

STEP/Polynomials Q1 (26/6/23)

Factorise $2x^3 - 33x^2 - 6x + 11$

Solution

If the factorisation is of the form $= (x + a)(2x^2 + bx + c)$,

then a must be \pm a factor of 11

Applying the factor theorem, this is found not to be the case.

Let $2x^3 - 33x^2 - 6x + 11 = (2x + a)(x^2 + bx + c)$,

Equating coefficients gives:

$$-33 = 2b + a, -6 = 2c + ab \quad \& \quad 11 = ac$$

Testing the possible combinations of a & c (\pm the factors of 11)

shows that $a = -1, c = -11$ & $b = -16$

ie $2x^3 - 33x^2 - 6x + 11 = (2x - 1)(x^2 - 16x - 11)$