Proof Exam Practice

Q1. Prove, using algebra, that the sum of any two odd numbers is even.

(2 marks)

Q2. Prove, using algebra, that the sum of any two consecutive integers is always odd.

(2 marks)

Q3. Prove that the difference between the squares of any 2 consecutive integers is always odd.

(2 marks)

Q4. Prove, using algebra, that the sum of any three consecutive integers is always divisible by three.

(2 marks)

Q5. Let n be an even number. Prove that n^2 is even.

(2 marks)

Q6. Prove that $(2n-5)^2 + n^2 + 25n + 1$ is never divisible by 5 for all whole values of n.

(3 marks)

Q7. Prove that $m^2 + m$ is an even number for all values of m.

(3 marks)

Q8. Prove that the points D = (-5, 2), E = (-3, -4) and C = (3, -2) are the vertices of a isosceles triangle.

(3 marks)

Q9. Prove that $3n^2 - 4n + 10$ is positive for all values of n.

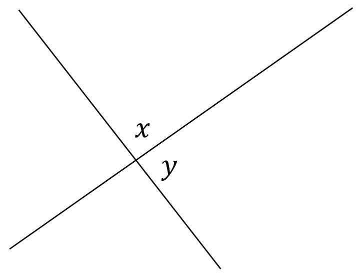
(4 marks)

Q10. Prove that $(4n+3)^2 - (4n-3)^2$ is always divisible by 6 for all whole values of n.

(3 marks)

Mixed Practice Problems

Q11.



(i) Find an expression for y in terms of x.

(1 mark)

(ii) Hence prove that "opposite angles at a point are equal".

(2 marks)

Q12. Prove that the product of two surds is not always a surd.

(2 marks)

Q13. Using algebra, prove that $2^{48} - 1$ is not a prime number.

(3 marks)

Q14. Prove that $\sqrt{x} < x^2$ is not always true.

(2 marks)

Q15. A quadratic sequence has the formula, $an^2 + bn + c$ where n is a whole positive number, and a, b and c are whole numbers.

(i) Work out the first 3 terms of the quadratic sequence.

(1 mark)

(ii) Hence prove that a is equal to half the *second difference* of the sequence

(2 marks)

Q16. Prove that all square numbers are either a multiple of 4 or 1 more than a multiple of 4.

(4 marks)