

Inequalities (answers at the end)

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

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

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

(OCR)

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 distinct 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 $9x^2 + 12x + 7 > 19$.

(OCR)

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 $x - \frac{3}{2} > \frac{1}{x}$.

(OCR)

1 $-6 \leq x \leq 7$

2 $-4 < x < 2$

3 $-4 < x < 3$

4 $-1 < x < 0$ or $x > 1$

5 $-3 \leq x \leq 0$ or $x \geq 2$

6 (a) $k < 0$ or $k > 8$

(b) $-1\frac{1}{2} < k < 1\frac{1}{2}$ provided $k \neq 0$ (if $k = 0$ the equation is linear, and has just one root)

(c) $k < -2$ or $k > 2$

7 (a) $0 \leq k < 5$ (b) $k = 0$ (c) $-\frac{8}{25} < k < 0$

8 $k \leq 0$ or $k \geq \frac{4}{9}$

9 $x < -2$ or $x > \frac{2}{3}$

10 $-\frac{1}{2} < x < 0$ or $x > 2$