2.

If 𝑛 is even, then (𝑛 + 3)2 is odd.

If 𝑛 is even, then, by definition, there exists an integer 𝑘 such that 𝑛 = 2𝑘.

We substitute this value of 𝑛 into the expression (𝑛 + 3)2 as follows:

(𝑛 + 3)2 = (2𝑘 + 3)2

= 4𝑘2 + 12𝑘 + 9 (expanding the term)

= 2(2𝑘2 + 6𝑘 + 4) + 1 (factorizing 2 out of the terms with *k*)

= 2*t* + 1, where *t* = 2𝑘2 + 6𝑘 + 4

*t* is an integer because the product of integers is an integer, and the sum of integers is an integer.

An odd number, *r*, can be expressed in the form 2*k* + 1, where *k* is an integer.

Therefore, (𝑛 + 3)2 is an odd number.

3.

grandfather(X, Z) :-

father(X, Y), (mother(Y, Z) ; father(Y, Z)).

This rule is saying that X is the grandfather of Z if:

X is the father of some person Y and

Y is the mother or father of some Z

The , operator is used to combine two conditions, so the first condition is that X is the father of Y, and the second condition is that Y is either the mother or father of Z.

The ; operator is used to combine two possibilities: either Z is the mother of Y, or Z is the father of Y. So, the rule reads as follows: X is the grandfather of Z if there exists some person Y, who is the child of X and the parent of Z.