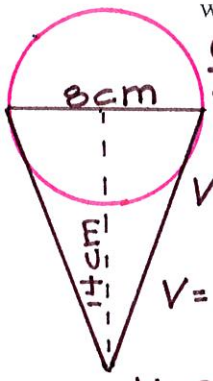
Compound Volume--Sketch Diagrams

Big Idea: Use knowledge of volume to solve for compound/composite shapes.

Break the composite figure down into shapes you know.

Examples:

An ice cream cone is 14cm tall and has a diameter of 8cm. A scoop of ice cream that is a perfect sphere and has a diameter of 8cm is placed on the cone. If the ice cream melts, will the cone overflow?



Cone

$V = \frac{\pi r^2 h}{3}$

$V = \frac{\pi 4^2 \cdot 14}{3}$

$V = \frac{16 \cdot 14 \cdot \pi}{3}$

$V = \frac{224\pi}{3}$

$V = 74\frac{2}{3}\pi \text{ cm}^3$

Sphere

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

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

$V = \frac{64 \cdot 4 \cdot \pi}{3}$

$V = \frac{256\pi}{3}$

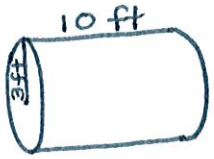
$V = 85\frac{1}{3}\pi \text{ cm}^3$

Yes overflow!

$74\frac{2}{3}\pi < 85\frac{1}{3}\pi$

The volume of the sphere is greater than the volume of the cone.

A rectangular pool measuring 20 feet long, by 12 feet wide, and 5 feet deep is being filled by a water tanker truck with a tank in the shape of a cylinder with a height of 10 feet and a 3 foot radius. How many trips will the truck need to make to fill the pool?



Rectangular Prism

$V = L \cdot W \cdot H$

$V = 20 \cdot 12 \cdot 5$

$V = 1200 \text{ ft}^3$

Cylinder

$V = \pi r^2 h$

$V = \pi 3^2 \cdot 10$

$V = 9 \cdot 10 \cdot \pi$

$V = 90\pi$

$V \approx 282.6 \text{ ft}^3$

$\frac{1200}{282.6} \approx 4.25$ trip so 5 trips!