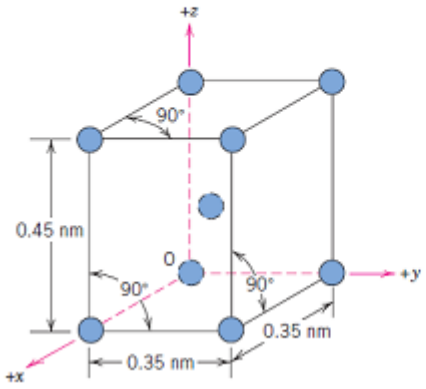
**Øving 2 i TMT4185, Materialteknologi, 2014**

Øvingen vil bli gjennomgått 8 september. Frist for levering 12 september.

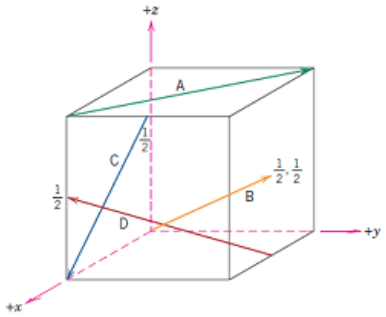
Oppgave 1

**3.20** The accompanying figure shows a unit cell for a hypothetical metal.
(a) To which crystal system does this unit cell belong?
(b) What would this crystal structure be called?
(c) Calculate the density of the material, given that its atomic weight is 141 g/mol.



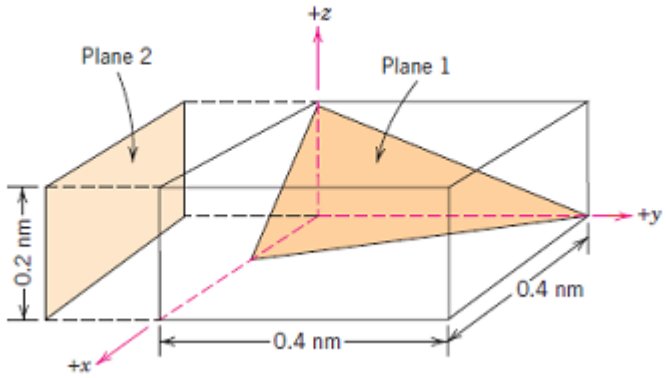

Oppgave 2

**3.31** Determine the indices for the directions shown in the following cubic unit cell:



## Oppgave 3

**3.38** What are the indices for the two planes drawn in the sketch below?



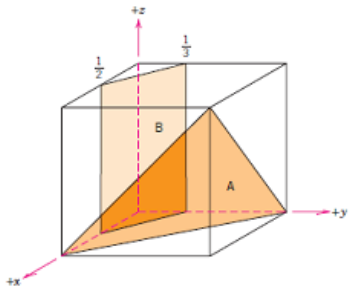

## Oppgave 4

**3.39** Sketch within a cubic unit cell the following planes:

**(a)** $(10\bar{1})$,
**(b)** $(2\bar{1}1)$,
**(c)** $(012)$,
**(d)** $(3\bar{1}3)$,

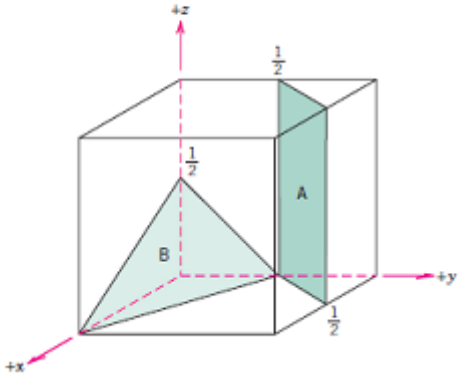
## Oppgave 5

**3.40** Determine the Miller indices for the planes shown in the following unit cell:



## Oppgave 6

**3.41** Determine the Miller indices for the planes shown in the following unit cell:




## Oppgave 7

**3.51** **(a)** Derive linear density expressions for FCC [100] and [111] directions in terms of the atomic radius $R$.

**(b)** Compute and compare linear density values for these same two planes for copper.

## Oppgave 8

**3.53** **(a)** Derive planar density expressions for FCC (100) and (111) planes in terms of the atomic radius $R$.

**(b)** Compute and compare planar density values for these same two planes for aluminum.

## Oppgave 9

**3.58** Determine the expected diffraction angle for the first-order reflection from the (310) set of planes for BCC chromium when monochromatic radiation of wavelength 0.0711 nm is used.

## Oppgave 10

**3.62** For which set of crystallographic planes will a first-order diffraction peak occur at a diffraction angle of 44.53 degrees for FCC nickel when monochromatic radiation having a wavelength of 0.1542 nm is used?

## Oppgave 11

**3.64** The diffraction peaks shown in Figure 3.21 are indexed according to the reflection rules for FCC (i.e., $h$, $k$, and $l$ must all be either odd or even). Cite the $h$, $k$, and $l$ indices of the first four diffraction peaks for BCC crystals consistent with $h + k + l$ being even.

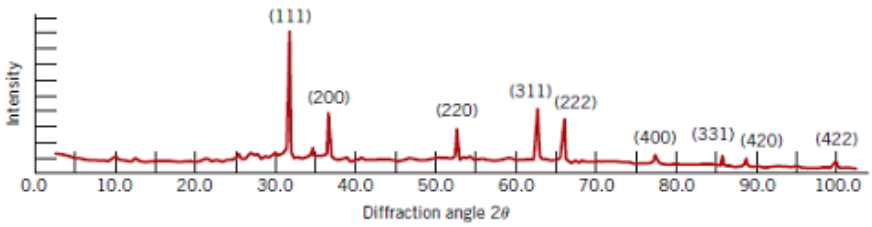



**Figure 3.21** Diffraction pattern for powdered lead. (Courtesy of Wesley L. Holman.)