



## Problem of the Week

### Problem A and Solution

#### Pumpkin Patch

#### Problem

The mass of a standard carving pumpkin is approximately 12 kg. Lavina plans to sell the pumpkins she has grown at the farmer's market. The table she has to display the pumpkins can support 224 kg. If the mass of each of her pumpkins is 12 kg, what is the largest number of pumpkins that Lavina can put on her table?

#### Solution

We can make a table to calculate the total mass of various quantities of pumpkins.

<b>Number of Pumpkins</b>	1	2	3	4	5	6	7	8	9	10
<b>Total Mass (in kg)</b>	12	24	36	48	60	72	84	96	108	120

<b>Number of Pumpkins</b>	11	12	13	14	15	16	17	18	19
<b>Total Mass (in kg)</b>	132	144	156	168	180	192	204	216	228

The total mass of 19 pumpkins, which is 228 kg, exceeds the capacity of the table. So the largest number of pumpkins Lavina can fit safely on her table is 18.

Having to make a table counting from 1 to 19 takes quite a bit of work.

Alternatively, we could try to reduce the work by narrowing the search area. We can use easier numbers such as multiples of 10 to find a narrower range to check. We see that  $10 \times 12 = 120$  and  $20 \times 12 = 240$ . From this we know that the answer must be between 10 and 20 pumpkins. So instead of starting our table with 1 pumpkin, we could start it with 10 pumpkins.

We might also notice that the number we are looking for (224 kg) is much closer to 240 than 120. So rather than counting up, we could count down from 240 in a table.

<b>Number of Pumpkins</b>	20	19	18
<b>Total Mass (in kg)</b>	240	228	216

Again, from this result we can conclude that the largest number of pumpkins she can put on her table is 18.



## Teacher's Notes

In this problem we said that the pumpkins all had the same mass of 12 kg. However, in reality, we would not expect each of the pumpkins to have exactly the same mass. A more realistic statement would be that the mass of each pumpkin is approximately 12 kg, but that makes the problem a bit trickier. If we had rounded to the nearest kilogram, that means the mass of each pumpkin could be greater than or equal to 11.5 kg and less than 12.5 kg.

Let's assume that all the pumpkins have a mass of no more than 11.6 kg, which is still approximately 12 kg. In this case we see that  $11.6 \times 19 = 220.4$  kg, so we could fit 19 pumpkins on the table.

Let's assume that all the pumpkins have a mass of no less than 12.45 kg, which is still approximately 12 kg. In this case we see that  $12.45 \times 18 = 224.1$  kg, which is more than the capacity of the table.

Sometimes we need to recognize a margin of error to reflect that our physical world does not always fit into our nice and neat world of mathematical problems.