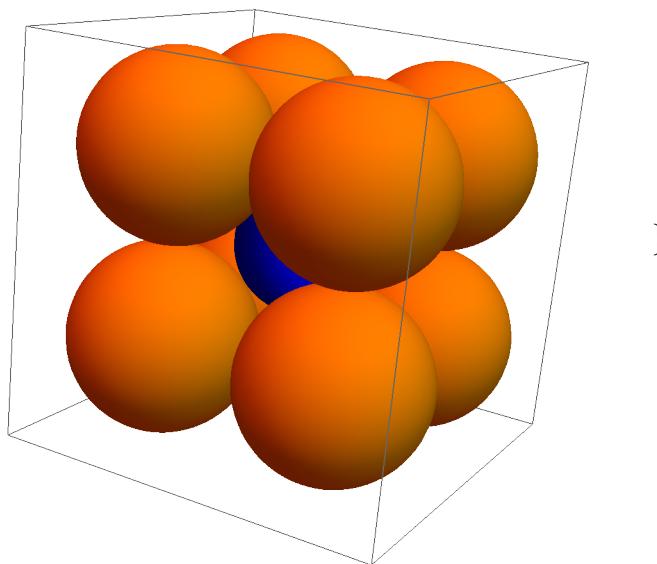
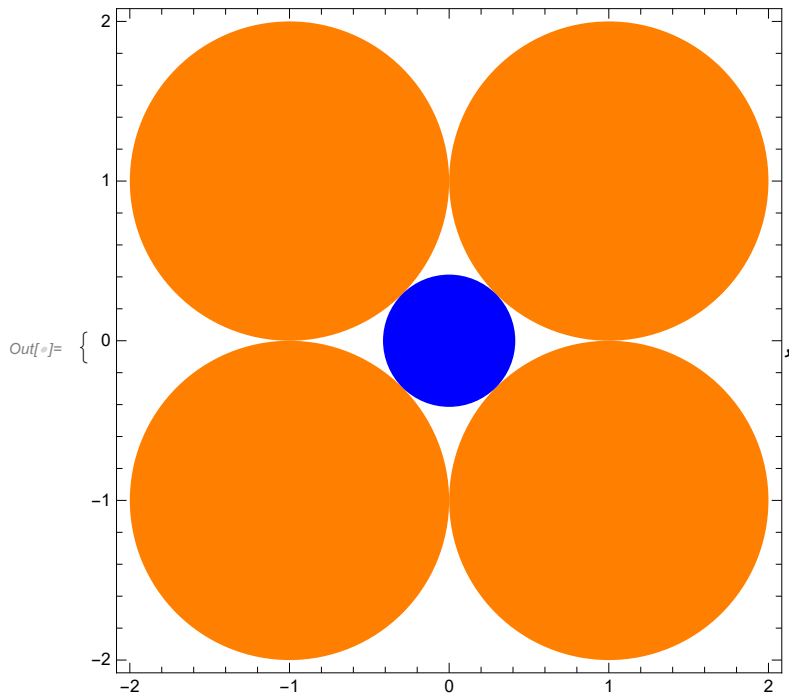


Pensieve header: December 7, 2020: The cube of oranges riddle.

```

In[ ]:= {Graphics[{Orange, Disk /@ Tuples[{1, -1}, 2], Blue, Disk[{0, 0},  $\sqrt{2} - 1$ ]},
  Frame -> True, ImageSize -> 360],
Graphics3D[{Orange, Ball /@ Tuples[{1, -1}, 3], Blue, Ball[{0, 0, 0},  $\sqrt{3} - 1$ ]},
  ImageSize -> 360]}

```



$$\text{In[*]:= } \sigma_0 = 2; \sigma_1 = 2\pi; \sigma_{n-} := \sigma_n = \frac{2\pi}{n-1} \sigma_{n-2};$$

$$\beta_{n-} := \frac{\sigma_{n-1}}{n};$$

In[*]:= Table[σ_n , {n, 0, 10}]

Out[*]:= {2, 2 π , 4 π , 2 π^2 , $\frac{8 \pi^2}{3}$, π^3 , $\frac{16 \pi^3}{15}$, $\frac{\pi^4}{3}$, $\frac{32 \pi^4}{105}$, $\frac{\pi^5}{12}$, $\frac{64 \pi^5}{945}$ }

In[*]:= Table[β_n , {n, 1, 10}]

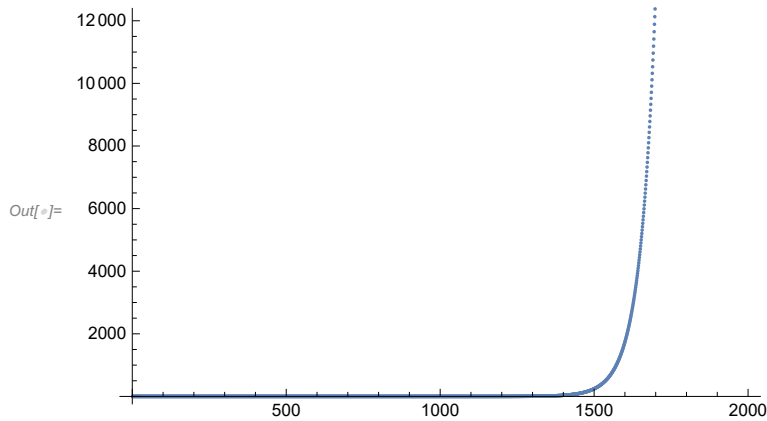
Out[*]:= {2, π , $\frac{4 \pi}{3}$, $\frac{\pi^2}{2}$, $\frac{8 \pi^2}{15}$, $\frac{\pi^3}{6}$, $\frac{16 \pi^3}{105}$, $\frac{\pi^4}{24}$, $\frac{32 \pi^4}{945}$, $\frac{\pi^5}{120}$ }

$$\text{In[*]:= } r[n_] := \frac{\beta_n (\sqrt{n} - 1)^n}{4^n}$$

In[*]:= Table[N[r[n], 5], {n, 1, 10}]

Out[*]:= {0, 0.033688, 0.025676, 0.019277, 0.014832, 0.011701, 0.0094300, 0.0077362, 0.0064424, 0.0054335}

In[*]:= ListPlot[Table[N[r[n], 5], {n, 1, 2000}]]



In[*]:= ListPlot[Table[N[Log[r[n]], 5], {n, 1, 2000}]]

