

Advanced Higher Maths
SQA 2023 Paper 1
Question 8

(a) Consider the statement:

For all integers a and b , if $a < b$ then $a^2 < b^2$.

Find a counterexample to show that the statement is false.

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(b) Let n be an odd integer.

Prove directly that $n^2 - 1$ is divisible by 4.

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Answers:

(a) Any $a < 0$ and $b > 0$, where $|a| > |b|$, will serve as a counterexample.

(b) Write n as either $2k + 1$ or $2k - 1$, substitute into $n^2 - 1$ and factorise to show a common factor of 4.