

## The JETS Challenge

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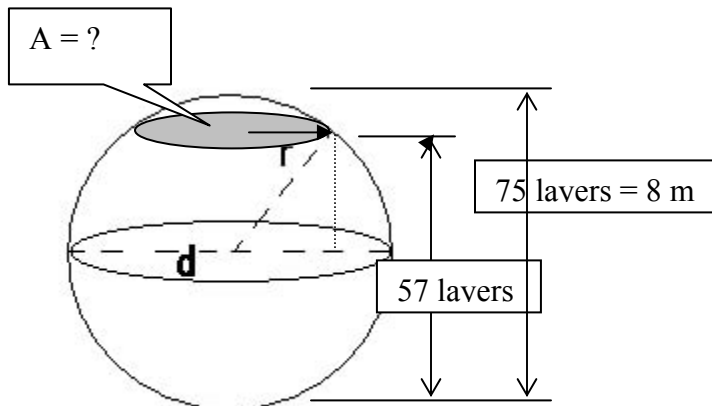
### Challenge 95 – The Atomic Pile Challenge

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#### Problem:

The Atomic Age started 65 years ago when Enrico Fermi first split the atom for the Manhattan Project on a squash court under the football stadium at the University of Chicago. The design called for 385 tons of graphite plus nearly 40 tons of uranium in 8 cm cylinders. These were to be arranged into a sphere with a radius of 4 meters. After 57 of the planned 75 uniformly thick layers were in place, Fermi began the first experiment. Around 3:20 on December 2, 1942, the reactor went critical, producing more neutrons than it consumes and raising the temperature of the pile. Fermi allowed the reaction to continue for the next 27 minutes before inserting the control rods to soak up the extra neutrons and quench the reaction.

Find the surface area ( $\text{m}^2$ ) on the top of the pile at the time of the experiment.



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**Solution:**

$$h = \left( \frac{57}{75}(8) - 4 \right) = 2.08 \text{ or } h = \left( \frac{57 - 37.5}{37.5} \times 4 \right) = 2.08$$

$$16 = h^2 + r^2$$

$$r^2 = 16 - h^2 = 16 - (2.08)^2 = 11.6736$$

$$A = \pi r^2 = 36.67\text{m}^2$$