***PROBABILITY PROBLEMS***

1. Pat and Chandra are playing a game. They take turns throwing two dice. The game is won by the first player to throw a double six. Pat starts the game.

(i) Find the probability that Pat wins the game on his first throw.

(ii) What is the probability that Pat wins the game on the first or on the second throw.

(iii) Find the probability that Pat eventually wins the game. [HSC, 2013]

**[NOTE: you will need to use the fact that the sum of the series 4 + 2 + 1 + ½ + ¼ + … is found using the formula** $S=\frac{a}{1-r}$**, where a is the first term , 4 , and r is the common ratio, ½ .]**

2. (a) What is the probability of tossing a head and a tail in 2 tosses of a coin.

 (b) What is the probability of obtaining at least one head and one tail in three tosses of a coin?

 (c) How many times do you need to toss a normal coin to be 95% chance of obtaining both a head and a tail?

3. Weet-Bix are running a promotion where each pack contains one of six special limited edition Dr Who collector cards.

(a) What is the probability that you get the complete set after the purchase of just 6 boxes?

(b) How many boxes would you need to purchase to be 90% sure of obtaining the full set?

[This is an actual application of Probability Theory.]