Some "hard" factoring problems chosen by my students:

$$(x + 1)^2 - 8(x - 1) + 16$$

$$8(x - 3)^2 - 64(x - 3) + 128$$

$$7a^2x - 6a^2 - 7x + 6$$

$$x^4 - x^2 - 12$$

$$a^{4n} - b^{4n}$$