



## Estimate the Number of Items in a Cylinder (Jar)

### Step 1:

Count the number of items around the outside of the bottom of the jar. Start with an item that sticks out from the ones around it, or put your finger somewhere to keep track. Try to count the number of items in *just a single layer*, as accurately as you are able. This number can be considered to be the **circumference** of the jar, measured in item units.

### Step 2:

Use the formula for finding a circle's circumference to find the circle's **radius** in item units. Formula is:

$$\text{circumference} = 2 \times \text{Pi (approximately 3.14)} \times \text{radius}$$

By rounding Pi off slightly more (to just 3), we can approximate the formula as:

$$\text{circumference} = 6 \times \text{radius}$$

rearranging the terms:

$$\text{radius} = \text{circumference} / 6$$

*In other words - dividing the circumference number by 6 should give you an approximate measurement for the radius.*

**EXAMPLE:** If there are 30 items around the outside of the bottom of the jar, divide this number by 6 to get a radius measurement of 5 items.

### Step 3:

Find the **area** of the bottom of the jar in item units. The formula for finding the area of a circle is:

$$\text{area} = \text{Pi (about 3.14)} \times \text{radius}^2$$

So, multiply the radius number by itself, and, to get a rough estimate, multiply this number by 3.

**EXAMPLE:** With a radius of 5, your formula would be:

$$\text{Pi} \times 5^2 = 3 \times 25 = 75$$

So, a single layer of items in the jar should be about 75 items.

**Step 4:**

Now, count how many layers of items are in the jar. Starting with a single item at the bottom of the jar, count the number of items in a single line towards the top. This number is the height of the jar, measured in item units.

**Step 5:**

Finally - use the formula for volume of a cylinder to guess the amount of items in a jar. This formula is:

$$\text{volume} = \text{area of the base} \times \text{height}$$

So, multiply the area number you found using the last formula by the item height.

EXAMPLE: Multiply the base of 75 items by a height of, say, 10 items, for a result of 750 total items in the jar.

$$75 \times 10 = 750$$

## Estimate the Number of Items in a Cube – That’s Easier!

### Volume of a Cube

$$\text{Volume} = L \times W \times h$$

*h*  
Like a rectangular solid,  
multiply the length,  
times the width times  
the height.

