Name: _____ Date: Feb 25 Hour: ___Alg 1____

Unit 6 Day 6 and 7: Volume Formula of Cones and Spheres

Focus Question: How are the volume of a cylinder, cone, and sphere related?

same radius

h = d

A. Find the relationship between the volume of Cylinders, Cones, and Spheres

1. Take a **Guess:** A cylinder will fill up a cone with equal radius and height _____ times.

The reality: 3 = 1

2. Use the relationship established in #1 and substitution to find the volume formula for 1 cone.

$3V_{co} = 1V_{cy}$

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

$V_{cone} = \frac{\pi r^2 h}{3}$ memorize

3. Take a **Guess:** A sphere will fill up a cone with equal radius and height _____ times.

The reality: 1 = 2

4. Use the relationship established in #3 and substitution to find the volume formula for a sphere.

$1V_{sp} = 2V_{co}$

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

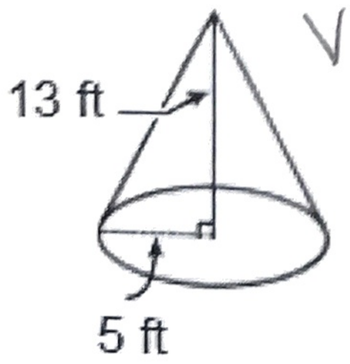
$V_{sp} = \frac{2\pi r^2 d}{3} \Rightarrow \frac{2\pi r^2 \cdot 2r^1}{3}$

$V_{sphere} = \frac{4\pi r^3}{3}$ memorize

B. Easy Volume Practice

Find the exact and approximate volume of each shape below.

hundredths

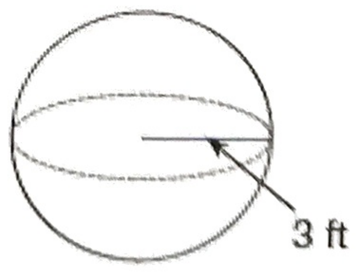


$V_{co} = \frac{\pi r^2 h}{3}$

$= \frac{\pi (5)^2 \cdot 13}{3}$

$= \frac{\pi (25)(13)}{3}$

$= \frac{325\pi}{3} ft^3 \approx 340.34 ft^3$



$V_{sp} = \frac{4\pi r^3}{3}$

$= \frac{4\pi (3)^3}{3^1}$

$= 4\pi \cdot 3^2$

$= 4\pi (9)$

$= 36\pi ft^3$

$\approx 113.10 ft^3$

See next pages for work

C. Tougher Volume Problems – Do work on a separate paper.

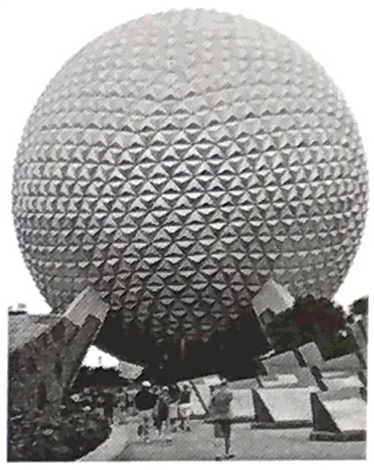
1. The ice cream at the right goes all the way to the tip of the cone. If the radius of the ice cream is 1.5 inches and the slant height is 10 inches, **approximately** how much ice cream is there in a drumstick?

inside

≈ 23.30 in³

2. Spaceship earth at EPCOT in Orlando has a circumference of 50π meters. Find the capacity of air for people on the ride.

$V = \frac{62500\pi}{3}\ m^3$ or $\approx 65449.85 m^3$



3. A navel orange contains 382 cubic centimeters of orange. What is the **approximate** radius of the orange?

Vol.

sphere

$r \approx 4.50$ cm

4. Find the radius of a cone with a volume of 196π mm^3 and a height of 12 mm.

r = 7mm

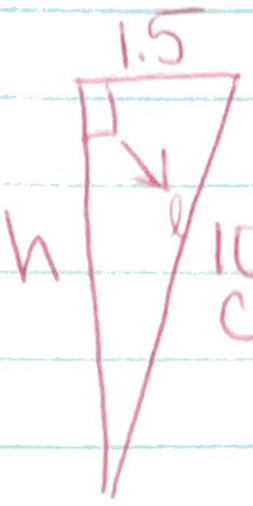
5. Find the approximate height of a cone with a volume of 150 in^3 and a radius of 6 in.

$r \approx 3.98$ in

① $V_{co} = \frac{\pi r^2 h}{3}$

$= \frac{\pi (1.5)^2 \sqrt{97.75}}{3}$

$\approx 23.30 \text{ in}^3$



$1.5^2 + h^2 = 10^2$

$2.25 + h^2 = 100$

$-2.25 \quad -2.25$

$\sqrt{h^2} = \sqrt{97.75}$

$h = \sqrt{97.75}$

② $V_{sp} = \frac{4\pi r^3}{3}$

$= \frac{4\pi (25)^3}{3}$

$= \frac{4\pi 15625}{3}$

$= \frac{62500\pi}{3} m^3 \approx 65449.85 m^3$

r = ? using $C = 50\pi$

$C = 2\pi r$

$\frac{50\pi}{2\pi} = \frac{2\pi r}{2\pi}$

$25 = r$

③ $V_{sp} = \frac{4\pi r^3}{3}$

$\frac{3}{4} \cdot 382 = \frac{4\pi r^3}{3} \cdot \frac{3}{4}$

$\frac{286.5}{\pi} = \frac{\pi r^3}{\pi}$

$\sqrt[3]{91.20} \approx \sqrt[3]{r^3}$

$4.50 \approx r$ cm

(4) $V_{co} = \frac{\pi r^2 h}{3}$

$196\pi = \frac{\pi r^2 (12)}{3}$

$\frac{196\pi}{4\pi} = \frac{\pi r^2 \cdot 4}{4\pi}$

$\sqrt{49} = \sqrt{r^2}$

$\pm 7 = r$

but r is a distance

so $r = 7$ mm

(5) $V_{co} = \frac{\pi r^2 h}{3}$

3. $150 = \frac{\pi (6)^2 h}{3} \cdot 3$

$\frac{450}{(36\pi)} = \frac{\pi 36h}{36\pi}$

3.98 in $\approx r$