



Problem of the Week

Problem A and Solution

Purchasing Pencil Crayons

Problem

Mrs. Zhang needs to buy pencil crayons for her classroom. A local store is running a sale where the shopper will receive a free box of pencil crayons for every 4 boxes purchased. Her teaching partner, Mr. Holland also mentioned that he needs 5 more boxes of pencil crayons for his classroom. How many boxes of pencil crayons must Mrs. Zhang purchase in order to get 5 free boxes to give to Mr. Holland?

Solution

We can use a table to show how many free boxes Mrs. Zhang receives as she buys her pencil crayons. On each row, we increase the number of boxes purchased by 4 and the number of free boxes by 1.

Boxes Purchased	Free Boxes
4	1
8	2
12	3
16	4
20	5

From the table we see that Mrs. Zhang would need to buy 20 boxes of pencil crayons in order to get 5 free boxes.

Alternatively we can determine the result this way. In order to get the pencil crayons that Mr. Holland needs, Mrs. Zhang needs to buy 5 sets of 4 boxes. This means that she needs to buy a total of $5 \times 4 = 20$ boxes of pencil crayons.





Teacher's Notes

We can describe the relationship between the number of boxes Mrs. Zhang bought and the number of boxes she got for free in a number of ways.

The *ratios* $4 : 1$ and $20 : 5$ show the relative number of paid boxes to the number of free boxes. Since these two ratios show the same relationship, they are said to be *proportional*.

The fraction of free boxes in the total that Mrs. Zhang acquired is $\frac{5}{25}$ or $\frac{1}{5}$. These are examples of equivalent fractions.

The *percentage* of free boxes is 20% which can also be written as the decimal number 0.2 or the fraction $\frac{20}{100}$. The term percent, literally means *per 100*.

The less well know term *per mille* is used to describe a fraction out of 1000. This is written using the symbol ‰. So, $2‰$ of the boxes acquired were free.

