

Question 1

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Prove algebraically that $3n^2\left(\frac{24}{n} + n\right) + 24n(n^2 - 3)$ is always a cube number.

Question 2

Solve $\frac{x}{3} - \frac{2x}{x+6} = 10$, writing your solutions correct to 3 decimal places.

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$$\begin{aligned} & 3n^2\left(\frac{24}{n} + n\right) + 24n(n^2 - 3) \\ &= 72n + 3n^3 + 24n^3 - 72n \\ &= 27n^3 \\ &= (3n)^3, \text{ which is a cube number.} \end{aligned}$$

Question 2

Solve $\frac{x}{3} - \frac{2x}{x+6} = 10$, writing your solutions correct to 3 decimal places.

Multiplying each side by $3(x+6)$, we get

$$x^2 = 30x + 180$$

Rearranging, we get $x^2 - 30x - 180 = 0$

Solving using the quadratic formula we see

$$x = 35.125, x = -5.125$$
