

Pearson Edexcel A Level Mathematics 9MA0

Unit Test 1 Proof

Time allowed: 50 minutes

School: www.CasperYC.club

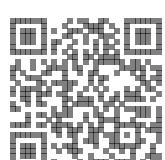
Name:

Teacher:

How I can achieve better:

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Question	Points	Score
1	4	
2	3	
3	5	
4	5	
5	4	
6	4	
7	4	
8	5	
9	10	
10	6	
Total:	50	

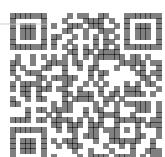


1. It is suggested that the sequence $a_k = 2^k + 1, k \geq 1$ produces only prime numbers.

(a) Show that a_1, a_2 and a_4 produce prime numbers. [2]

(b) Prove by counter example that the sequence does not always produce a prime number. [2]

Total: 4

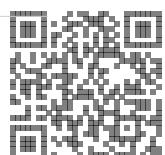


2. Prove by exhaustion that

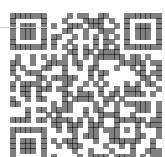
[3]

$$1 + 2 + 3 + \cdots + n \equiv \frac{n(n+1)}{2}$$

for positive integers from 1 to 6 inclusive.

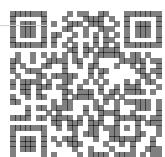


3. Use proof by contradiction to prove the statement: 'The product of two odd numbers is odd.' [5]

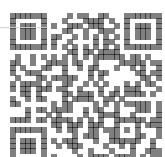


4. Prove by contradiction that if n is odd, $n^3 + 1$ is even.

[5]

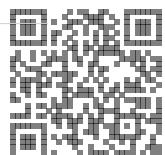


5. Use proof by contradiction to show that there exist no integers a and b for which $25a + 15b = 1$. [4]

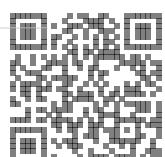


6. Use proof by contradiction to show that there is no greatest positive rational number.

[4]

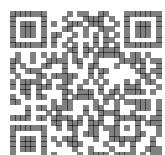


7. Use proof by contradiction to show that, given a rational number a and an irrational number b , [4]
 $a - b$ is irrational.



8. Use proof by contradiction to show that there are no positive integer solutions to the statement

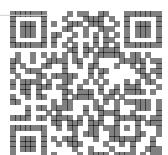
$$x^2 - y^2 = 1.$$



9. (a) Use proof by contradiction to show that if n^2 is an even integer then n is also an even integer. [4]

(b) Prove that $\sqrt{2}$ is irrational. [6]

Total: 10



10. Prove by contradiction that there are infinitely many prime numbers.

[6]

