

Interview Technical Exercise

You have been asked to help a scientist with their project investigating the interaction between an increasing number of objects. Initially, they wish to know the total binding energy of 3 objects for a given geometry.

The formula for the binding energy, u , of a pair of objects separated by distance, r , is given by:

$$u(r) = 4\varepsilon \left(\left(\frac{\sigma}{r} \right)^{12} - \left(\frac{\sigma}{r} \right)^6 \right)$$

where

$$\sigma = 3.41 \times 10^{-10} \text{m}$$

$$\varepsilon = 1.65 \times 10^{-21} \text{J}$$

An example binding energy for $r = 6.82 \times 10^{-10} \text{m}$ is $-1.0 \times 10^{-22} \text{J}$

The binding energy for larger numbers of objects is the sum of all the pairwise interactions. The scientist has provided the distances between the three pairs of objects they are initially interested in:

$$r(\text{object1} - \text{object2}) = 4.1 \times 10^{-10} \text{m}$$

$$r(\text{object1} - \text{object3}) = 2 \times 10^{-10} \text{m}$$

$$r(\text{object2} - \text{object3}) = 3.41 \times 10^{-10} \text{m}$$

Implement a solution to meet the scientist's needs, to be shared at the interview (see Interview Information Pack for more details including timings).

There is no single correct solution to this exercise and different people may emphasize different aspects based on their skills, knowledge, and experience. You may use any appropriate programming language and/or other tools available to you, and we would be interested to hear what alternatives you may have liked to use.