

Riddler Express
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Can You Survive Squid Game Riddler? | FiftyEight

The volume of a sphere is given by this equation:

$$V = \frac{4}{3} \pi r^3$$

The surface area of a sphere is given by this equation:

$$S = 4 \pi r^2$$

To find the radii such that these two values are equal, I simply set them equal and solve for r.

$$\frac{4}{3} \pi r^3 = 4 \pi r^2$$

$$\frac{1}{3} r = 1$$

$$r = 3$$

For $r=3$, the volume and the surface area are both 36π .

Extra credit

If I know the formula for the surface area of an N-dimensional hypersphere with radius R, I can find the volume of the sphere by taking the sum of shells whose volume is Δr times the surface area of a hypersphere of radius r. Say this formula gives the surface area of a hypersphere with radius r (where C is some unknown constant):

$$A = C \cdot r^{N-1}$$

The formula for the volume of hypersphere is radius R is as follows:

$$V = \int_0^R A \cdot dr = \int_0^R C \cdot r^{N-1} dr = C \cdot \frac{R^N}{N}$$

I set V equal to A and solve for R.

$$C \cdot \frac{R^N}{N} = C \cdot R^{N-1}$$

$$\frac{R}{N} = 1$$

$$R = N$$

If $R=N$, both the volume and the surface area are $C \cdot R^{N-1}$.

Notice that the 3-dimension problem is just a special case of the N-dimensional problem. For $N=3$, $R=N=3$.