

- (E)** 3 Given that, for  $x < 0$ ,  $\frac{2x^2 + 2x - 18}{x(x-3)^2} \equiv \frac{P}{x} + \frac{Q}{x-3} + \frac{R}{(x-3)^2}$ , where  $P$ ,  $Q$  and  $R$  are constants, find the values of  $P$ ,  $Q$  and  $R$ . **(4 marks)**

- (E)** 6  $\frac{4x^3 - 5x^2 + 3x - 14}{x^2 + 2x - 1} \equiv Ax + B + \frac{Cx + D}{x^2 + 2x - 1}$   
Find the values of the constants  $A$ ,  $B$ ,  $C$  and  $D$ . **(4 marks)**

- (E/P)** 7 When  $(1 + ax)^n$  is expanded as a series in ascending powers of  $x$ , the coefficients of  $x$  and  $x^2$  are  $-6$  and  $27$  respectively.
- a** Find the values of  $a$  and  $n$ . **(4 marks)**
  - b** Find the coefficient of  $x^3$ . **(3 marks)**
  - c** State the values of  $x$  for which the expansion is valid. **(1 mark)**

**(E/P)** 14  $f(x) = \frac{12x + 5}{(1 + 4x)^2}$ ,  $|x| < \frac{1}{4}$

For  $x \neq -\frac{1}{4}$ ,  $\frac{12x + 5}{(1 + 4x)^2} = \frac{A}{1 + 4x} + \frac{B}{(1 + 4x)^2}$ , where  $A$  and  $B$  are constants.

- a** Find the values of  $A$  and  $B$ . **(3 marks)**
- b** Hence, or otherwise, find the series expansion of  $f(x)$ , in ascending powers of  $x$ , up to and including the term  $x^2$ , simplifying each term. **(6 marks)**