Question 1

Given that

$x^2 : 3x + 28 = 1 : 1$

find the possible values of x.

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$$\begin{aligned} & 1(x^2) && = && 1(3x + 28) \\ \Longrightarrow \quad & x^2 && = && 3x + 28 \\ \Longrightarrow \quad & x^2 - 3x - 28 && = && 0 \\ \Longrightarrow \quad & (x-7)(x+4) && = && 0 \\ \Longrightarrow \quad & x = 7, \ x = -4 \end{aligned}$$

Question 2

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

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

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

$$= n^2 + 8n + 16 + 3n^2 + 12n + 9$$

$$= 4n^2 + 20n + 25$$

$$= (2n+5)^2 \text{ which is a square number.}$$