AQA, Edexcel, OCR

A Level

A Level Mathematics

Proof by Contradiction

Name:

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Total Marks:

A1 – Proof Questions

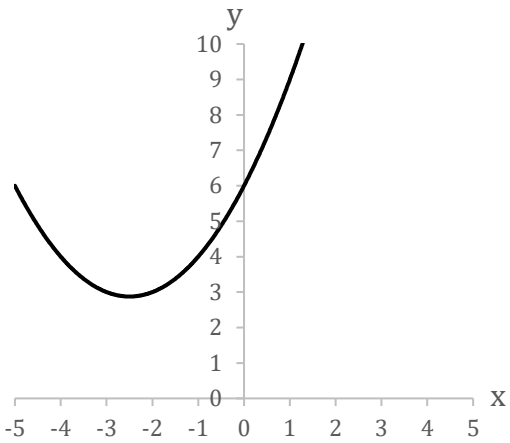
AQA, Edexcel, OCR

1) Prove that there is an infinite amount of prime numbers. [4]

2) For all real numbers, show that if the number x is rational then x^3 must also be rational. [4]

True or false?

3)



The graph is given by function $kx^2 + 6kx + 5$ where k is constant. Prove that $0 \leq k \leq \frac{5}{6}$ [4]

4) Prove that $\sqrt{2}$ is irrational. [4]

5) If $a, b \in \mathbb{Z}$, then $a^2 - 4b - 3 \neq 0$. [4]

6) Using proof by contradiction show that there are no positive integer solutions to the Diophantine equation $x^2 - y^2 = 1$. [4]

7) If a is a rational number and b is an irrational number, then $a + b$ is an irrational number. [3]

Demonstrate, using proof, why the above statement is correct.

8) Prove that triangle ABC can have no more than one right angle. [2]

9) Prove that the sum of three consecutive integers is divisible by 3. [2]

10) The number of even integers is limitless. Prove or disprove this statement. [3]

11) Suppose $a \in \mathbb{Z}$ If a^2 is even, then a is even. [2]

12) Prove that $\frac{d}{dx}\left(3^{\frac{1}{2}}x + \pi\right)$ is irrational. [5]