ACT Study Modules

Topic: Volume of Sphere and Cone

Video:

Volume of a sphere:

https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-geometry/cc-8th-volume/v/volume-of-a-sphere

Volume of a cone:

https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-geometry/cc-8th-volume/v/volume-cone-example

1. Determine the height of a cone when given the radius and the height.

   The radius of a cone is $5\ inches$ and the volume is 100π cubic inches. Determine the height of the cone.

$V = \frac{1}{3}\pi r^2 h$
$100\pi = \frac{1}{3}\pi(5^2)h$
$100\pi = \frac{1}{3}\pi(25)h$
$\frac{100\pi}{25\pi} = \frac{\frac{1}{3}\pi(25)h}{25\pi}$
$\left(\frac{3}{1}\right)4 = \frac{1}{3}h\left(\frac{3}{1}\right)$
$12 = h$

2. Determine the radius of a sphere, given the volume. The volume of a volleyball is $12348\pi\ cm^3$. Determine the radius.

$V = \frac{4}{3}\pi r^3$
$12348\pi = \frac{4}{3}\pi r^3$
$\left(\frac{3}{4}\right)12348\pi = \frac{4}{3}\pi r^3\left(\frac{3}{4}\right)$
$\frac{12348\pi}{\pi} = \frac{\pi r^3}{\pi}$
$12348 = r^3$
$\sqrt[3]{12348} = \sqrt[3]{r^3}$
$21 = r$ The radius of a volleyball is 21 cm.

Practice:

1. Find the volume of a cone if $r = 7$ *miles* and $h = 2$ *miles*.

$V_{cone} = \frac{1}{3}\pi r^2 h$

$V_c = \frac{1}{3}\pi(7)^2(2)$

$V_c = \frac{1}{3}\pi(49)(2)$

$V_c = \frac{98\pi}{3}$ miles^3

2. Find the height of a cone that has a radius 4 m and a volume of 64π *cubic meters*.

$V_{cone} = \frac{1}{3}\pi r^2 h$

$64\pi = \frac{1}{3}\pi(4)^2 h$

$\frac{3}{16}(64) = \left(\frac{16}{3}h\right)\left(\frac{3}{16}\right)$

$12 = h$

meters

3. Find the volume of a sphere if $r =$ 16 *inches*. Leave your answer in terms of π.

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

$V_s = \frac{4}{3}\pi(16)^3$

$V_s = \frac{16{,}384\pi}{3}$ inches^3

4. The volume of a basketball is $972\,\pi$ *cubic inches*. Determine the radius.

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

$972\pi = \frac{4}{3}\pi r^3$

$\frac{3}{4}(972) = \left(\frac{4}{3}r^3\right)\frac{3}{4}$

$\sqrt[3]{729} = \sqrt[3]{r^3}$

$9 = r$

inches

Bonus: if the NBA requires the diameter of the game balls to be 18.75 inches, is the basketball in this problem legal for the NBA?

$r_{basketball} = 9$ inches

diameter $= 2r = 2(9) = 18$ inches

No, this basketball's diameter is 18 inches, not 18.75 inches. So it would not be legal for the NBA.