In[1]:= `hexpoints = Table[{Cos[i 2 Pi / 6], Sin[i 2 Pi / 6]}, {i, 1, 6}]`

Out[1]= $\left\{\left\{\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}\right\}, \left\{-\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}\right\}, \{-1, 0\}, \left\{-\dfrac{1}{2}, -\dfrac{\sqrt{3}}{2}\right\}, \left\{\dfrac{1}{2}, -\dfrac{\sqrt{3}}{2}\right\}, \{1, 0\}\right\}$

In[33]:= `HexPrismPoints[rad_, l_] := HexPrismPoints[rad, l] =`
`    Join[Map[Append[#, 0] &, rad * hexpoints], Map[Append[#, -l] &, rad * hexpoints]]`

In[3]:= `HexPrismPoints[rad_, l_, transfunc_] := Map[transfunc[#] &, HexPrismPoints[rad, l]]`

In[4]:= `HexPrismPoints[1, 3]`

Out[4]= $\left\{\left\{\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}, 0\right\}, \left\{-\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}, 0\right\}, \{-1, 0, 0\}, \left\{-\dfrac{1}{2}, -\dfrac{\sqrt{3}}{2}, 0\right\}, \left\{\dfrac{1}{2}, -\dfrac{\sqrt{3}}{2}, 0\right\}, \{1, 0, 0\},\right.$

$\left\{\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}, -3\right\}, \left\{-\dfrac{1}{2}, \dfrac{\sqrt{3}}{2}, -3\right\}, \{-1, 0, -3\}, \left\{-\dfrac{1}{2}, -\dfrac{\sqrt{3}}{2}, -3\right\}, \left\{\dfrac{1}{2}, -\dfrac{\sqrt{3}}{2}, -3\right\}, \{1, 0, -3\}\right\}$

In[5]:= `HexPrismPoints[1, 2, RotationTransform[Pi / 6, {0, 1, 0}]];`

In[17]:= `HexPrism[rad_, l_] := GraphicsComplex[HexPrismPoints[rad, l] ,`
`    Polygon[{{1, 2, 3, 4, 5, 6}, {12, 11, 10, 9, 8, 7}, {2, 1, 7, 8},`
`      {3, 2, 8, 9}, {4, 3, 9, 10}, {5, 4, 10, 11}, {6, 5, 11, 12}, {1, 6, 12, 7}}]]`

In[13]:= `HexPrism[rad_, l_, transfunc_] := GraphicsComplex[HexPrismPoints[rad, l, transfunc],`
`    Polygon[{{1, 2, 3, 4, 5, 6}, {12, 11, 10, 9, 8, 7}, {2, 1, 7, 8},`
`      {3, 2, 8, 9}, {4, 3, 9, 10}, {5, 4, 10, 11}, {6, 5, 11, 12}, {1, 6, 12, 7}}] ]`

In[18]:= `Graphics3D[HexPrism[Sqrt[3] / 3, 5], Axes → True, ViewPoint → Top]`

Out[18]=
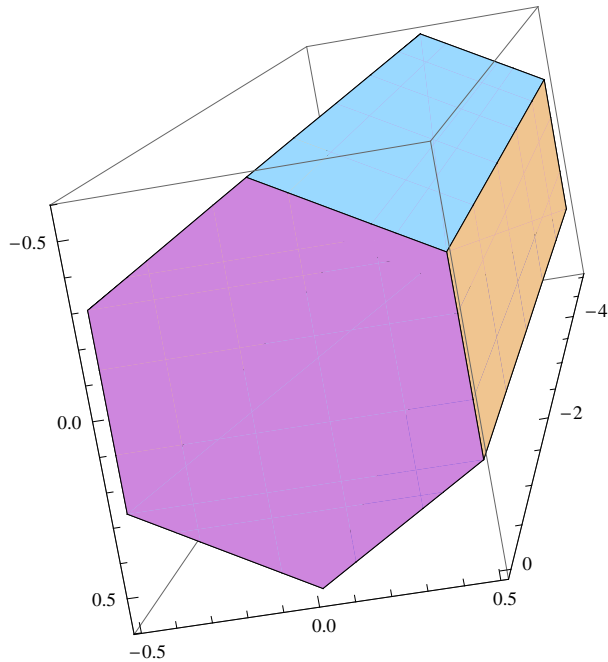
In[19]:= `temp = Graphics3D[{HexPrism[Sqrt[3] / 3, 5, TranslationTransform[{0, 0, 0}]],`
`    HexPrism[Sqrt[3] / 3, 5, TranslationTransform[{Cos[Pi / 6], Sin[Pi / 6], .4}]]}]`

Out[19]=
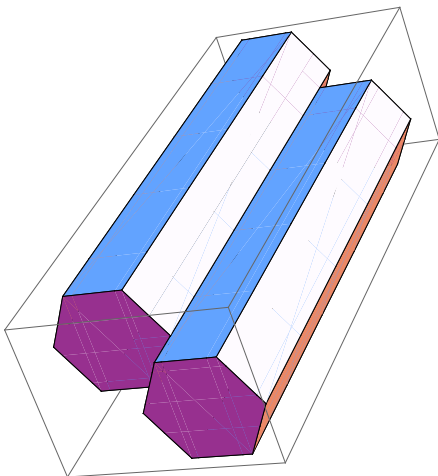
```
In[24]:= temp = Graphics3D[{HexPrism[Sqrt[3] / 3, 5, RotationTransform[3 Pi / 4, {1, 2, 0}].
            TranslationTransform[{0, 0, 0}]], HexPrism[Sqrt[3] / 3, 5,
          RotationTransform[3 Pi / 4, {1, 2, 0}].TranslationTransform[{Cos[Pi / 6], Sin[Pi / 6], .4}]],
        HexPrism[Sqrt[3] / 3, 5, RotationTransform[3 Pi / 4, {1, 2, 0}].
          TranslationTransform[{Cos[3 Pi / 6], Sin[3 Pi / 6], -.5}]]}]
```

Out[24]=
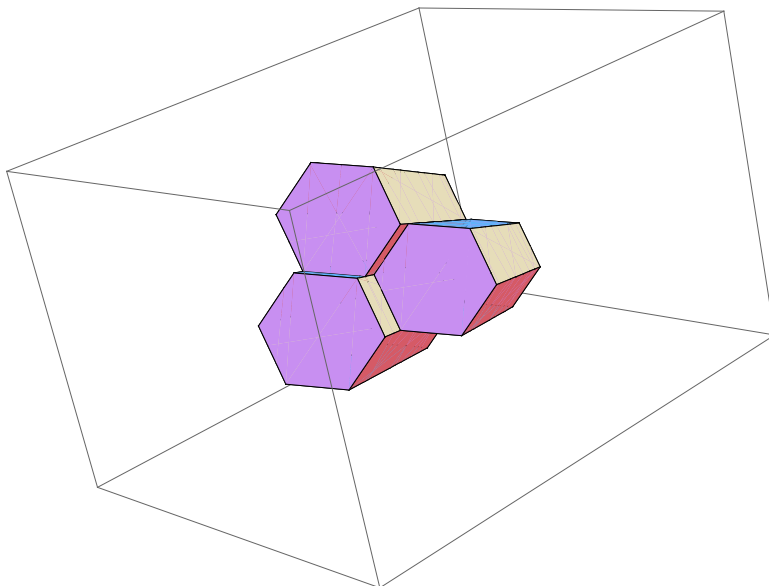
```
In[86]:= rhomlat = 0.04 * {{Cos[Pi / 6], Sin[Pi / 6]}, {Cos[3 Pi / 6], Sin[3 Pi / 6]}}
```
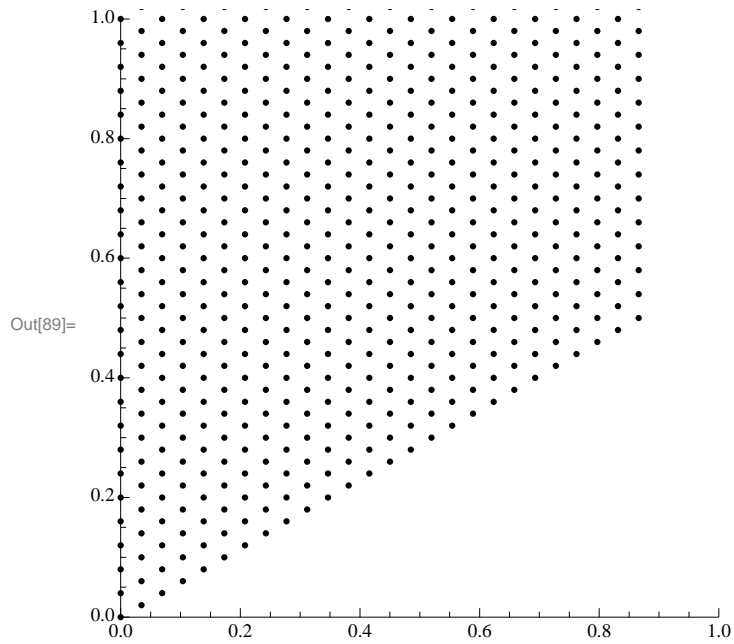
Out[86]= {{0.034641, 0.02}, {0, 0.04}}

```
In[87]:= hexlat = Tuples[Range[0, 25], 2].rhomlat;
```

```
In[88]:= Length[hexlat]
```

Out[88]= 676

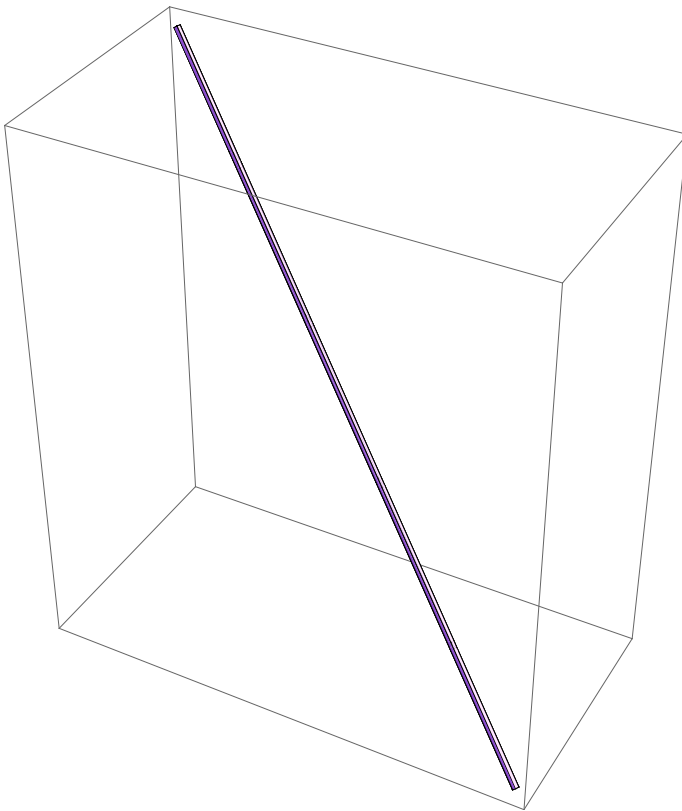In[89]:= `Graphics[Point[hexlat], Axes → True, PlotRange → {{0, 1}, {0, 1}}, AspectRatio → 1]`

Out[89]=

In[90]:= `therot = RotationTransform[3 Pi / 4, {1, 2, 0}] // N;`

In[91]:= `hp[v_] := HexPrism[.04 * Sqrt[3] / 3, 5, therot.TranslationTransform[v]]`

In[92]:= `Graphics3D[hp[{0, 1, 1}]]`

Out[92]=

In[93]:= `Length[hexlat]`

Out[93]= 676
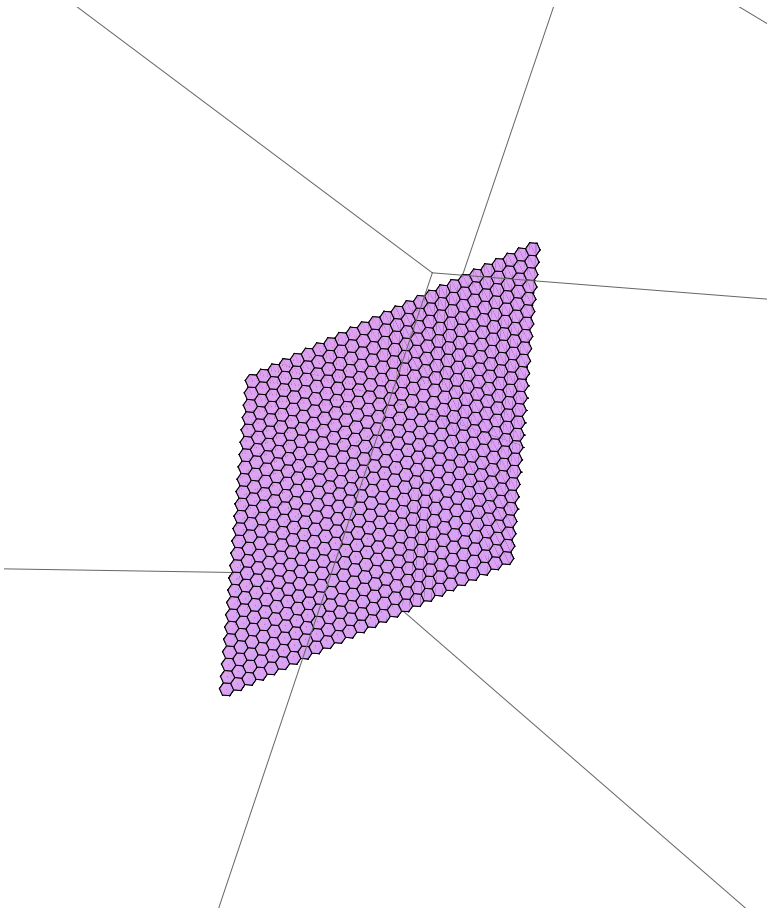
In[94]:= `theflatpoints = Table[{hexlat[[i, 1]], hexlat[[i, 2]], 0}, {i, 1, Length[hexlat]}];`

In[95]:= `theflatpoints[[1]]`

Out[95]= {0., 0., 0}

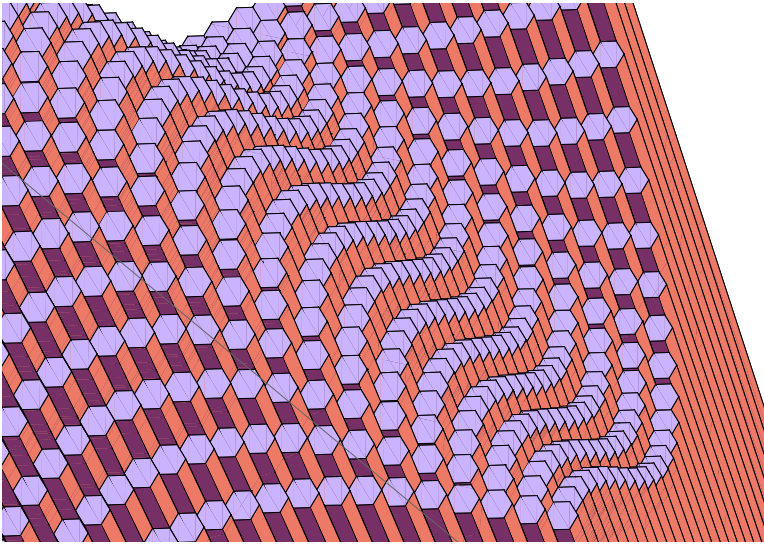In[97]:= `Graphics3D[{Map[hp[#] &, theflatpoints]}, Axes → True]`

Out[97]=

In[98]:= `pts = Table[{hexlat[[i, 1]], hexlat[[i, 2]],`
`2 Sin[ Pi hexlat[[i, 1]]] Cos[Pi hexlat[[i, 2]]]}, {i, 1, Length[hexlat]}];`

In[100]:= **Graphics3D[{Map[hp[#] &, pts]}]**

In[105]:= **Plot3D[5 Sin[x] Cos[y], {x, -5, 5}, {y, -5, 5}]**

Out[105]=