Question 1

n is an integer.

Prove algebraically that $2n^2\left(\dfrac{6}{n}+n\right)+6n\left(n^2-2\right)$ is always a cube number.

Question 2

Solve $\dfrac{x}{7}-\dfrac{x}{x+1}=11$, writing your solutions correct to 3 decimal places.

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$$2n^2\left(\frac{6}{n}+n\right)+6n\left(n^2-2\right)$$

$$= 12n + 2n^3 + 6n^3 - 12n$$

$$= 8n^3$$

$= (2n)^3$, which is a cube number.

Question 2

Solve $\frac{x}{7}-\frac{x}{x+1}=11$, writing your solutions correct to 3 decimal places.

Multiplying each side by $7(x+1)$, we get

$x^2 - 6\,x = 77\,x + 77$

Rearranging, we get $x^2 - 83\,x - 77 = 0$

Solving using the quadratic formula we see

$x = 83.918$, $x = -0.918$