Problem of the Week
Problem A and Solution
Elevator

Problem

The small school elevator can hold a maximum weight of 227 kg.

A) The average weight of a 9 year old is 28 kg. How many 9 year olds could ride the school elevator safely?

B) The average adult weighs 73 kg. What is the maximum number of adults we expect could ride the school elevator?

Solution

A) One way to solve this problem is to use a table to keep track of the total weight of the people on the elevator.

Number of Students	Weight (kg)
1	28
2	56
3	84
4	112
5	140
6	168
7	196
8	224
9	252

So the maximum number of 9 year olds that we expect can safely ride the elevator would be 8. Alternatively, we could use division. We can calculate $227 \div 28 = 8$ remainder 3. Since we are looking for a maximum number of riders, and the answer must be a whole number, then the maximum number would be 8.

B) Using a table or division ($227 \div 73 = 3$ remainder 9) we can determine that the maximum number of adults that we expect can safely ride the elevator would be 3. Alternatively, we could estimate the average weight of the adults as 70 kg and the capacity of the elevator as 230 kg. We can see that 3 adults would weigh approximately 210 kg, so we expect that is the maximum number that would safely fit in the elevator.

Teacher's Notes

In part A of this question, when we used division to calculate how many students would be able to safely ride the elevator we got an answer of 8 remainder 3. Since the answer is not a whole number, we need to decide if our final answer needs to be rounded up or rounded down. We need to look for cues in the question to help. In this case the final answer must be a whole number, and we are looking for a maximum capacity. This means we need to round down, since rounding up will exceed the capacity.

In mathematics, we use the operations *floor* and *ceiling* to indicate if our calculated value should be rounded down or rounded up. So for this problem, we would use the floor operation. Symbolically, this would be the calculation:

$$\lfloor 227 \div 28 \rfloor = 8$$

In other cases you will need to round up. For example, suppose you were buying eggs for use at a restaurant. You know that you need 500 eggs each day, and that a carton contains one dozen eggs. If you need to know how many cartons of eggs are required each day, the calculation could be done by using division. The answer will need to be rounded up (i.e. find the ceiling), since you need at least 500 eggs, but you need to purchase a whole number of cartons. Symbolically, this would be the calculation:

$$\lceil 500 \div 12 \rceil = 42$$