The GCF of the three terms is $6x$, so $6x^3 + 6x^2 - 72x = 6x\left(x^2 + x - 12\right)$.

Factor by grouping:

$$6x\left(x^2 + x - 12\right) = 6x\left(x^2 + 4x - 3x - 12\right) = 6x(x + 4)(x - 3)$$