The Chefs Amazing Soup

(Adding and Subtracting Integers)

In a far-off land, there was once a team of amazing chefs who cooked up the most wonderful soups ever imagined.

They prepared their mixtures over a huge cauldron, and their work was very delicate and complex. During the cooking process, they frequently had to change the temperature of the cauldron in order to bring out certain flavors and cook the soup to perfection.

They adjusted the temperature of the soups either by adding special hot cubes or cold cubes to the cauldron or by removing some of the hot or cold cubes that were already in the cauldron. The cold cubes were similar to ice cubes except they didn't melt, and the hot cubes were similar to charcoal briquettes, except they didn't' lose their heat.

If the number of hot cubes in the cauldron was the same as the number of cold cubes, the temperature of the cauldron was 0° on their temperature scale. For each hot cube that was put into the cauldron, the temperature went up one degree; for each hot cube removed, the temperature went down one degree. Similarly, each cold cube put in lowered the temperature one degree and each cold cube removed raised it one degree.

The chefs used positive and negative numbers to keep track of the changes they were making to the temperature.

For example, suppose 4 hot cubes and 10 cold cubes were dumped into the cauldron. Then the temperature would be lowered by 6° altogether, since 4 of the 10 cold cubes would balance out the 4 hot cubes, leaving 6 cold cubes to lower the temperature 6°, and they would write

$$+4 + -10 = -6$$

to represent their actions and the overall final results of those actions.

Similarly, if they added 3 hot cubes and then removed 2 cold cubes, the combined result would be to raise the temperature 5°. In that case they would write

$$+3 - -2 = +5$$

And if they wrote −5 − +6 = −11, it would meat that first 5 cold cubes were added to the cauldron and then 6 hot cubes were removed, and that the combined result was to lower the temperature 11°.

Directions: Show work for these problems on another sheet of paper (if needed).

1. Each of the problems below describes an action taken by the chefs. Figure out how the temperature would change overall in each of these situations and write an equation to describe the action and the overall result.

    a. Three cold cubes were added and five hot cubes were added.

    b. Six hot cubes were added and eight cold cubes were added.

    c. Nine cold cubes were added and two more cold cubes were added.

    d. Ten cold cubes were added and six cold cubes were removed.

    e. Five hot cubes were added and four cold cubes were removed.

    f. Twelve hot cubes were added and seven cold cubes were removed.

2. Describe and action (similar to the word problems above) involving hot or cold cubes that is represented by each of the following arithmetic expressions and state how the temperature would change overall.

    a. $+23 + +5 =$

    b. $+3 + -7 =$

    c. $-4 + -10 =$

    d. $-9 + +3 =$

    e. $+5 - -1 =$

    f. $+13 - +5 =$

g. −8 − −5 =

h. −11 − +5 =

i. −4 + −8 =

j. −6 + 4 =

k. −9 − 5 =

l. −9 − −6 =

m. 10 + −6 =

n. 10 + 5 =