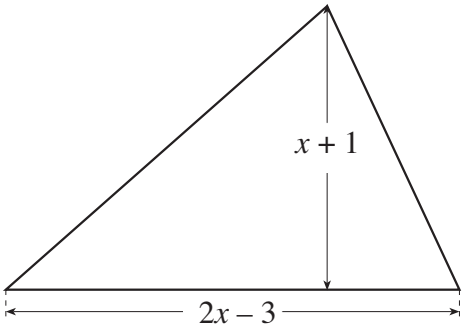
1 You are given that $f(x) = x^3 + kx + c$. The value of $f(0)$ is 6, and $x - 2$ is a factor of $f(x)$.

Find the values of k and c. [3]

2 The triangle shown in Fig. 10 has height $(x + 1)$ cm and base $(2x - 3)$ cm. Its area i cm^2.



Not to scale

Fig. 10

(i) Show that $2x^2 - x - 21 = 0$. [2]

(ii) By factorising, solve the equation $2x^2 - x - 21 = 0$. Hence find the height and base of the triangle. [3]

3 When $x^3 + kx + 5$ is divided by $x - 2$, the remainder is 3. Use the remainder theorem to find the value of k. [3]

4 When $x^3 + 3x + k$ is divided by $x - 1$, the remainder is 6. Find the value of k. [3]

5 You are given that

- the coefficient of x^3 in the expansion of $(5 + 2x^2)(x^3 + kx + m)$ is 29,
- when $x^3 + kx + m$ is divided by $(x - 3)$, the remainder is 59.

Find the values of k and m. **[5]**

6 You are given that $f(x) = x^3 + 6x^2 - x - 30$.

(i) Use the factor theorem to find a root of $f(x) = 0$ and hence factorise $f(x)$ completely. **[6]**

(ii) Sketch the graph of $y = f(x)$. **[3]**

(iii) The graph of $y = f(x)$ is translated by $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$.

Show that the equation of the translated graph may be written as

$$y = x^3 + 3x^2 - 10x - 24.$$ **[3]**

7 You are given that $f(x) = x^3 + 9x^2 + 20x + 12$.

(i) Show that $x = -2$ is a root of $f(x) = 0$. [2]

(ii) Divide $f(x)$ by $x + 6$. [2]

(iii) Express $f(x)$ in fully factorised form. [2]

(iv) Sketch the graph of $y = f(x)$. [3]

(v) Solve the equation $f(x) = 12$. [3]