



## Problem of the Week

### Problem A and Solution

#### Feeding the Pets

#### Problem

I give my dog 162 g of dog food each meal. He eats two meals per day.

I give my cat 95 g of cat food each meal. She eats one meal per day.

The dog food comes in a 5 kg bag. The cat food comes in a 2 kg bag.

If I start a new bag of food for each pet on the same day, which bag will run out first? Justify your answer.

#### Solution

One way to determine which bag will run out first is to make a table that keeps track of how much food each pet consumes.

Since the dog eats two meals of 162 g each day, then he consumes  $162 + 162 = 324$  g per day. Since  $1 \text{ kg} = 1000 \text{ g}$ , then  $2 \text{ kg} = 2 \times 1000 = 2000 \text{ g}$  and  $5 \text{ kg} = 5 \times 1000 = 5000 \text{ g}$ . We will continue tracking the amount of food consumed until we reach one of these limits.

Day	Total Consumed by Cat (in g)	Total Consumed by Dog (in g)
1	95	324
2	190	648
3	285	972
4	380	1296
5	475	1620
6	570	1944
7	665	2268
8	760	2592
9	855	2916
10	950	3240
11	1045	3564
12	1140	3888
13	1235	4212
14	1330	4536
15	1425	4860
16	1520	5184

On Day 16 the dog will have consumed more than 5000 g of food, but the cat has not yet consumed 2000 g of food. So the dog food bag will run out first.

Alternatively, we could use estimation to determine which bag will run out first. Since 95 g is less than 100 g, then the cat food will last at least 20 days since  $20 \times 100 = 2000$ . Since 324 g is greater than 250 g, then the dog food will last less than 20 days since  $20 \times 250 = 5000$ .

Therefore, the cat food will last longer than the dog food, so the dog food bag will run out first.