C3 RATIONAL EXPRESSIONS *Worksheet C*

1 Express $\dfrac{6}{x^2-9}-\dfrac{7}{2x^2-5x-3}$ as a single fraction in its simplest form. **(6)**

2 $$\mathrm{f}(x)\equiv\frac{3}{2x+3}-\frac{x+9}{2x^2+11x+12},\quad x>0.$$

Show that $\mathrm{f}(x)=\dfrac{1}{x+4}$. **(5)**

3 **a** Express $\dfrac{1}{x-6}-\dfrac{2}{x^2-36}$ as a single fraction in its simplest form. **(3)**

b Hence solve the equation

$$\frac{1}{x-6}-\frac{2}{x^2-36}=\frac{1}{2},$$

giving your answers in the form $a+b\sqrt{5}$, where $a, b\in\mathbb{Z}$. **(4)**

4 $$\mathrm{f}(x)\equiv 2x^3-5x^2-23x-10.$$

a Show that $(x-5)$ is a factor of $\mathrm{f}(x)$. **(2)**

b Express $\dfrac{\mathrm{f}(x)}{2x^2-9x-5}$ in its simplest form. **(5)**

5 Given that the equation

$$\frac{x+6}{x^2+9x+18}+\frac{x-p}{x+7}=0$$

has real, equal roots, find the possible values of the constant p. **(7)**

6 Express $\dfrac{1}{3x-1}-\dfrac{3x}{9x^2-6x+1}-\dfrac{1}{3x^2-x}$ as a single fraction in its simplest form. **(5)**

7 **a** Simplify

i $\dfrac{7x+14}{4-x^2}$,

ii $\dfrac{2x^2+x-28}{3x^2+12x}$. **(4)**

b Hence show that the equation $\dfrac{7x+14}{4-x^2}=\dfrac{2x^2+x-28}{3x^2+12x}$ has no real roots. **(4)**

8 The first three terms of an arithmetic series are $\dfrac{1}{t-2}$, $\dfrac{1}{2}$ and $\dfrac{4}{t^2-2t}$ respectively.

a Show that $\dfrac{4}{t^2-2t}+\dfrac{1}{t-2}=1$. **(2)**

b Given that the common difference of the series is not zero, find the value of t and the first term of the series. **(5)**