

1. Divide the polynomial  $3x^4 - 4x^3 - 3x - 1$  by  $x - 1$  and find its quotient and remainder.
2. If  $2x + y = -5$ , prove that  $8x^3 + y^3 - 30xy + 125 = 0$
3. Factorise by using the factor theorem:  $x^3 + 13x^2 + 32x + 20$
4. Let  $R_1$  and  $R_2$  are the remainders when the polynomials  $x^3 + 2x^2 - 5ax - 7$  and  $x^3 + ax^2 - 12x + 6$  are divided by  $(x + 1)$  and  $(x - 2)$  respectively. If  $2R_1 + R_2 = 6$ , find the value of  $a$ .
5. Factorise:
  - a.  $343a^3 - 729b^3$
  - b.  $25x^3y - 121xy^3$
6. If  $a, b, c$  are all non-zeroes and  $a + b + c = 0$ , prove that 
$$\frac{a^2}{bc} + \frac{b^2}{ac} + \frac{c^2}{ab} = 3.$$
7. Find the value of  $k$ , if  $x + 2$  is a factor of  $3x^2 + kx + 6$ .
8. Factorise:  $27x^3 + y^3 + z^3 - 9xyz$
9. Factorise:  $9(2a - b)^2 - 4(2a - b) - 13$
10. If  $f(x) = 3x^3 - 5x^2 + 7x - 11$ , is  $f(0) + f(1) = f(2)$ ?