**Mathematical Proof**

Remember:

* Proof by deduction is to prove directly using logical steps.
* Proof by exhaustion is to prove the statement is true for all cases.
* Disproof) by counter example is to find an example that shows that the statement is false.
1. Prove, by deduction that $(a+b)^{2}-\left(a-b\right)^{2}=4ab$
2. Prove, by exhaustion that no square number ends with an 8
3. Use a counter example to prove the following statement is not true. If x and y are real numbers, $x>y⇒x^{2}>y^{2}$
4. Prove, by deduction that the product of any two odd numbers is odd
5. It is suggested that for every prime number $p$, $2p+1$ is also prime. Give a counter example to disprove this statement
6. Prove, by deduction that if $k$ is any constant and $y=x^{2}+kx+k^{2}$, then $y>0$ for all values of $x$
7. Prove, by deduction that the sum of the squares of any two consecutive integers is an odd number.
8. Give a counter example for the following statement. If x and y are irrational real numbers then xy is also irrational.
9. Prove, by deduction that if x and y are real numbers, $x^{2}+y^{2}\geq 2xy$