

This activity was written by Candace Walkington.

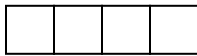
Willy Wonka's Caramel Factory

Willy Wonka's chocolate factory has started making magic caramels that are so sticky, children eating one have their mouths fastened shut **forever!** The Oompa-Loompas are hard at work making and packing the caramels, but there's a problem – Oompa-Loompas can only count to four!! After some deliberation, Willy Wonka has decided that the thing to do is to package his Wonka caramels by fours. Any time an Oompa-Loompa sees four caramels, he is to put them in a pack. Any time he sees four packs he is to put them in a flat, and any time he sees four flats, he is to put them in a box. That is, Wonka caramels are available only in the following quantities:

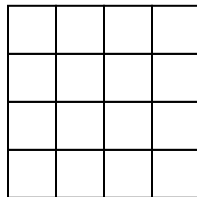
Singles



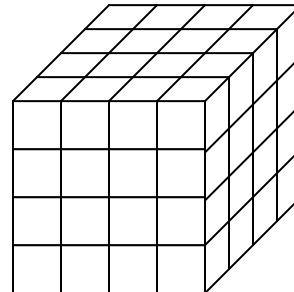
Packs (4 singles)



Flats (4 packs)



Boxes (4 flats)



Using these packing instructions, the Oompa-Loompas are now able to report how many caramels the machine has produced without ever counting beyond four!

Pretend you're an Oompa-Loompa and using your set of caramels...

- 1) Put your caramels into packs of 4
- 2) Put groups of 4 packs together to make flats
- 3) Put groups of 4 flats together to make boxes
- 4) Report your count on the "report" sheet

Once you've reported your initial amount on the caramel inventory sheet, do the following to represent additional shipments and report your new counts on the sheet as well:

- 1) Take away one caramel from your original amount
- 2) Add one caramel to your original amount
- 3) Take away 4 caramels from your original amount
- 4) Add 4 caramels to your original amount
- 5) Take away 16 caramels from your original amount
- 6) Add 16 caramels to your original amount.



Once you've filled out your report sheet, you're ready to do your assignment for today. As a group, I want you to write at least 4 observations about how this "Base 4" number system works, and how it compares to the way we usually count things. Then, I want you to write a description of (1) A method to convert the Oompa-Loompa 4-counts into the numbers we typically use, and (2) A method that would allow you to convert any number of caramels (i.e. "72 caramels") into how many singles, packs, flats, and boxes it would be packaged as.

Caramel Inventory Sheet

Shipment 1 (Starting amount):

_____ = _____
boxes flats packs singles total count of caramels

Additional Shipments:

_____ = _____
boxes flats packs singles total count of caramels

_____ = _____
boxes flats packs singles total count of caramels

_____ = _____
boxes flats packs singles total count of caramels

_____ = _____
boxes flats packs singles total count of caramels

_____ = _____
boxes flats packs singles total count of caramels

_____ = _____
boxes flats packs singles total count of caramels

