2 **(a)** A digit sum is the sum of all digits in a number, for example 31 has a digit sum of 4.

A student claims that all two digit prime numbers have a digit sum that is even.

(i) Prove by exhaustion that this is true for all prime numbers between 10 and 20. **[3]**

(ii) Find a counterexample to disprove that the statement is true for all two digit prime numbers. **[1]**

(b) Prove that $(2n+5)^2-(2n+3)^2$ is always a multiple of 8 for any integer n. **[3]**