Dairy Problem

Modified from a problem found in *Investigations in Mathematics for Elementary Teachers* by DeAnn M. Huinker and Eugene F. Krause (D.C. Heath, Lexington, Massachusetts, 1991).

In a Wisconsin dairy, the number six has special significance for the dairy workers. When they prepare the cartons of milk for shipping, they put six cartons in a box, six boxes in a crate, six crates in a flat, and six flats on a pallet.

6 cartons = 1 box
6 boxes = 1 crate
6 crates = 1 flat
6 flats = 1 pallet

So that they know how many more cartons of milk are needed to complete a pallet, the dairy workers have developed a system of describing the status of a pallet at any point during the packing process. Their notation is

(# of flats)(# of crates)(# of boxes)(# of cartons)

for any partially filled pallet. For example, a 4312 is a partially filled pallet with 4 flats, 3 crates, 1 box and 2 cartons on it. This notation could mean that there are exactly those containers on the pallet or the equivalent quantity of milk cartons waiting to be packed. Also, using this notation, a 10000 is a completed, ready-to-ship pallet.

(a)   While you were on a field trip to the dairy, you counted 321 cartons of milk that were ready to be placed on a pallet. How would you represent that amount of cartons in the dairy worker's notation? Show all your work.

(b)   As you were walking out the door, you heard someone yell, "I have a 2045 that needs filling!" How many milk cartons, in dairy notation, do they need to complete the pallet? Show all your work.