Probability Worksheet I

1. A family has five children – five year old Reece, six year old Aimee, eight year old Pauline, ten year old Michelle and thirteen year old Tim. A child is chosen at random from these children.
   a. List the sample space, *S*.
   b. The event E = {children under the age of 10}. List the set E.
   c. Find $n(S)$ and $n(E)$.
   d. Find the probability that the randomly chosen child is Aimee.
   e. Find the probability that the randomly chosen child is a male.

2. Eighty tickets had been sold for the chook raffle, numbered 1 to 80. You purchased 5 tickets, which had the numbers 4, 6, 12, 15, 78. There is only one prize, so only one ticket is drawn.
   a. What is the sample space? (Note: you do not need to list the entire sample space, just describe it.)
   b. What is the value of $n(S)$?
   c. What is the probability that one of your tickets is the winner?
   d. What is the probability that the number drawn is greater than 100?
   e. What is the probability that the number drawn is less than 100?

3. Assign a probability value from 0 to 1 to each of these phrases or adjectives. Compare your values to that of your friends. Are you in agreement?
   a. possible b. unlikely c. plausible d. highly likely
   e. "a snowball's chance in hell" f. near certain

4. I just bought a lottery ticket. I reason as follows, "Either my Lotto ticket will win, or it will lose. So the chance that my ticket will win must be 1 out of 2, as there are two outcomes. I have a 50% chance of winning Lotto!"

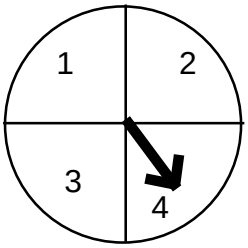
   Comment on my reasoning.

5. A researcher tested 40 mice to see how fast they could run a particular maze. Here is a frequency table showing the results.

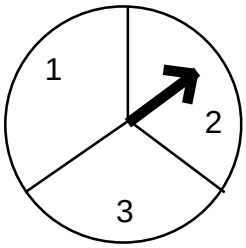
Time (min)	**Number of mice**
1	2
2	5
3	10
4	12
5	8
6	3
TOTAL	40

   I chose a mouse at random. Find the probability of the following events.
   a. The mouse ran the maze in 2 minutes.
   b. The mouse ran the maze in either 4 minutes or 5 minutes.
   c. The ran the maze in either 2, 4 or 6 minutes.
   d. The mouse took more than 3 minutes to run the maze.
   e. The mouse took at least 3 minutes to run the maze.
   f. The mouse took no more than 5 minutes to run the maze.
   g. The mouse ran the maze in under 6 minutes.
   h. The mouse took 7 minutes to run the maze.
   i. The mouse didn't take 6 minutes to run the maze.
   j. The mouse is white.

6. On the right are two spinners. Player A has the spinner on the left. Player B has the spinner on the right. Each player spins their spinner. The numbers are then added. If the total is odd, then player A wins $1. If the total is even, then player B wins $1.



A



B

   a. Draw a grid to show the sample space for this problem.
   b. Find P(total is greater than 4)
   b. Find P(total is not 4 or 5).
   c. Is this game fair? Explain.
   d. The players decide to change to rules. Now the winning player wins the total of the two dice. For example, if A spins a 2 and B spins a 3, then player B wins $5. Show that this game is not fair.

7. The "DIFFERENCE" game is a very simple dice game played between two players. Two dice are rolled and the numbers noted. Player A scores a point if the difference between the two numbers is 0, 1 or 2. Player B scores a point if the difference if 3,4 or 5.
   a. Draw a grid to list the sample space.
   b. What is the probability that A scores a point on the next throw of the two dice?
   c. What is the probability that B scores a point on the next throw of the two dice?
   d. Change the rules so the game is fair, i.e. so the P(A wins) = P(B wins). Explain clearly why your rules make the game fair.