Senior Challenge ’08 Solutions

3 (1 for answer, up to 2 for systematic approach)	1.

1	1	1	1	1	1	1	1
1	1	1		1	1	2	1
1	2	1		1		2	1
2	2			1		2	1
2	2					2	2

3 (1 for answer, up to 2 for systematic approach)	2. If m is the number of matches and b the number of byes, then m + b = 32 initially. As there are 4 late entries, then m + 4 = b. Therefore, 2m = 28 and thus m = 14, giving b = 18. The final number of entries is 2m + b + 4 = 50.
2 (1 for each answer)	3. Benny’s no. is 0151 121 5041, because 5! + 1 = 121 = 11^2 & 7! + 1 = 5041 = 71^2.
3 (1 for answer, up to 2 for explanation)	4. 7 floors will remain without power, namely 1, 4, 9, 16, 25, 36 and 49 (the square numbers, since these have an odd number of factors
3 (1 for answer, up to 2 for explanation)	5. THH would be more likely to terminate his sequence, because, unless HHH is the first sub-sequence thrown, HHH cannot occur before THH does.
5 (1 for answer, up to 4 for explanation)	6. Agnetha is wearing a white hat. Anna can see both Bjorn and Agnetha, so, if they both wore blue hats, she would realise she was wearing white and announce that. Since she does not, Bjorn is aware that at least one of he and Agnetha is wearing white. If he could see that Agnetha’s hat was blue, he would know for certain that he was wearing white and announce it. Because he remains silent, Agnetha now knows that this isn’t the case, so she must have on a white hat.
	7.