Polynomial notation and operations

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. State the degree and leading coefficient of $7 - 2x^4 + x$. [2 marks]

In descending order it is $-2x^4 + x + 7$.

Answer: Degree 4; leading coefficient -2.

2. Which are polynomials in x: $x^2 + \sqrt{3}$, $x^{-2} + 1$, $\sqrt{x} + 2$? [2 marks]

A constant $\sqrt{3}$ is allowed. Negative or fractional powers of x are not.

Answer: Only $x^2 + \sqrt{3}$.

3. Add $4x^3 - x^2 + 6$ and $-x^3 + 3x - 8$. [2 marks]

Add coefficients of each matching power, including zero coefficients.

Answer: $3x^3 - x^2 + 3x - 2$

4. Simplify $(2x^2 - 5x + 1) - (3x^2 + x - 4)$. [2 marks]

Change all signs in the second bracket, then collect like terms.

Answer: $-x^2 - 6x + 5$

5. Expand $(x + 2)(x^2 - 3x + 5)$. [2 marks]

$x^3 - 3x^2 + 5x + 2x^2 - 6x + 10 = x^3 - x^2 - x + 10$.

Answer: $x^3 - x^2 - x + 10$

6. A non-zero cubic is multiplied by a non-zero quartic. What is the degree of the product? Can their sum have degree 3? [2 marks]

Multiply leading terms to obtain degree $3 + 4$. The cubic has no fourth-degree term to cancel the quartic leading term.

Answer: Product degree 7; their sum has degree 4, not 3.