

YOU & MATHS **Verifying** Given $a = \sqrt{3} - 1$, verify that: $a^3 + a^2 - 4a + 2 = 0$.

In order to simplify the calculations and to avoid evaluating third powers, we rewrite the equality:

$$a^3 + a^2 - 4a + 2 = 0 \rightarrow a^2(a + 1) - 4a + 2 = 0.$$

We now substitute the value $a = \sqrt{3} - 1$ and we get:

$$\begin{aligned} a^2(a + 1) - 4a + 2 &= (\sqrt{3} - 1)^2 \cdot (\sqrt{3} - 1 + 1) - 4(\sqrt{3} - 1) + 2 = (4 - 2\sqrt{3}) \cdot \sqrt{3} - 4\sqrt{3} + 4 + 2 = \\ &= 4\sqrt{3} - 6 - 4\sqrt{3} + 6 = 0. \end{aligned}$$

Therefore the equality is verified.