Comparing volume of a cone, cylinder, and sphere

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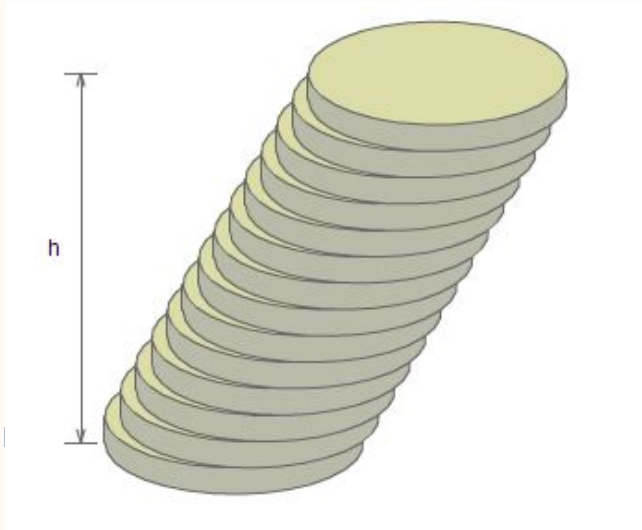
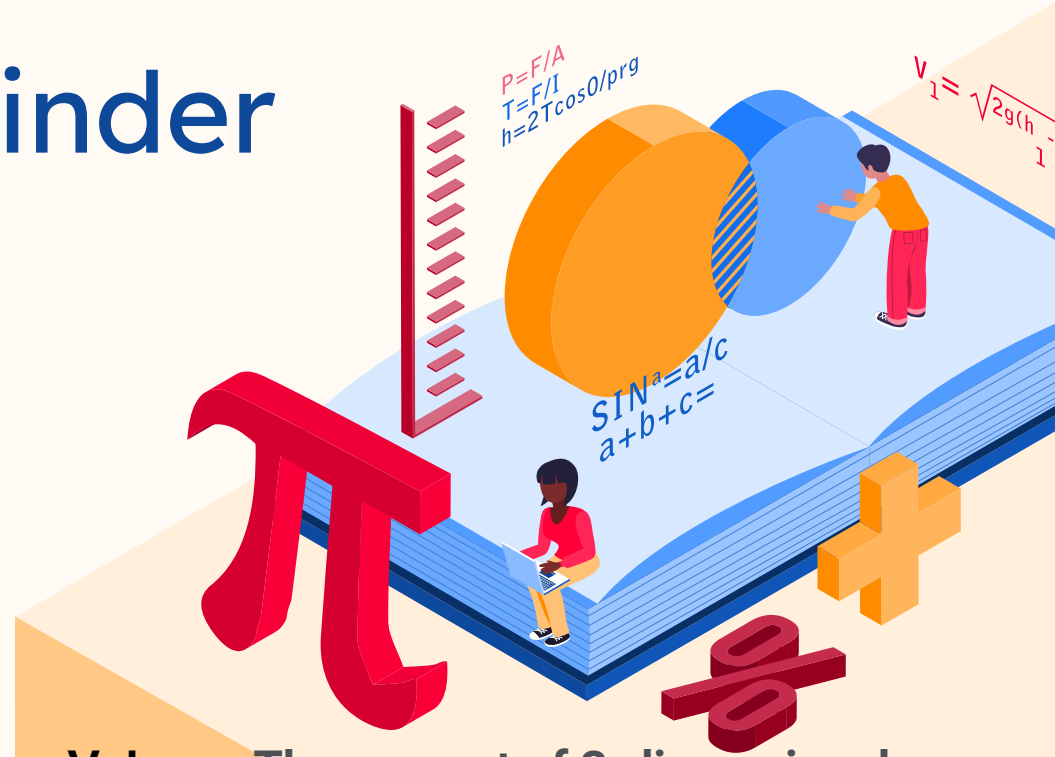
Volume of cylinder

$$V = \pi r^2 h$$

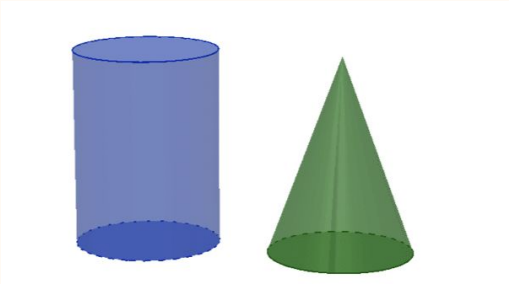




Volume: The amount of 3-dimensional space something takes up

Radius: The distance from the center to the circumference of a circle

Volume of a cylinder vs cone



Prediction time!

I predict that the volume of a cylinder will be _____ times the volume of a cone.

In order for this to be an accurate investigation, we must make sure that both objects have the same radius and height.

Radius of cone: 1.125 in

Height of cone: 3 in

Radius of cylinder: 1.125 in

Height of cylinder: 3 in

Next steps

Investigation

1. Fill the cone to the top with beans

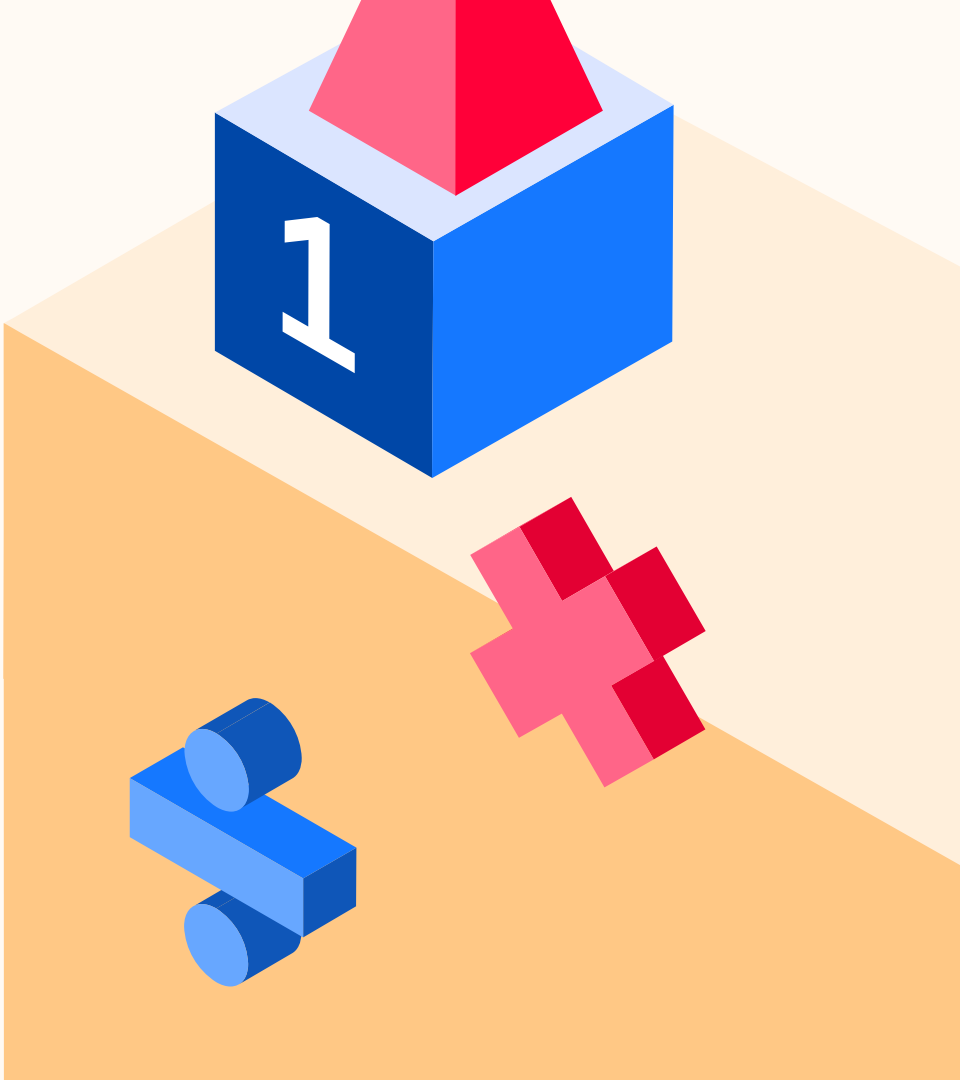
2. Take that same amount of beans and transfer into the cylinder

3. Assess data

What did you find?

The volume of a cylinder is **THREE** times the volume of a cone.
OR
The volume of a cone is ⅓ the volume of a cylinder.

We saw this visually, but let's look algebraically.



01 Cone: V=(⅓)πr^2h
Cylinder: V=πr^2h

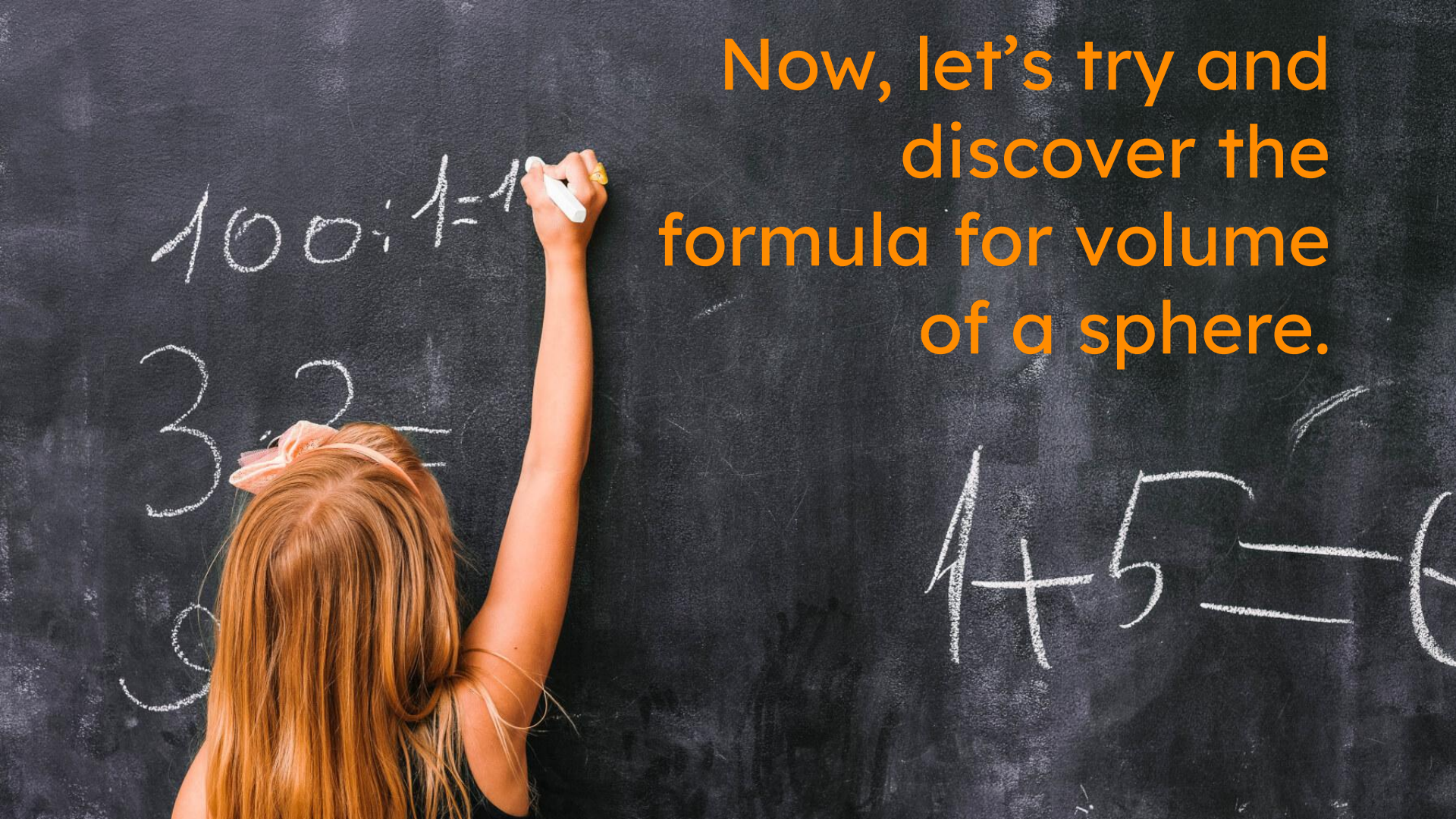
02 (V of cone)(?)=(V of cylinder)
(V of cone)(3)=(V of cylinder)

03 Plug in data

Cone: (⅓)π(1.125)^2 * 3
= (⅓)π(1.27)*3
=1.26 in^3

Cylinder: π(1.125)^2 *3
=3.8 in^3

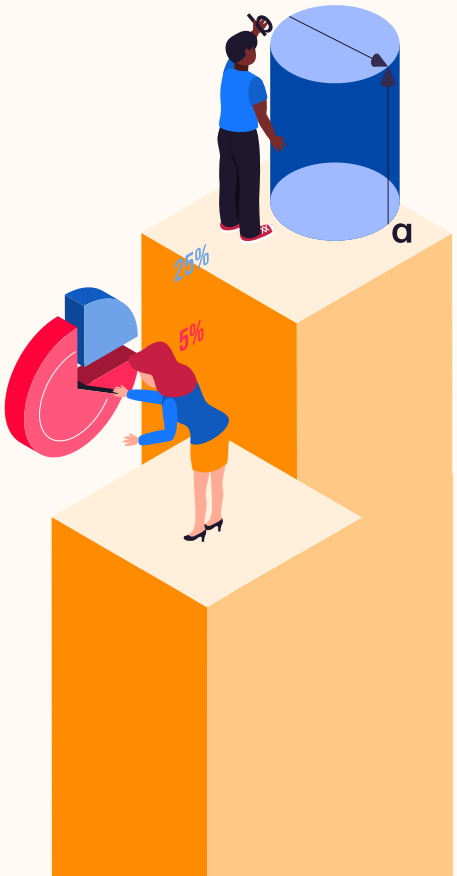
04 Compare 3.8/1.26 is about **3**


Now, let's try and discover the formula for volume of a sphere.

01

First, lets check to see that our sphere and cylinder have the same radius

R= 1 in



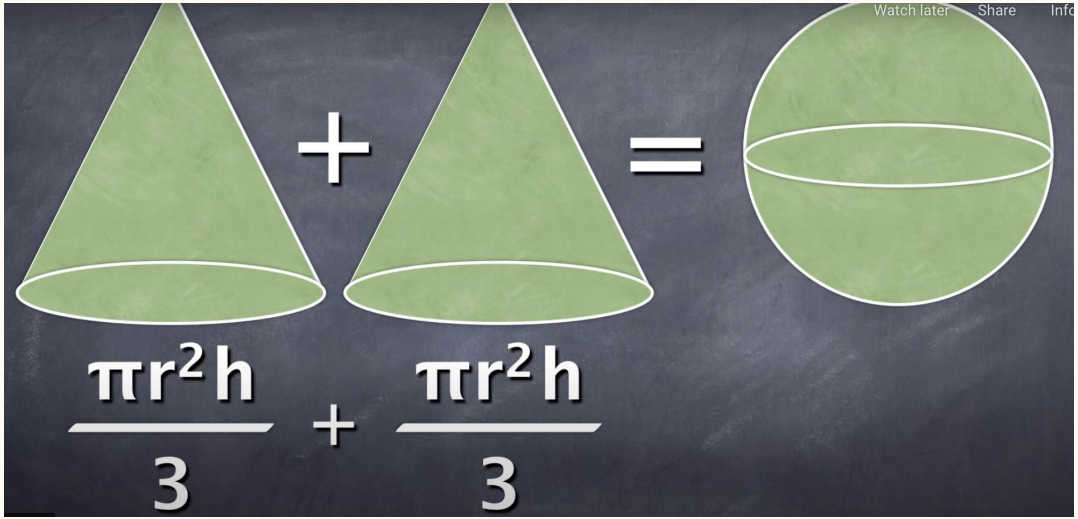
02

Now, how many cones of beans can fit in the sphere?

Answer: 2

So…what does this mean?

(volume cone1) + (volume cone2) = volume of sphere



What do we notice about the relationship between radius and height of sphere?

Radius: 1 in
Height: 2 in

2 radii = height of the sphere

How do we replace this in the formula

$$(⅓)\pi r^2 * h + (⅓)\pi r^2 * h = \text{volume of sphere}$$

$$((⅓)\pi r^2 * (2r)) + ((⅓)\pi r^2 * (2r)) = \text{volume of a sphere}$$

$$((2/3)\pi r^3 + (2/3)\pi r^3 = \text{volume of a sphere}$$

$$(4/3)\pi r^3 = \text{volume of a sphere}$$