Factor Theorem & Polynomials

i. **Decide which of the following are factors of the function:**

$$f(x) = 8x^4 - 10x^3 - 97x^2 + 27x + 36$$

- $(x + 2)$
- $(x - 4)$
- $(x + 1)$
- $(2x + 1)$

- $(x + 3)$
- $(3x - 2)$
- $(2x - 1)$
- $(4x - 3)$

ii.
- **Show that** $(2x + 3)$ **is a factor of** $g(x) = 2x^4 + 7x^3 - 20x^2 - 19x + 30.$
- **Hence, find the values of** p, q, r, s **such that** $(2x + 3)(px^3 + qx^2 + rx + s) = g(x).$
- $(x - 1)$ **is also a factor of** $g(x).$ **Hence, factorise** $g(x)$ **completely.**

iii.
- **Use trial and error to find one factor of:**

$$f(x) = x^3 - 2x^2 - 5x + 6$$

- **Hence, factorise** $f(x)$ **fully.**

iv. **Given that** $h(x) = 2x^2 - 5x - 1$**:**
- **Divide** $h(x)$ **by** $(x - 3)$ **using long division.**
- **Hence, show that** $h(x)$ **can be written in the form** $(x - 3)(ax + b) + c$**, where** a, b, c **are integers.**