

1.1 Proof

Question Paper

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

Time allowed: 50

Score: /42

Percentage: /100

Question 1

Prove that the sum of any three consecutive integers is a multiple of 3.

[3 marks]

Question 2

Prove that $x^2 + 2 \geq 2$ for all values of x .

[2 marks]

Question 3

Prove that the square of an even number is a multiple of 4.

[3 marks]

Question 4

The set of numbers S is defined as all positive integers less than 5.
Prove by exhaustion that the cube of all values in S are less than 100.

[3 marks]

Question 5

Use a counter-example to prove that the difference between any two square numbers is not always odd.

[2 marks]

Question 6

(a) Express 18 as a product of its prime factors.

[2 marks]

Question 6

(b) Write down all prime numbers between 1 and 13.

[1 mark]

Question 6

(c) By dividing 13 by each of the prime numbers found in part (b), prove that 13 is a prime number.

[3 marks]**Question 7**

(a) Factorise $n^2 + 3n + 2$.

[1 mark]**Question 7**

(b) Hence show that $n^3 + 3n^2 + 2n = n(n + 1)(n + 2)$.

[1 mark]**Question 7**

(c) Given that n is even, write down whether $(n + 1)$ and $(n + 2)$ are odd or even.

[2 marks]

Question 7

(d) Hence deduce whether $n^3 + 3n^2 + 2n$ is odd or even. Justify your answer.

[2 marks]**Question 8**

(a) By writing it as a fraction in its lowest terms, show that 0.35 is a rational number.

[2 marks]**Question 8**

(b) 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 an expression for ab .

[3 marks]

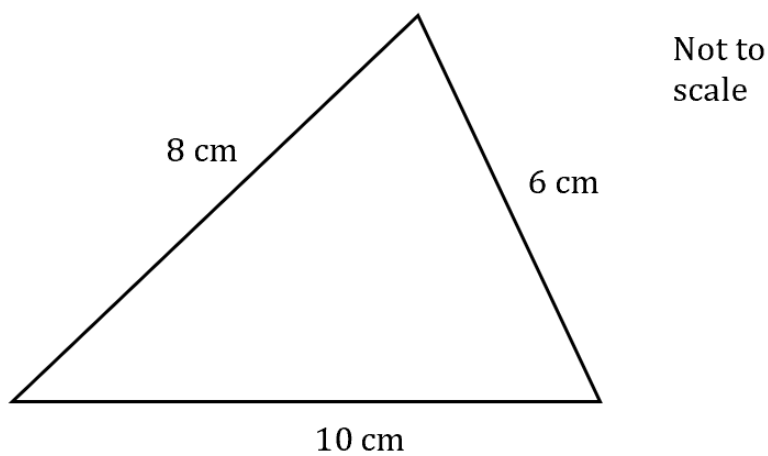
Question 8

(c) Deduce whether or not the product ab is rational or irrational.

[2 marks]

Question 9

Prove that a triangle with side lengths of 8 cm, 6 cm and 10 cm must contain a right-angle. You may use the diagram below to help.



[4 marks]

Question 10

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

(a) How many 2×2 - sized squares are there on a standard chess board?

[1 mark]

Question 10

(b) Write down the number of 3×3 - sized and 4×4 - sized squares there are on a standard chess board.

[2 marks]

Question 10

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

[3 marks]



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