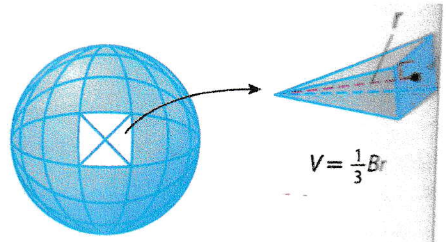
Volumes of Spheres

2 Volume of Spheres Suppose a sphere with radius r contains infinitely many pyramids with vertices at the center of the sphere. Each pyramid has height r and base area B. The sum of the volumes of all the pyramids equals the volume of the sphere.



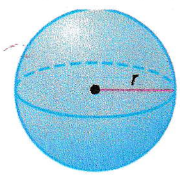
$V = \frac{1}{3}B_1r_1 + \frac{1}{3}B_2r_2 + \ldots + \frac{1}{3}B_nr_n$	Sum of volumes of pyramids
$= \frac{1}{3}r(B_1 + B_2 + \ldots + B_n)$	Distributive Property
$= \frac{1}{3}r(4\pi r^2)$	The sum of the pyramid base areas equals the surface area of the sphere.
$= \frac{4}{3}\pi r^3$	Simplify.

KeyConcept Volume of a Sphere

Words The volume V of a sphere is $V = \frac{4}{3}\pi r^3$, where r is the radius of the sphere.

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

Model



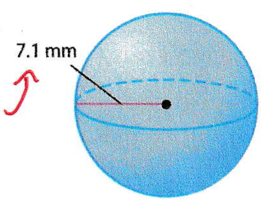
Example 3 Volumes of Spheres and Hemispheres

Find the volume of each sphere

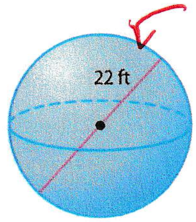
GuidedPractice

1A.

r



1B.



d=22
r=11

1A. V= 4/3 πr³
= 4/3·3.14·7.1³
V = 1498.45 mm³

1B. V= 4/3 πr³
4/3·3.14·11³
V= 5572.45 ft³