QUADRATICS & INEQUALITIES

AS Unit 1: Pure Mathematics A

WJEC past paper questions: 2010 – 2017

Total marks available 89 (approximately 1 hour 50 minutes)

1. a) Find the range of values of k for which the quadratic equation
$$kx^2 + 3x - 5 = 0$$
has no real roots. (4)
b) Solve the inequality $2x^2 - x - 6 > 0$. (3)
(January 10)

2. a) Find the range of values of k for which the quadratic equation
$$2x^2 + kx + 18 = 0$$
has no real roots. (4)
b) Solve the inequality $10x^2 - x - 3 \geq 0$. (3)
(Summer 10)

3. Given that the quadratic equation
$$2x^2 + (3k - 1)x + (3k^2 - 1) = 0$$
has two distinct real roots, show that
$$5k^2 + 2k - 3 < 0.$$
Find the range of values of k satisfying this inequality. (7)
(January 11)

4. The curve C has equation
$$y = x^2 + (4k + 3)x + 7,$$
and the line L has equation
$$y = x + k,$$
where k is a constant.
Given that L and C intersect at two distinct points,
a) show that $4k^2 + 5k - 6 > 0$, (6)
b) find the range of values of k satisfying this inequality. (3)
(Summer 11)

5. Given that the quadratic equation
$$(k + 6)x^2 + 4x + (k + 3) = 0$$
has no real roots, show that
$$k^2 + 9k + 14 > 0.$$
Find the range of values of k satisfying this inequality. (7)
(January 12)

6. a) Show that the equation
$$x^2 + (2k - 1)x + (k^2 - k + 2) = 0$$
has no real roots, whatever the value of the constant k. (4)
b) Find the range of values of x satisfying the inequality.
$$3x^2 + 16x - 12 > 0.$$ (3)
(Summer 12)

7. a) Find the range of values of k for which the quadratic equation
$$5x^2 + 6x - 3k = 0$$
has two distinct real roots. (4)

b) Solve the inequality
$$2x^2 - 11x + 15 \leq 0.$$ (3)

(January 13)

8. a) i) Assuming that the quadratic equation
$$(k+1)x^2 + (4k+1)x + (k-5) = 0$$
has **two equal** roots, show that $4k^2 + 8k + 7 = 0$

ii) Hence show that there are **no real** values of k such that the quadratic equation
$$(k+1)x^2 + (4k+1)x + (k-5) = 0$$
has two equal roots. (6)

b) Find the range of values of x satisfying the inequality.
$$4x^2 - 9x - 9 \geq 0.$$ (3)

(Summer 13)

9. Given that the quadratic equation
$$(2k-3)x^2 + 8x + (2k+3) = 0$$
has no real roots, show that *k* satisfies an inequality of the form
$$m - nk^2 < 0,$$
where *m*, *n* are integers whose values are to be found.

Hence find the range of values of k such that the quadratic equation
$$(2k-3)x^2 + 8x + (2k+3) = 0$$
has no real roots. (6)

(January 14)

10. Given that the quadratic equation
$$(k-1)x^2 + 2kx + (7k-4) = 0$$
has no real roots, show that
$$6k^2 - 11k + 4 > 0.$$
Find the range of values of k satisfying this inequality. (7)

(Summer 14)

11. a) Find the range of values of k for which the quadratic equation
$$kx^2 + (2k-5)x + (k-6) = 0$$
has **no real roots**. (4)

b) Without carrying out any further calculation, write down the value of k for which the quadratic equation
$$kx^2 + (2k-5)x + (k-6) = 0$$
has **two equal roots**. (1)

(Summer 15)

12. a) Find the range of values of k for which the quadratic equation
$$9x^2 + 8x - 2k = 0$$
has **two distinct real roots**. (4)

b) Solve the inequality
$$x(5x-7) \geq 6.$$ (4)

(Summer 16)

13. Solve the inequality $2x^2 + 11x + 12 \geq 0$. (3)

(Summer 17)