Further probability

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83 How many numbers greater than 5000 can be formed with the digits 4, 5, 6, 7 and 8 if no digit is used more than once in a number?

(A) 96
(B) 120
(C) 196
(D) 216

84 At a football club a team of 11 players is to be chosen from a pool of 30 players consisting of 18 Australian-born players and 12 players born elsewhere. What is the probability that the team will consist of all Australian-born players?

(A) $\frac{{}^{18}C_{11}}{{}^{30}C_{11}}$

(B) $\frac{{}^{30}C_{11}}{{}^{18}C_{11}}$

(C) $\frac{{}^{18}C_{12}}{{}^{30}C_{12}}$

(D) $\frac{{}^{30}C_{12}}{{}^{18}C_{12}}$

85 How many distinct permutations of the letters of the word 'ATTAINS' are possible in a straight line when the word begins and ends with the letter T?

(A) 60
(B) 120
(C) 360
(D) 1260

86 Rose and Andrew are among eight people who arrange themselves at random in a straight line. What is the probability that Rose and Andrew are next to each other?

(A) $\frac{1}{8}$

(B) $\frac{1}{7}$

(C) $\frac{1}{4}$

(D) $\frac{1}{2}$

87 At a dinner party, the host, hostess and their six guests sit at a round table. In how many ways can they be arranged if the host and hostess are separated?

(A) 720
(B) 1440
(C) 3600
(D) 5040

88 Eden, Toby and four friends arrange themselves at random in a circle. What is the probability that Eden and Toby are *not* together?

(A) $\frac{1}{120}$

(B) $\frac{2}{5}$

(C) $\frac{3}{5}$

(D) $\frac{119}{120}$

89 A box contains seven identical balls except for their colour. Four are blue, two are white and one is red. Two balls are selected at random. What is the probability of getting two blue balls on exactly three occasions from five selections of two balls?

(A) 0.0119
(B) 0.0298
(C) 0.1190
(D) 0.2975

90 A clay shooter hits the target 95% of the time. In a competition he will have forty shots at the target. What is the probability he misses at most two times?

(A) 0.3233
(B) 0.4791
(C) 0.5834
(D) 0.6767

91 A die is tossed 3 times. What is the probability of 0 or 1 six turning up?

(A) $\frac{2}{27}$

(B) $\frac{25}{27}$

(C) $\frac{91}{216}$

(D) $\frac{125}{216}$

92 George is a target shooter who keeps record of his performance. He scores a bull's eye on 3 out 4 occasions. George fires 5 rounds at a target. What is the probability of at least 4 bull's eyes?

(A) $\frac{243}{1024}$

(B) $\frac{405}{1024}$

(C) $\frac{47}{128}$

(D) $\frac{81}{128}$

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	Solution	**Criteria**
83	If all 5 digits are used: Number of permutations $= 5! = 120$ If only 4 digits are used: Number of permutations $= 4\times4\times3\times2 = 96$ Therefore Total $= 216$	1 Mark: D
84	$P(E) = \frac{{}^{18}C_{11}}{{}^{30}C_{11}}$	1 Mark: A
85	Place the T at the start and end. $\frac{5!}{2!} = 60$	1 Mark: A
86	Number of possible arrangements $= 8!$ Number of favourable arrangements $= 2\times7!$ $P(E) = \frac{2\times7!}{8!} = \frac{1}{4}$	1 Mark: C
87	With no restrictions there are 8 people Arrangements $= = (n-1)!$ $= 7!$ $= 5040$ When the host and hostess sit next to each other. Arrangements $= = 2!(n-1)!$ $= 2!6!$ $= 1440$ Number of arrangements when host and hostess are separated. $= 5040 - 1440$ $= 3600$	1 Mark: C
88	Number of possible arrangements in a circle $= (6-1)! = 5!$ Number of favourable arrangements $= 5! - 2\times4!$ $P(E) = \frac{5! - 2\times4!}{5!} = \frac{3}{5}$	1 Mark: C
89	$P(BB) = \frac{4}{7}\times\frac{3}{6} = \frac{2}{7}$ P(Two blue exactly 3 times) $= {}^5C_3\left(\frac{2}{7}\right)^3\left(\frac{5}{7}\right)^2$ $= 0.1190$	1 Mark: C
90	Misses at most 2 targets then $k = 38$, 39 and 40 P(At most 2 misses) $= {}^{40}C_{38}0.95^{38}0.05^2 + {}^{40}C_{39}0.95^{39}0.05^1 + {}^{40}C_{40}0.95^{40}$ $= 0.6767$	1 Mark: D

91	$P(6) = \frac{1}{6}$ and $P(\text{Not } 6) = \frac{5}{6}$ P(0 or 1 six) $= {}^3C_0\left(\frac{5}{6}\right)^3\left(\frac{1}{6}\right)^0 + {}^3C_1\left(\frac{5}{6}\right)^2\left(\frac{1}{6}\right)^1$ $= \frac{25}{27}$	1 Mark: B
92	$P(\text{Bull's eye}) = \frac{3}{4}$ and $P(\text{Not Bull's eye}) = \frac{1}{4}$ P(4 or 5 bull's eye) $= {}^5C_4\left(\frac{3}{4}\right)^4\left(\frac{1}{4}\right)^1 + {}^5C_0\left(\frac{3}{4}\right)^5\left(\frac{1}{4}\right)^0$ $= \frac{81}{128}$	1 Mark: D