5 Factors of polynomials

1 Multiply $(x^3 + 2x^2 + x - 4)$ by $(x + 2)$.

2 Multiply $(2x^3 - 3x^2 + 2x + 2)$ by $(x - 1)$.

3 Multiply $(2x^3 - 5x^2 + 4)$ by $(2x - 1)$.

4 Multiply $(x^3 + 3x^2 - 5x + 5)$ by $(x + 3)$.

5 Multiply $(2x^2 - 5x + 6)$ by $(x^2 + x - 2)$.

6 Divide $(x^3 + x^2 - 4x - 4)$ by $(x + 1)$.

7 Divide $(x^3 + 7x^2 + 16x + 12)$ by $(x + 2)$.

8 Divide $(x^3 - 13x + 12)$ by $(x - 1)$.

9 Simplify $(2x^2 - 7x + 1)^2$.

10 Determine whether the following linear functions are factors of the given polynomials or not.

a) $(x^3 + 9x^2 - 2x + 4); (x - 1)$

b) $(x^3 - x^2 - x + 1); (x + 1)$

c) $(2x^3 - 2x^2 + 5x - 5); (x - 1)$

11 For each equation:

(i) use the factor theorem to find a factor of each function

(ii) factorise each function as a product of three linear factors

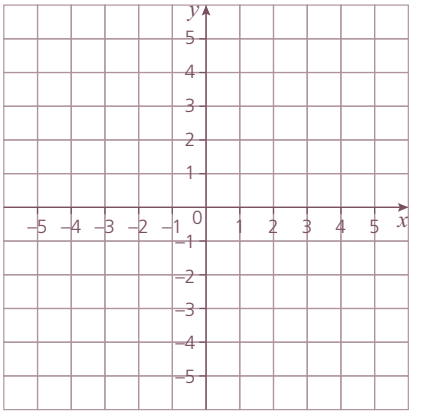
(iii) draw its graph on the axes provided.

a) $x^3 - 3x^2 - x + 3$

(i)

(ii)

(iii)

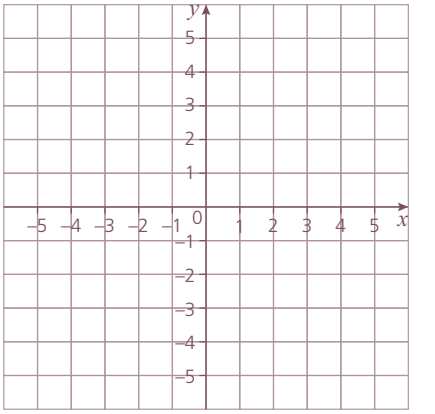


b) $x^3 + 2x^2 - 5x - 6$

(i)

(ii)

(iii)



12 Factorise as far as possible: $x^3 + 6x^2 + 12x + 7$.

13 For what value of a is $(x - 3)$ a factor of $x^3 - ax^2 + 18$?

14 For what value of b is $(2x + 1)$ a factor of $2x^3 - 7x^2 - bx - 6$?

15 The expression $x^3 + px^2 - 6x + q$ is exactly divisible by $(x + 1)$ and $(x + 4)$.

Find and solve two simultaneous equations to find p and q.

16 Find the remainder when each function is divided by the linear factor (shown in brackets).

a) $x^3 + 3x^2 - 2x + 1; (x - 2)$

b) $3x^3 + 3x^2 - 4x - 14; (x - 1)$

17 The equation $f(x) = x^3 + 3x^2 - 10x - 24$ has three integer roots. Solve $f(x) = 0$.

18 When $x^3 + ax^2 + bx + 2$ is divided by $(x - 2)$ the remainder is 36.
When it is divided by $(x + 3)$ the remainder is -4.

a) Find the values of a and b.

b) Solve the equation $x^3 + ax^2 + bx + 2 = 0$.