Subsets[grayset, {3}, {x}];

       jointsub = Join[jointsub, subsub]];

       permsten = Permutations[jointsub[[1]] ];

       For[x = 2, x ≤ 120, x++,

           permsten = Join[permsten, Permutations[jointsub[[x]] ] ] ];


       g10 = Partition[permsten, 6];

       Show[Graphics[RasterArray[Apply[RGBColor, g10 , {2}]]],

         ImageSize → {720, 720}]
```

Example 14.nb 6

Out[7]= - Graphics -

Example 14.nb 7

```
(* Display the palette

   generated above in a Schroedinger cube *)


Show[
   Graphics3D[
    Line[
     Append[permsten, First[permsten]
       (* Append needs to be fixed so that the

          first and last points are not connected *)
     ]]],
   ImageSize → {256, 256}, AxesStyle → RGBColor[0, 1, 0],
   BoxStyle → RGBColor[0, 1, 0]];
```