

PROOF – PRACTICE QUESTIONS



1.

Prove algebraically that $(x + 3)(2x + 2)$ is always an even number.

2.

Prove algebraically that $2x(x + 5) + x(x + 2)$ is always a multiple of 3.

3.

Prove algebraically that $(4x + 3)(x - 4) - 3(x + 4)$ is always a multiple of 4.

4.

Prove algebraically that $(3x - 2)^2 + 2(6x + 1)$ is always a multiple of 3.

5.

Prove algebraically that $(x + 3)^2 - (x - 2)^2$ is always a multiple of 5.

6.

Prove algebraically that $(2x + 1)^2$ is always an odd number.

7.

Prove algebraically that $(4x - 3)^2$ is always an odd number.

8.

Prove algebraically that $(3x - 5)^2 + x(x + 12)$ is always an odd number.

9.

Prove algebraically that $(3x + 4)^2 + (x + 1)(x - 9)$ is always an odd number.

10.

Prove algebraically that $(5x + 2)^2 - (x + 1)(x - 1)$ is always an odd number.

11.

Prove algebraically that the sum of two consecutive integers is always odd.

12.

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

13.

Prove algebraically that the sum of four consecutive integers is always even.

14.

Prove algebraically that the sum of two consecutive odd integers is always a multiple of 4.

15.

Prove algebraically that the sum of three consecutive odd integers is always a multiple of 3.

16.

Prove algebraically that the product of two consecutive odd integers is always odd.

17.
Prove algebraically that the sum of three consecutive even integers is always divisible by 6.

18.
Prove algebraically that the product of two consecutive even integers is always divisible by 4.

19.
Prove algebraically that the sum of four consecutive odd integers is always divisible by 8.

20.
Prove algebraically that the sum of two consecutive square numbers is always odd.

21.
Prove algebraically that the difference of two consecutive square numbers is always odd.

22.

Prove algebraically that $x(x + 12) - 3(2x - 3)$ is always a square number.

23.

Prove algebraically that $(2x + 9)(x + 4) - x(x + 5)$ is always a square number.

24.

Prove algebraically that $(x + 8)^2 - (x + 2)^2$ is always divisible by 12.

25.

Prove algebraically that $(3x + 2)^2$ is always one more than a multiple of 3.

26.

Prove algebraically that $(4x + 5)^2$ is always one more than a multiple of 8.

27.

Prove algebraically that $(2x + 3)^2 - 2(8x + 7)$ is always one less than a multiple of 4.

28.

Prove algebraically that the sum of five consecutive integers is always divisible by 5.

29.

Prove algebraically that when you square an odd number and then take away the number itself you always end up with an even number.

30.

Prove algebraically that the difference of the squares of two consecutive odd numbers is always a multiple of 8.

31.

Prove algebraically that the sum of three consecutive square numbers is always one less than a multiple of 3.

32.

Prove algebraically that $(4x + 3)(x - 1) + 7(3x + 4)$ is a square number for all values of x .

33.

Prove algebraically that $(3x + 2)^2 + x(1 - 6x)$ is never prime when x is positive.