FLUID PRESSURE

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SpaceX Resuming Deliveries

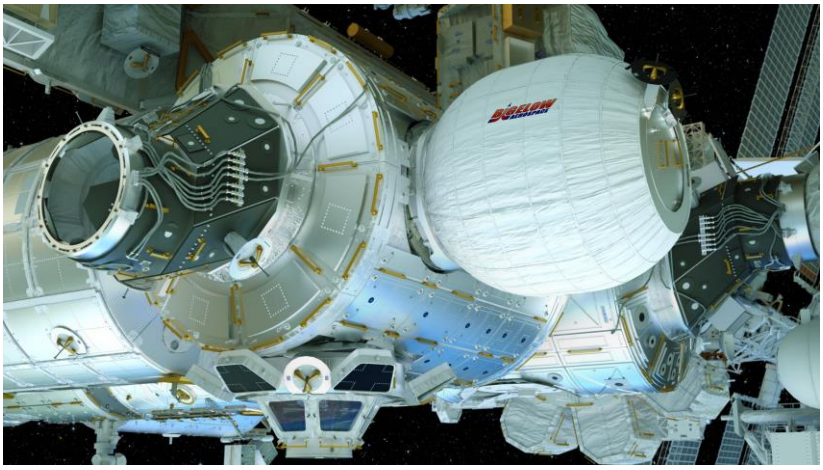
to International Space Station

INTRODUCTION: This inflatable module is lited below as 10.5 ft. in diameter & 12 ft. long.

QUESTIONS: (a) Find area of each 10.5 ft. diameter side of module? (b) Find total area of combined 10.5 ft. diameter oval sides? (c) Find area of cylindrical 12 ft. long side? (d) Find TOTAL internal area of module? (e) Convert TOTAL area in ft.^{2} to inch^2? (f) Fans will blow air into module at normal atmospheric pressure of 14.7 lb./inch^2. Find total force on entire internal surface area of the module?

HINTS: $A_{CIRCLE} = \pi R^2$, $A_{CYLINDER} = 2 \pi R L$, ft.^{2} = 144 inch^2 , Pressure = Force/Area = P = F/A

ANSWERS: (a) 86.59 ft.^{2}, (b) 173.18 ft.^{2}, (c) 395.84 ft.^{2} , (d) 569.02 ft.^{2}, (e) 81,939 in.^{2} (f) 1.204 X 10^6 lb.



An artist's rendering of an inflatable module, right, that could expand space station living space. CreditBigelow Aerospace

After a nine-month hiatus because of a rocket failure, the Space Exploration Technologies Corporation, or SpaceX, is to resume cargo deliveries for NASA on Friday. The latest haul of freight aboard one of the company's Falcon 9 rockets includes an **(((inflatable module))) that is to be added to the International Space Station, a test of technology that could provide ample living space for astronauts on future deep-space journeys.**

Among the nearly 7,000 pounds of supplies, equipment and experiments packed in the Dragon are seeds that will be grown on the space station. Last year for the first time, station **astronauts ate red romaine grown and harvested in orbit**.

The biggest piece will be the **$17.8 million Bigelow Expandable Activity Module, or Beam. Unlike the other metal modules of the International Space Station, Beam has soft sides made of layers of materials including tough fabrics similar to those found in bulletproof vests. The soft sides allow the module to be packed into a tuna can-shape enclosure at the bottom of the Dragon capsule.** A few weeks from now — exactly when has not yet been scheduled — the space station's robotic arm is to pluck the **3,100-pound module and attach it to a port on the space station. *Fans will blow air from the rest of the station into Beam, pushing the walls outward to its final configuration,*(((a cookie jar-like shape 12 feet long and 10.5 feet in diameter.)))** During at least two years attached to the space station, sensors inside will take measurements like temperature, radiation, leakage of air, to gauge how well such structures perform. Bigelow Aerospace of North Las Vegas, Nev., has been pursuing an ambitious project developing expandable modules after licensing technology that NASA had developed in the 1990s then abandoned. **Bigelow has also developed the B330, a much bigger module, with 20 times the volume of the Beam.** The company intends to create private space stations that it could lease to companies, other countries or even NASA, but has slowed its work because there is currently no transportation other than Russian Soyuz rockets to take people to and from orbit.