

3rd and 4th Problem Solving Solutions 3rd April 2020

1. Dr Martin the chemist is weighing out some pills. He has some 5g weights and some 7g weights. Can he weigh exactly 38g of pills? Can he weigh out 52g? Find as many possible ways of doing each.

(i) 38 is not divisible equally by 5 or 7 so both 5g and 7g weights are needed.

Dr. Martin needs four 7 g weights and two 5g weight to make 38g.
 $28\text{g} + 10\text{g} = 38\text{g}$.

(ii) In order for Dr. Martin to make 52 g, he can do this in two ways:
nine 5g and one 7 g weight = $45\text{g} + 7\text{g} = 52\text{g}$

or

six 7g weights and two 5g weights = $42\text{g} + 10\text{g} = 52\text{g}$

2. Ariana needs a metre ruler, but she can't find one. She knows that the wooden table is exactly 1 metre long. She makes herself a ruler from an A4 sheet of paper torn into strips lengthways which she then tapes together end to end. How many pages does Ariana need?

An A4 sheet is approximately 29.7cm long. Three 29.7cm lengths makes only 89.1cm. I need to get to 100cm, which is 1 metre.

Four 29.7cm lengths make 118.8cm. Therefore, to make at least 1m (100cm) I **require 4 A4 lengths**. Three is not enough.

3. In parking meters in town, you can get 15 minutes parking for 50c. Dad put \$3.50 into the parking meter at 3.15pm. At what time did the parking meter expire?

\$3.50 is $7 \times 50\text{c}$. $7 \times 15\text{ minutes} = 105\text{ minutes}$. 105 minutes is the same as 1 hour and 45 minutes (Remember 60 mins in one hour!) . $3:15 + 1:45 = 5:00$. So Dad can park in the car park up until 5 pm.

4. The pizza place has three tables. The biggest one seats three times as many people as the smallest one. The middle-sized table seats twice as many people as the smallest one. On Tuesday night three-quarters of the seats were taken. Then twelve more people arrived.

Unfortunately there were only enough seats for half of them. How many people can sit at the smallest table?

What do we know?

1. We know that 12 people arrive and half of them are turned away. So 6 are turned away and 6 people can be seated.

Pizza Place is three-quarters full (has one-quarter empty). 6 people is a quarter of a full house. So the full house is 4 times $6 = 24$.

2. Using a guess and check approach:

We could guess that the smallest table seats 3. In that case the next table seats 6 and the biggest table seats 9. Since $3 + 6 + 9 = 18$, our guess is a bit low. So guess 5. Then we get 10 and 15 for the other tables. Now $5 + 10 + 15 = 30$ and that's too high. So the smallest table must seat 4. That can be easily checked. $4 + 8 + 12 = 24$