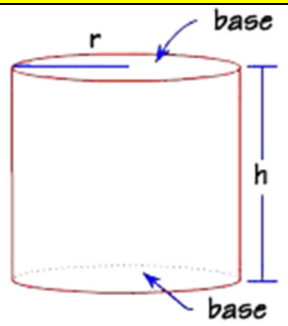
Solve Real-World Math Problems involving Volume of Cylinders, Cones, Spheres

THE CYLINDER

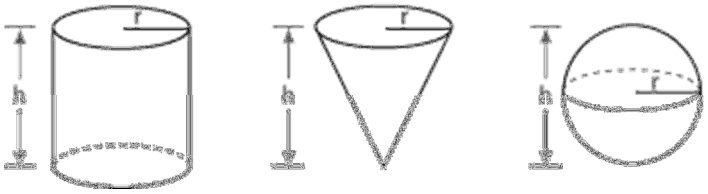


1. Volume is 3-dimensional space
2. As with prisms or cubes, cylinders are right objects that have parallel bases. If we find the area of the base (2D space, but think of this as a layer 1 unit high—so the 2D space becomes 3D and our measure is units^2). We can then multiply by the height (think of the height as layers of the 1unit high base).
3. In this case, the base is a circle, so we find the area of the circle ($A=\pi r^2$), then multiply by the height.
4. Cylinder volume = Bh (B refers to a the 2D area of the base as opposed to b which refers to a 1D length)

CONES and SPHERES (and their relationship to the cylinder):

Note: As states in the core, students can use formulas. To empower their memory and ready access to the formulas it is recommended that they experience the relationship, either visually or via an online interactive.

1. Have students predict the relationship between a cone, a sphere and a cylinder with the same height and circle radius.
2. If you have hollow plastic models, use rice or water—pour it from the cone or the sphere into the cylinder.
3. If you don't, then use this online interactive—it's cool!
   http://www.learner.org/courses/learningmath/measurement/session8/part_b/cylinders.html
4. The cone is 1/3 the volume of the cylinder. The cylinder is filled with 3 cones. Cone volume= 1/3Bh or $1/3(\pi r^2)h$
5. The sphere takes up 2/3 of the cylinder. Two cones will fill up the sphere.
6. A great question to investigate, especially for honors sections: Why **doesn't** the formula "sphere volume= 2/3Bh" work? (does a sphere have a base or height—it only has a diameter). Consider the height of the sphere as twice the radius, then we have $V=(2/3)(\pi r^2)(2r)$ or $V=(4/3)(\pi r^3)$.



7. Extend the discussion: How are pyramids related to prisms of the same base and height?