Exercise: Rock, Paper, Scissors

In these exercises, you will practice design, implementation and unit test.
You will also work with threads and synchronization.

We will implement a silly version of the classic Rock, Paper and Scissors game.
Remember:

Rock beats scissors
Scissors beats paper
Paper beats rock

Exercise 1: (Design)
Design a game with two players:
Each player rolls a six-sided dice a 1000 times and adds up all the values.
The player then choose rocks, paper, scissors based on the total sum:

Sum	Weapon
<2500	Rock
2500 <= 4500	Paper
<4500	Scissors

At last, the winner is announced.
Explain your design to one or two of your fellow students.

Exercise 2: (Implementation)
Implement your design as a Console application
Output the total sum for each player in the console and announce the winner.

Exercise 3: (SRP consideration)
Does your design adhere to the Single Responsibility Principle?
If not, how can you improve your design?
Update the UML diagram(s) and the implementation.

Exercise 4: (Unit test)
Write NUnit tests for the software.
Make sure to consider boundary values and equivalence partitions.

Exercise 5: (Threading and synchronization)
Your PC probably has more than one processor. Let's use that power!
Modify your game, so the players roll their dice at the same time.

Exercise 6: (Design and implementation)
You have a new friend ☺
Modify the game, so three persons can play.
What changes were needed? Why?

Exercise 7:
You are good at getting friends ☺
Modify the game, so any number of persons can play.
What changes were needed? Why?

Exercise 8: (Unit test)
Are your unit tests still valid? If not, update the unit tests.

Exercise 9: (Unit test)
Do you need some new unit tests?
Discuss this with one or two of your fellow students.
If you find, that you need more tests, implement the tests.

Exercise 10: (Design and implementation)
A new weapon is added to the game: Atomic Bomb.
Atomic Bomb beats all other weapons.
The rules for weapon selection is now:

Sum	Weapon
<2500	Rock
2500 <= 4500	Paper
<4500 <= 5990	Scissors
>5900	Atomic Bomb

Make the necessary changes to your game and update the unit tests.

Exercise 11:
How often does each weapon win? (i.e. find the percentage of wins)