Question 1

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$x^2 : -7x \ - \ 4 \ = 2 : 3$

find the possible values of x.

Question 2

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Prove algebraically that the sum of $n(n + 92) + 100$ and $8(n + 1)(n - 8)$ is always a square number.

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$$\begin{aligned} & 3(x^2) && = && 2(-7x - 4) \\ \Longrightarrow \quad & 3x^2 && = && -14x - 8 \\ \Longrightarrow \quad & 3x^2 + 14x + 8 && = && 0 \\ \Longrightarrow \quad & (3x + 2)(x + 4) && = && 0 \\ \Longrightarrow \quad & x = -\frac{2}{3}, \quad x = -4 \end{aligned}$$

Question 2

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Prove algebraically that the sum of $n(n + 92) + 100$ and $8(n + 1)(n - 8)$ is always a square number.

$$n(n + 92) + 100 + 8(n + 1)(n - 8)$$

$$= n^2 + 92n + 100 + 8(n^2 - 7n - 8)$$

$$= n^2 + 92n + 100 + 8n^2 - 56n - 64$$

$$= 9n^2 + 36n + 36$$

$$= (3n + 6)^2 \text{ which is a square number.}$$