Topic assessment

1. Expand $(3-x)^{-4}$ in ascending powers of x up to and including the term in x^3, stating the range for which the expansion is valid. [5]

2. Simplify $\dfrac{4x^2-1}{2x^2+5x-3}$. [3]

3. Write as a single fraction in its simplest form $\dfrac{x}{x-3}-\dfrac{3x}{x^2-9}$. [4]

4. Write $\dfrac{6}{9x^2-1}$ as a sum of two partial fractions. [4]

5. Given that $\dfrac{x+15}{(x-1)(x+3)} \equiv \dfrac{A}{x-1}+\dfrac{B}{x+3}$ find values for A and B. [4]

6. Divide $\dfrac{x^2-3x-4}{x^2-25}$ by $\dfrac{x+1}{x-5}$. [4]

7. Divide x^3-2x^2+3 by $x+3$. [5]

8. $\dfrac{1+x}{1-2x}$ is approximately equal to $1+ax+bx^2$. Find the values of a and b. [6]

9. (i) Write $\dfrac{9}{(1-x)(1+2x)^2}$ as partial fractions. [5]

   (ii) Using your answer to part (i), expand $\dfrac{9}{(1-x)(1+2x)^2}$ up to and including the term in x^2, stating the range of values for which your expansion is valid. [7]

10. (i) Write $\mathrm{f}(x)=\dfrac{4}{(x-1)(x+3)}$ as partial fractions. [4]

    (ii) Hence show that $\mathrm{f}'(x)=\dfrac{-1}{(x-1)^2}+\dfrac{1}{(x+3)^2}$. [3]

    (iii) Find the x co-ordinate(s) of any turning points on the curve $y=\mathrm{f}(x)$. [3]

    (iv) Find $\mathrm{f}''(x)$ and hence identify the nature of the turning point(s). [3]

Total 60 marks