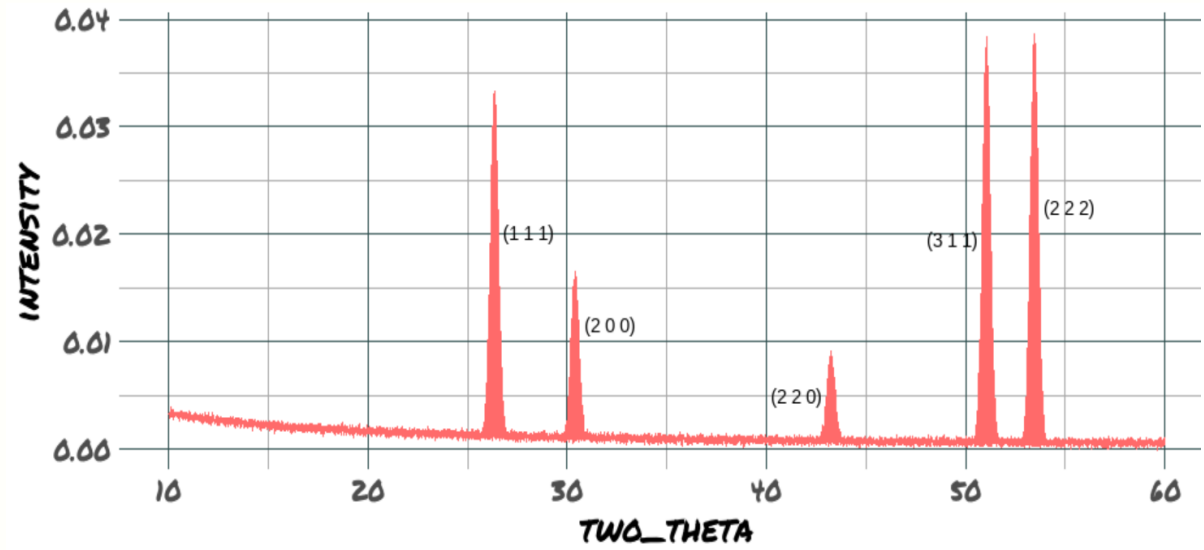
Question 1

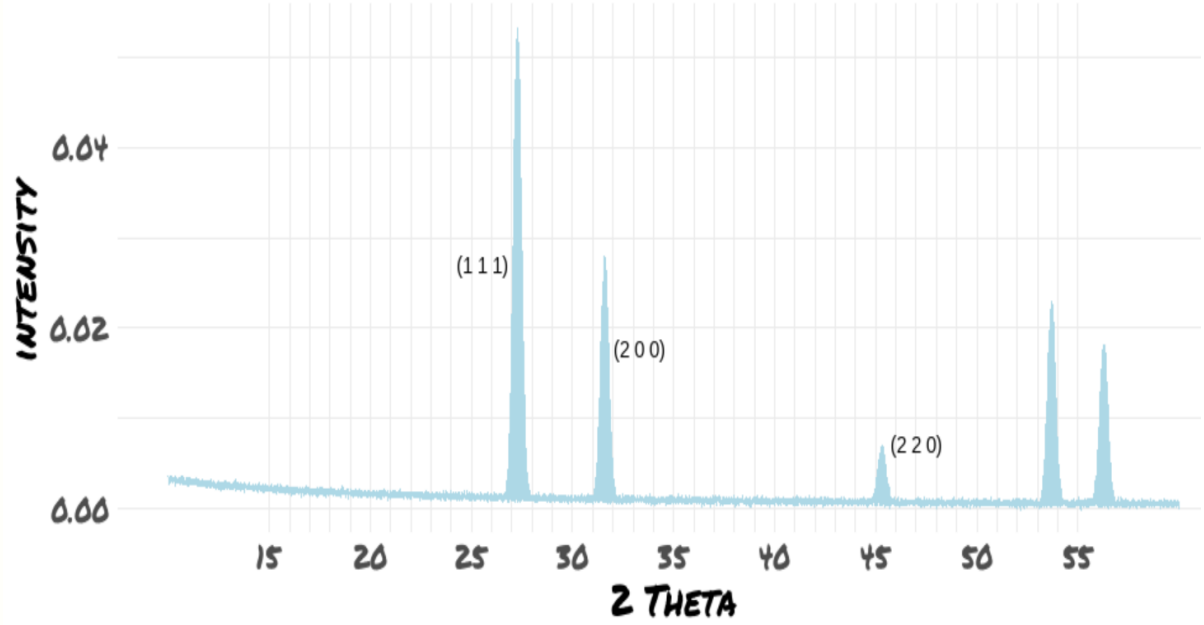
Looking at the powder X-ray diffraction spectrum below and taking into account any extinctions, what kind of crystal lattice is this?



Question 2

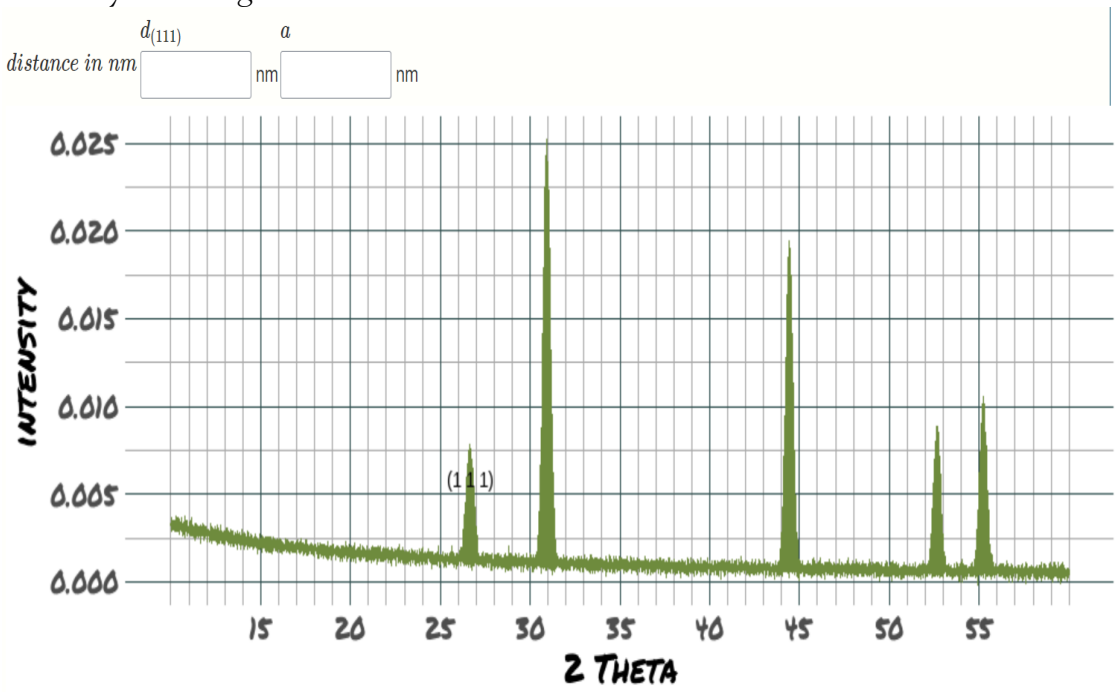
Examine the powder X-ray diffraction spectrum below. Estimate the 2θ values for the three labelled peaks and use these to calculate the interplanar separations, d, for each peak. The value for the X-ray wavelength is λ=0.154051nm. Suggest (hkl) indices for the two unlabelled peaks to the right of the spectrum.

(*hkl*)	(111)	(200)	(220)
d	nm	nm	nm



Question 3

Examine the powder X-ray diffraction spectrum. One of the peaks is labelled with its Miller Indices, (hkl)=(111). The label is centered on the peak. Use the position, 2θ(111) of this peak to calculate the interplanar spacing and thence the lattice parameter, a, in nm. The value for the X-ray wavelength is λ=0.154051nm



Question 4

The following diffraction pattern was obtained from a powder sample of NaCl using CuKα x-rays (wavelength = 0.154051nm).

(i) Calculate the interplanar spacing for the two peaks labelled A and B in the diagram.

(ii) Given that NaCl is cubic and has a lattice parameter of 0.56nm, give the Miller indices, (hkl), for the two peaks labelled A and B.

(iii) What extinctions are present in this x-ray diffraction pattern?

(iv) What do these extinctions tell us about the NaCl lattice?