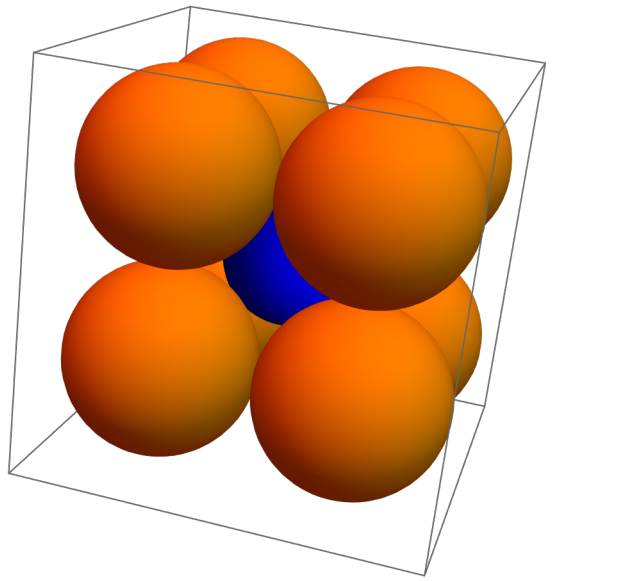
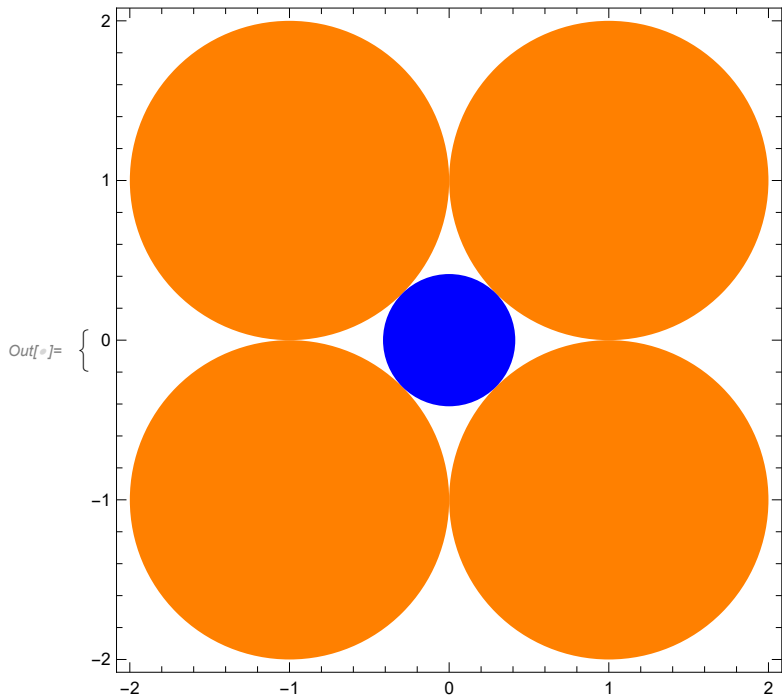


Pensieve header: January 14, 2022: The cube of oranges riddle.

```

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[ $\sigma_n$ , {n, 0, 10}]**

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

**In[\*]:= Table[ $\beta_n$ , {n, 1, 10}]**

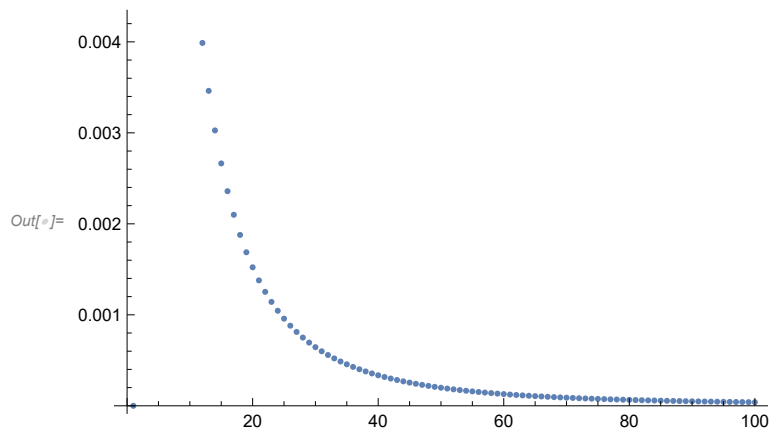
$$\text{Out}[*]:= \left\{ 2, \pi, \frac{4\pi}{3}, \frac{\pi^2}{2}, \frac{8\pi^2}{15}, \frac{\pi^3}{6}, \frac{16\pi^3}{105}, \frac{\pi^4}{24}, \frac{32\pi^4}{945}, \frac{\pi^5}{120} \right\}$$

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

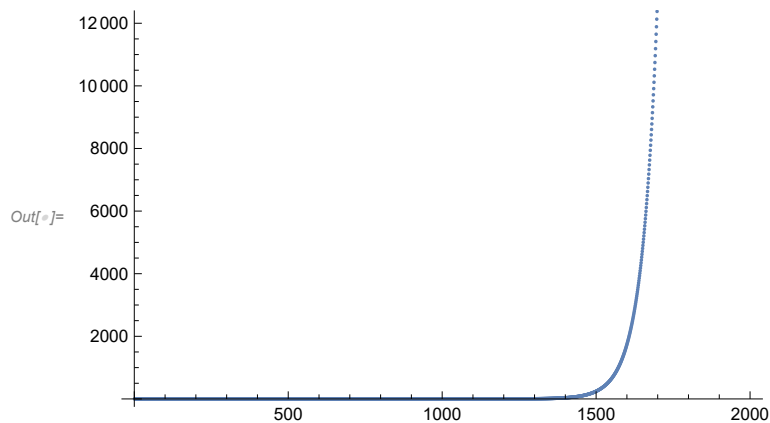
**In[\*]:= Table[N[r[n], 5], {n, 1, 10}]**

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

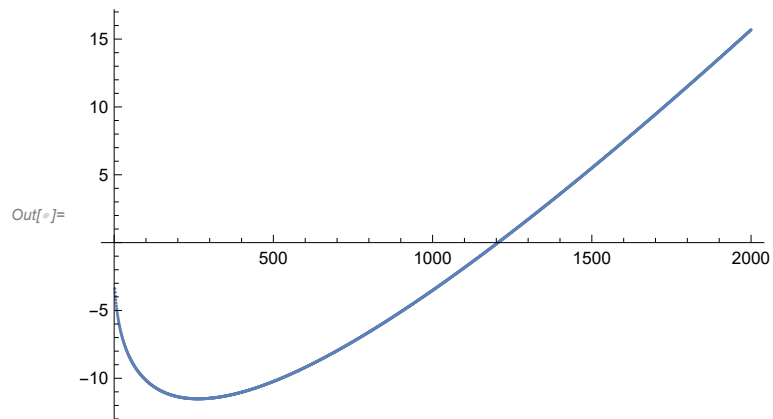
**In[\*]:= ListPlot[Table[N[r[n], 5], {n, 1, 100}]]**



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



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



```
In[ ]:= ListPlot[Table[N[Log[r[n]], 5], {n, 1, 20000}]]
```

