1. Suppose a spherical tank has a radius of 2 ft. The volume of a sphere is $\frac{4}{3}\pi r^3$. One quart is 1 qt = 946 cm^3 and 1 in = 2.54 cm To the nearest integer, what is the volume of the sphere in units of qt?

    (a) 1003 qt

    (b) 1004 qt

    (c) 1005 qt

    (d) 1006 qt

2. On average, a person in the UK consumes oil at a rate of 4ℓ per day. What is this consumption rate in units of $\frac{bbl}{yr}$? bbl means "oil barrel": 1 bbl = 159 ℓ.

    (a) .92 $\frac{bbl}{yr}$

    (b) .92 bbl

    (c) 9.2 $\frac{bbl}{yr}$

    (d) 92 $\frac{bbl}{yr}$

3. The UK consumes about 1.5 million barrels of oil per day. How many liters of oil does the UK consume per year?

    (a) 8.7×10^{10} $\frac{\ell}{yr}$

    (b) 8.7×10^{10} ℓ yr

    (c) 9.7×10^{10} $\frac{\ell}{yr}$

    (d) 9.7×10^{10} ℓ yr

4. The amount of arable land in the state of Iowa is 2.6×10^7 acres. If that land were arranged into a square, what would be the length of one of the sides, in units of miles? 1 square mile is 640 acres.

    (a) 201.6 mi

    (b) 201.6 mi^2

    (c) 4.06×10^4 mi

    (d) 4.06×10^4 mi^2

5. The United States consumes energy at 1.0×10^{20} J per year. If all the arable land in Iowa was used for production of sugar beets, for conversion to ethanol, what fraction of the energy needs of the US could be supplied? Ignore the energy inputs required to produce the ethanol. 1 acre = 0.40 ha.

    (a) 4.3%

    (b) 3.3%

    (c) 2.3%

    (d) 1.3%