

How to guess the number of sweets in a jar

From the sweeties.net wiki

Guessing the number of sweets in a jar feels like luck, but a little maths gets you much closer. The idea is simple: work out how much space is inside the jar, allow for the gaps between the sweets, and divide by the space one sweet takes up.

Step 1: the space inside the jar

For a straight sided, round jar, measure the inside width and the height the sweets reach. Halve the width to get the radius, then work out $\pi \times \text{radius} \times \text{radius} \times \text{height}$. With measurements in centimetres, that gives cubic centimetres, and 1,000 cubic centimetres is a litre.

Step 2: allow for the gaps

Sweets never fill a jar completely, because there are gaps between them. Experiments and computer simulations show that same size spheres, packed at random, fill about 64% of the space at most. So for roughly round sweets, multiply the jar's volume by about 0.64.

Shape matters. In 2004, researchers at Princeton and other universities found that ellipsoids, squashed spheres with a shape close to that of M&M's, can pack more densely, filling about 68 to 71% of the space. One of the team, Salvatore Torquato, pointed out that M&M's made good test objects because you could eat the experiment afterwards. A jar of mixed sizes can pack differently again, because small pieces fill the gaps between big ones.

Step 3: divide by one sweet

Estimate the volume of one sweet. For a round sweet, work out $\frac{4}{3} \times \pi \times \text{radius} \times \text{radius} \times \text{radius}$. Divide the filled space from step 2 by that, and you have your estimate.

An example. Say a jar holds 1,000 cubic centimetres of round sweets, and each sweet is about 2 cubic centimetres. The sweets fill about $1,000 \times 0.64 = 640$ cubic centimetres, and $640 \div 2 = 320$ sweets.

A cross check: count the layers

Count the sweets you can see along the bottom of the jar and up the side, and use them to estimate how many fit in each layer and how many layers there are. If this and the maths roughly agree, you can be more confident.

Weighing is easier, if you can

In a shop, sweets are sold by weight, and weight makes counting easy: divide the total weight by the weight of one sweet. Barratt's Black Jack chews, for example, come 46 to a 250 g pack, which works out at about 5.4 g a chew: see [how many sweets are in 100 g of pick and mix?](#)

The wisdom of the crowd

If you can, ask other people too, and take the middle guess. At a country fair in Plymouth in 1906, around 800 people guessed the weight of an ox. The statistician Francis Galton found that the middle guess, 1,207 pounds, was within 1% of the true weight of 1,198 pounds. Crowds do best when there is a right answer and people guess independently, and a jar of sweets has a right answer.

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