# THE FACTOR THEOREM

**1** If $P(x) = x^4 + x^2 - 2$, indicate whether each statement is correct or incorrect.

**(a)** $P(1) = 0$ **(b)** $P(2) = 0$ **(c)** $P(-1) = 0$ **(d)** $P(-2) = 0$

**2** Use the factor theorem to factorise each polynomial

| | |
|---|---|
| **(a)** $x^3 + 4x^2 - 7x - 10$ | **(b)** $x^3 + 2x^2 - 41x - 42$ |
| **(d)** $6x^3 - 5x^2 - 12x - 4$ | **(f)** $2x^3 + 7x^2 - 10x - 24$ |

**8** If $5x^2 - 6x - 56$ and $3x^2 - 14x + a$ have a common factor $(x + b)$, find the values of $a$ and $b$.

**10** Find the values of $a$ and $b$ that make $2x^3 + ax^2 - 13x + b$ exactly divisible by $x^2 - x - 6$.

**12** Let $P(x) = (x-1)(x+3)Q(x) + ax + b$, where $Q(x)$ is a polynomial and $a$ and $b$ are real numbers. The polynomial $P(x)$ has a factor of $(x+3)$. When $P(x)$ is divided by $(x-1)$ the remainder is 8.

**(a)** Find the values of $a$ and $b$.

**(b)** Find the remainder when $P(x)$ is divided by $(x-1)(x+3)$.

**13** The polynomial $P(x)$ is given by $P(x) = ax^3 + 12x^2 + cx - 60$, where $a$ and $c$ are constants. The three zeros of $P(x)$ are 2, $-3$ and $\beta$. Find the value of $\beta$.