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PURE MATH

ALGEBRA AND FUNCTION

Level & Board	EDEXCEL (A-LEVEL)	
TOPIC:	QUADRATICS	
PAPER TYPE:	QUESTION PAPER 1	
TOTAL QUESTIONS	8	
TOTAL MARKS	28	

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Questions

Q1. The equation $kx^2 + 4kx + 3 = 0$, where *k* is a constant, has no real roots. Prove that

$$0 \le k < \frac{3}{4}$$

(4) (Total for question = 4 marks)

Q2.

- (a) Using algebra, find all solutions of the equation $3x^3 - 17x^2 - 6x = 0$ (3)
- (b) Hence find all real solutions of $3(y-2)^6 - 17(y-2)^4 - 6(y-2)^2 = 0$ (3)

(Total for question = 6 marks)

Q3.

Find, using algebra, all real solutions to the equation (i) $16a^2 = 2\sqrt{a}$

- (ii) $b^4 + 7b^2 18 = 0$

(4)

(4) (Total for question = 8 marks)

Q4.

$$f(x) = 2x^2 + 4x + 9 \quad x \in \mathbb{R}$$

- (a) Write f(x) in the form $a(x + b)^2 + c$, where *a*, *b* and *c* are integers to be find.
 - (3)

(3)

- (b) Sketch the curve with equation y = f(x) showing any points of intersection with the coordinates axes and the coordinates of any turning point.
- (c) (i) Describe the fully transformation that maps the curve with equation y = f(x) onto the curve with equation y = g(x) where g(x) = 2(x 2)² + 4x 3 x ∈ ℝ
 (ii) Find the range of the function

$$h(x) = \frac{21}{2x^2 + 4x + 9} \qquad x \in \mathbb{R}$$

(4) (Total for question = 10 marks)

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Q5.

The quadratic equation $kx^2 + (k - 3)x + 1 = 0$ has two equal real roots. Find the possible value of k.

(4) (Total for question = 4 marks)

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Q6.

The equation $kx^2 + 4x + (5 - k) = 0$, where k is a constant, has two different solutions for x.

(a) Show that *k* satisfies

$$k^2 - 5k + 4 > 0. (4)$$

(b) Hence find the sets of possible values of k.

(4)

(Total for question = 8 marks)

Q7.

Given that the equation

 $kx^2 + 6kx + 5 = 0$ where k is non zero constant

has no real roots, find the range of possible values for k.

(5)

(Total for question = 5 marks)

Q8.

One solution of the equation $kx^2 + (3k + 1)x - 8 = 0$ is x = -4Find

(a) The value of k,

(b) The second possible value of x.

(3)

(3)

(Total for question = 6 marks)

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