1.1 Proof

Question Paper

Course	Edexcel IAL Maths: Pure 2
Section	1. Proof
Topic	1.1 Proof
Difficulty	Hard

Time allowed: **50**

Score: **/42**

Percentage: **/100**

Question 1

Prove that the sum of any three consecutive even numbers is a multiple of 6.

[4 marks]

Question 2

Prove that $f(x) \geq 4$ for all values of x, where $f(x) = (3 - x)^2 + 4$.

[3 marks]

Question 3

Prove that the square of an odd number is always odd.

[3 marks]

Question 4

The set of numbers S is defined as all positive integers greater than 5 and less than 10. Prove by exhaustion that the square of all values in S differ from a multiple of 5 by 1.

[4 marks]

Question 5

Use a counter-example to prove that not all integers of the form $2^n - 1$, where n is an integer, are prime.

[2 marks]

Question 6

By considering all possible prime factors of 17, prove it is a prime number.

[3 marks]

Question 7

(a) Fully factorise $n^3 + 6n^2 + 8n$.

[2 marks]

Question 7

(b) Prove that, if n is odd, $n^3 + 6n^2 + 8n$ is odd and that if n is even, $n^3 + 6n^2 + 8n$ is even.

[3 marks]

Question 8

(a) Two rational numbers, a and b are such that $a = \frac{m}{n}$ and $b = \frac{p}{q}$, where m, n, p, q are integers with no common factors and $n, q \neq 0$.

Find expressions for ab and $\frac{a}{b}$.

[4 marks]

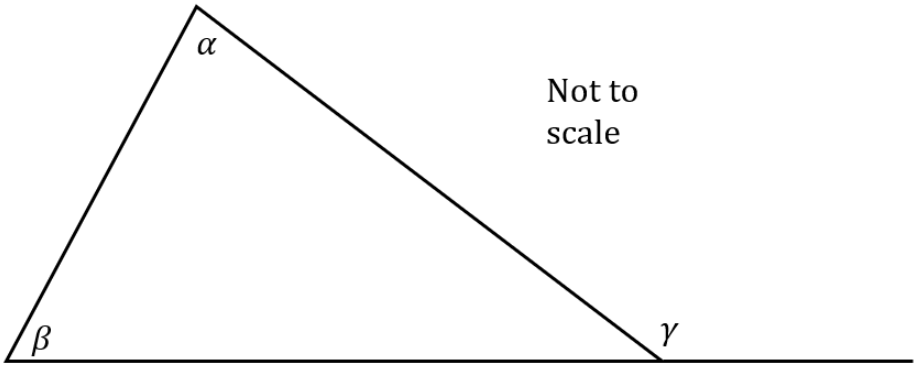
Question 8

(b) Deduce whether or not ab and $\frac{a}{b}$ are rational or irrational.

[4 marks]

Question 9

Prove that the exterior angle in any triangle is equal to the sum of the two opposite interior angles. You may use the diagram below to help



[4 marks]

Question 10

A standard chess board has 64 1x1 - sized squares.
It also has 1 8x8 - sized square.

(a) How many 2x2 - sized and 3x3 - sized squares are there on a standard chess board?

[2 marks]

Question 10

(b) Hence show that there are 204 squares in total on a standard chess board.

[4 marks]