Question 1

Given that

$x^2 : -3x - 1 = 1 : 2$

find the possible values of x.

Question 2

n is an integer.
Prove algebraically that the sum of $n(n+8)+16$ and $3(n+1)(n-5)$ is always a square number.

Question 1

Given that

$x^2 : -3x - 1 = 1 : 2$

find the possible values of x.

$$\begin{aligned} & 2(x^2) && = && 1(-3x - 1) \\ \Longrightarrow \quad & 2x^2 && = && -3x - 1 \\ \Longrightarrow \quad & 2x^2 + 3x + 1 && = && 0 \\ \Longrightarrow \quad & (2x + 1)(x + 1) && = && 0 \\ \Longrightarrow \quad & x = -\frac{1}{2}, \quad x = -1 \end{aligned}$$

Question 2

n is an integer.
Prove algebraically that the sum of $n(n+8)+16$ and $3(n+1)(n-5)$ is always a square number.

$$n(n+8) + 16 + 3(n+1)(n-5)$$

$$= n^2 + 8n + 16 + 3(n^2 - 4n - 5)$$

$$= n^2 + 8n + 16 + 3n^2 - 12n - 15$$

$$= 4n^2 - 4n + 1$$

$$= (2n-1)^2 \text{ which is a square number.}$$