Question. What is the volume of a sphere that with a great circle that has an area of 225π square centimeters?

Solution. Notice that the radius of a sphere is equal to the radius of its great circle. Also recall that the volume of a sphere of radius r is given by the formula:

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

while the area of a circle of the same radius r is

$$A = \pi r^2.$$

In our case

$$A = \pi r^2 = 225\,\pi,$$

whence $r^2 = 225$ and so

$$r = \sqrt{225} = 15 \ cm.$$

Therefore the volume of the sphere is equal to

$$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi \cdot 15^3 = 4 \cdot 15^2 \cdot 5\pi = 20 \cdot 225\pi = 4500 \ cm^3.$$

Answer. $V = 4500 \ cm^3.$