2010 Primary Set 1 solutions

P1.1 A lottery win is shared between three people. Allan gets 20 percent more than Jane, and 25 percent more than Charlie. Jane's share is £3,600. How much money does Charlie receive?

Solution 1

Jane gets £3600 and Allan gets 20% more than her. So Allan gets
£3600 + £720 = £4320.

Allan gets 25% more than Charlie so Charlie gets $\frac{4}{5}$ of Allan's amount.

$\frac{1}{5}$ of £4320 is £864. So Charlie gets £4320 − £864 = £3456.

Solution 2

Let the amounts be £a, £j and £c.

Immediately, $j = 3600$.

$$a = j \times 1.2 = 4320$$

$$c \times 1.25 = a = 4320$$

$$c = \frac{4}{5} \times 4320 = 3456$$

Charlie gets £3456.

P1.2 You are in a party crossing the desert. The party has the following containers

- one 8 litre container which is full of water,
- one 5 litre container which is empty,
- one 3 litre container which is empty.

There are no other containers available.

It has been decided that the party should split up to follow two different routes, each group taking 4 litres of water. Is it possible to give each group 4 litres of water to continue their journey?

Explain your answer.

Solution

(a) Pour 5 litres from the 8 litre container into the 5 litre container

(b) Pour 3 litres from the 5 litre container into the 3 litre container

(c) Pour 3 litres from the 3 litre container into the 8 litre container

(d) Pour the 2 litres from the 5 litre container into the 3 litre container

(e) Pour 5 litres from the 8 litre container into the 5 litre container

(f) Pour 1 litre from the 5 litre container into the 3 litre container, which leaves 4 litres in the 5 litre container

(g) Pour 3 litres from the 3 litre container into the 8 litre container, so having 4 litres in each of 2 containers

Thus it is possible to give each group 4 litres of water.

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
8 litres	8	3	3	6	6	1	1	4
5 litres	0	5	2	2	0	5	4	4
3 litres	0	0	3	0	2	2	3	0

P1.3
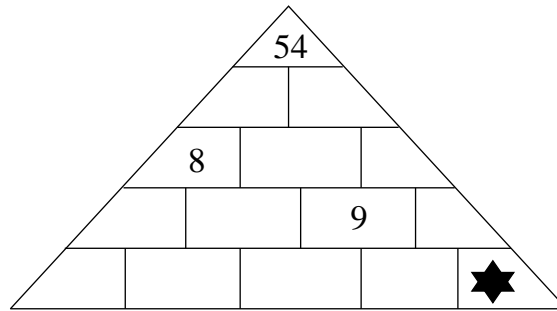
In each region of the triangle shown there is a whole number, three of which are given.

Each number is the sum of the two numbers immediately below it and all numbers are different. Find out which number must be in the region marked with the star and explain why.

Solution

As the numbers are all different, the smallest possible numbers in the bottom row are 1, 2, 3, 4 and 5. Thus the smallest possible number in the second row is 3.
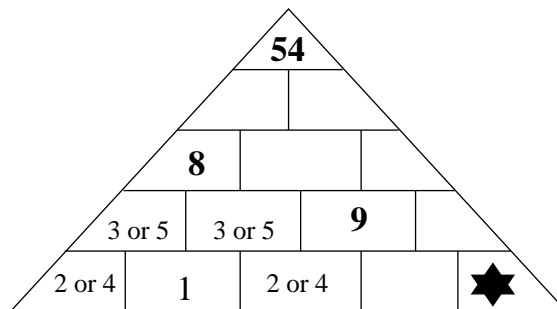
To get the 8, the cells below it must contain 3 and 5.

Below the 3, we must have 1 and 2.

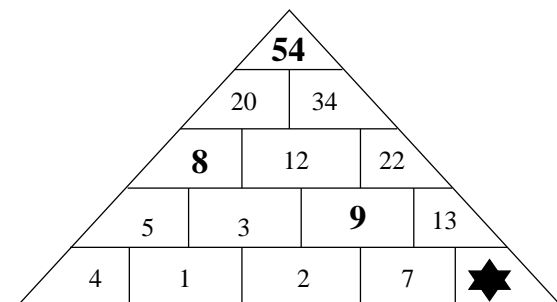Below the 5, we could have 2 and 3 or 1 and 4, but 3 cannot be repeated so 5 comes from 1 + 4.

As 1 feeds into 3 and into 5, it must be directly below the 8 with 4 and 2 on either side. So we have:

But 4 cannot feed into 9 as 5 is already used. So 4 is on the left.

This means that below 8 we have 5 and 3 (rather than 3 and 5).

The rest can now be filled in: 12, 20, 34, 13, 7 and finally the required number is 6.