

Going to the Cinema

l is the no. of adults

m is the no. of pensioners

n is the no. of children

$$\therefore 85n + 100m + 350l = 10,000$$

$$(l + m + n = 100) \times 350$$

$$\text{or } 350l + 350m + 350n = 35,000$$

$$\therefore 250m + 265n = 25,000$$

$$\therefore 50m = 5,000 - 53n$$

$\therefore n$ must be a multiple of 50

$$\text{If } n = 50, m = 47, l = 3$$

If $n = 0, m = 100$ but m cannot be 100

If $n > 100, m < 0$ but $m \in \mathbb{Z}^+$

\therefore The only solution is $l = 3, m = 47, n = 50$

$$400l + 100m + 50n = 10,000$$

$$(l + m + n = 100) \times 400$$

$$\therefore 400l + 400m + 400n = 40,000$$

$$\therefore 300m + 350n = 30,000$$

$$\therefore m = \frac{600 - 7n}{6}$$

$$\therefore m = 100 - \frac{7n}{6}$$

$\therefore n$ has to be a multiple of 6. $0 \leq n \leq 100$. Values of l & m can be found for each value of n .

$$500l + 250m + 50n = 10,000$$

$$\therefore 10l + 5m + n = 200$$

$$(l + m + n = 100) \times 10$$

$$\therefore 5m + 9n = 80$$

$$\therefore m = 16 - \frac{9n}{5}$$

$\therefore n$ has to be a multiple of 5.

There are 25 adults & 75 children

$$\therefore 25a + 75c = \cancel{10,000} 10,000$$

$$a + 3c = \cancel{400} 400$$

∝ If we assume that $a \gg c$, we get that $a \gg 100$ & $c \leq 100$.

There are 40 adults, 40 children & 20 pensioners

$$\therefore 40a + 40c + 20p = \cancel{10,000} 100$$

$$\therefore 2a + 2c + p = 100$$

Let us now take a look at the 2 highlighted equations:

$$m = 100 - \frac{53}{50}n \text{ and}$$

$$m = 100 - \frac{7}{6}n$$

The first equation gives ^{one} multiple values of n .
On the other hand, the second equation gives multiple values of n .

Equation 1: n has to be a multiple of 50. If $n > 50$, the second term $> 100 \Rightarrow m > m < 0$. Only 1 n is possible.

Equation 2: n has to be a multiple of 6. n can take many values and the second term would still be less than 100.

The set of prices: adults; £3.00, pensioners; £2.00, children; £1.50 offers many solutions.

The set of prices: adults; £3.50, pensioners; £1.00, children; £0.65 offers one solution.