# π day at SNOLAB

Question Sheet

Several of the experiments deep underground at SNOLAB are spherical in shape. Using a sphere makes the experiment symmetrical which can help with data analysis. One spherical experiment at SNOLAB is the DEAP-3600 dark matter experiment. The DEAP-3600 experiment is filled with something called argon, which would interact with dark matter passing through the experiment. To determine how much argon is needed for the experiment, what is the volume of the experiment inner sphere if it has a radius of 85cm? Give the answer in cubic metres.
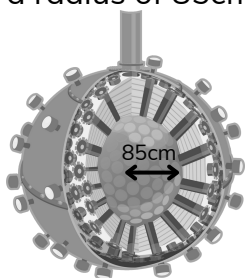
In order to shield the experiment more, it is placed in a large cylindrical tank that is filled with very clean water, called ultra-pure water. What is the volume of the tank that is 7 meters tall and has a 7-meter diameter?
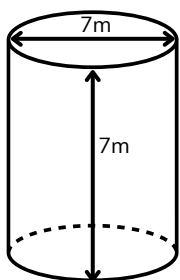
When it is built, the experiment stainless steel shell takes up some of the volume of the cylinder. To calculate the accurate volume of water needed we can subtract the volume of the outer spherical shell, diameter 3.4m, from the cylinder volume. So, what is the volume of water needed?
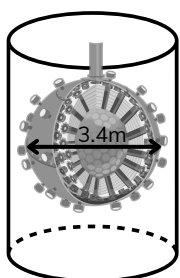
Amazing! Now that we know the volume of water needed the project planner can ensure that the required amount of ultra-pure water is available!

Volume of a sphere: $V = \frac{4}{3}\pi r^3$	Volume of a cylinder: $V = \pi r^2 h$