

# C3 RATIONAL EXPRESSIONS

## Worksheet C

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

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

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

3 a Express  $\frac{1}{x-6} - \frac{2}{x^2-36}$  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  $f(x) \equiv 2x^3 - 5x^2 - 23x - 10.$

a Show that  $(x-5)$  is a factor of  $f(x)$ . (2)

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

7 a Simplify

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

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

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

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

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