

### Miscellaneous exercise 5

1 Solve the inequality  $x^2 - x - 42 \leq 0$ .

2 Solve the inequality  $(x+1)^2 < 9$ .

3 Solve the inequality  $x(x+1) < 12$ .

4 Solve the inequality  $x - x^3 < 0$ .

5 Solve the inequality  $x^3 \geq 6x - x^2$ .

Use the discriminant ' $b^2 - 4ac$ ' in answering Questions 6 to 8. You may need to check the value  $k = 0$  separately.

6 Find the values of  $k$  for which the following equations have two separate roots.

(a)  $kx^2 + kx + 2 = 0$

(b)  $kx^2 + 3x + k = 0$

(c)  $x^2 - 2kx + 4 = 0$

7 Find the values of  $k$  for which the following equations have no roots.

(a)  $kx^2 - 2kx + 5 = 0$

(b)  $k^2x^2 + 2kx + 1 = 0$

(c)  $x^2 - 5kx - 2k = 0$

8 Find the range of values of  $k$  for which the equation  $x^2 + 3kx + k = 0$  has any roots.

9 Find the set of values of  $x$  for which  $9x^2 + 12x + 7 > 19$ .

10 Sketch, on the same diagram, the graphs of  $y = \frac{1}{x}$  and  $y = x - \frac{3}{2}$ . Find the solution set of the inequality  $x - \frac{3}{2} > \frac{1}{x}$ .

11 Solve each of the following inequalities.

(a)  $\frac{x}{x-2} < 5$

(b)  $x(x-2) < 5$