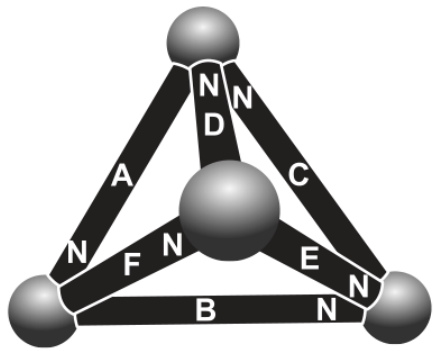
6. Magnets (6 pts)

Certain type of magnetic toys are made up of ferromagnetic spheres and permanent magnets of cylindrical shape. These building blocks can be used to build, for instance, a tetrahedron, see figure (letter "N" marks the northern end of a magnet). Assume that all these permanent magnets are identical and each of them alone can create a magnetic flux Φ (assuming the both ends of the magnet are in contact with a U-shaped large piece of ferromagnetic material, so that a closed ferromagnetic contour is formed). Assume also that due to high magnetic permeability of the material of the building blocks, all the magnetic field lines are constrained inside of them (i.e. in the surrounding medium, the magnetic inductance $B = 0$).



1) Let us designated the fluxes in each permanent magnet (magnets A–F in figure) by Φ_A – Φ_F. Write down equation relating Φ_A, Φ_B, and Φ_C to each other (and possibly to Φ) (1 pt).

2) Write down equation relating Φ_A, Φ_B, and Φ_F to each other (and possibly to Φ) (1 pt).

3) Find the ratio Φ_F/Φ_C (1 pt).

4) Find the magnetic fluxes in each permanent magnet (2 pts).

5) Which of the magnets is the most difficult one to remove? Motivate your answer (1 pts).