Challenge '25 Solutions

1. Jelly Babies

39 jelly babies in total.
Each child receives, respectively, 15, 8, 10 and 6.

2. Clean Break

Since you aren't allowed to break two or more pieces at the same time, it will take 23 breaks, since each break increases the number of pieces by one.

Charlie wins by snapping off the row containing both nuts and eating the rest. Then Ellie must eat a nut, because, wherever she snaps the remaining row, she will have a nut in each part.

He will win for any bar where both dimensions are greater than 1.
For a 1 by n bar, Ellie wins, because Charlie has to eat a nut in the same way as above.

NB the minimum bar size is 1 by 2

3. Imperial Volunteers

After Pat, Sharon and Helen have eaten their mints, there are 29 left.
Any attempt to share them fairly means four being allocated to each of the seven volunteers, with one remaining mint, so one volunteer would have had a fifth.

Sharing *unfairly* means that one or more volunteer has 5 or more.

4. Wonky Wine Gums

Red – lemon flavour
Green – strawberry flavour
Yellow – lime flavour
Orange – blackcurrant flavour
Purple – orange flavour

	R	Y	G	P	O
O	X	X	X	/	X
LE	/	X	X	X	X
LI	X	/	X	X	X
S	X	X	/	X	X
B	X	X	X	X	/

5. Hard Toffee

The minimum number of toffees he can give away is 1. This is 10% of 10, which means that he will have 9 to eat on the final day.
This means the box of toffees will last for 9 days.
Working backwards then:

Day	No at start	Eat	Leaving	Give Away	End of Day
9	9	9	0	0	0
8	18	8	10	1	9
7	27	7	20	2	18
6	36	6	30	3	27
5	45	5	40	4	36
4	54	4	50	5	45
3	63	3	60	6	54
2	72	2	70	7	63
1	81	1	80	8	72

So 81 toffees were in the box to start with.

6. Coin Conundrum

By doing direct computations, one can notice that the leftmost and rightmost coins touch each other. Then, by applying Pythagorean theorem, it can be shown that the distance between the touching pints is the square root of (13^2-5^2)r^2 = 12r.

7. Prize Purchasers

This is best considered as three simultaneous equations:
F is the cost of Fruit Drops, L of Liquorice Allsorts packs and S of Smarties tubes
3F + 2L + 4S = 585 [1]
2F + 4L + 3S = 560 [2]
F + L + 2S = 260 [3]
[1] – [3] × 2 → **F = 65**
Sub into [3] → L + 2S = 195 [4]; sub into [2] → 4L + 3S = 430 [5]
[4] × 4 – [5] → 5S = 350, so **S = 70**
Sub F = 65 and S = 70 into [3] → **L = 55**

8. Alfajor Arrangements

3 possible scenarios: 6 unique alfajores, 1 pair and 4 different types, 2 pairs and 2 different types.

6 unique = 8!/(6!*2!) = 8*7/2=28
1 pair and 4 different = 8 possible pairs, then picking 4 from 7 so
8*7!/(4!*3!)= 8*7*6*5/6=8*7*5=280
2 pairs and 2 different = 8 possible first pairs, 7 second pairs, but these could interchange, so divide by 2, then pick 2 from 6 so
8*7/2*6!/(2!*4!)= 28*6*5/2=28*15=420
So 28+280+420=728

9. Dorothy's Journey

The correct answer for (a) is **15**
The correct answer for (b) is **22**

For (c), it must be mentioned:

(c.1) During the time interval [55, 60] was eaten exactly 5 balls

(c.2) During the time interval [0, 55] was eaten exactly 5 balls; Similarly, for time interval [60, 115]

(c.3) If the balls during the time interval [0, 55] were eaten at times t1<t2<t3<t4<t5 and during the time interval [60, 115] at s1<s2<s3<s4<s5; THEN it must be that

s1 <= t1 <= s2 <= t2<= s3 <= t3 <= s4 <= t4<= s5 <= t5