Quadratic Functions - Edexcel Past Exam Questions

1. Given that the equation $kx^2 + 12x + k = 0$, where k is a positive constant, has equal roots, find the value of k. **(4)**

Jan 05 Q3

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2. $x^2 - 8x - 29 \equiv (x + a)^2 + b$,

where a and b are constants.

(a) Find the value of a and the value of b. **(3)**

(b) Hence, or otherwise, show that the roots of

$$x^2 - 8x - 29 = 0$$

are $c \pm d\sqrt{5}$, where c and d are integers to be found. **(3)**

June 05 Q3

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3. $x^2 + 2x + 3 \equiv (x + a)^2 + b$.

(a) Find the values of the constants a and b. **(2)**

(b) Sketch the graph of $y = x^2 + 2x + 3$, indicating clearly the coordinates of any intersections with the coordinate axes. **(3)**

(c) Find the value of the discriminant of $x^2 + 2x + 3$. Explain how the sign of the discriminant relates to your sketch in part (b). **(2)**

The equation $x^2 + kx + 3 = 0$, where k is a constant, has no real roots.

(d) Find the set of possible values of k, giving your answer in surd form. **(4)**

Jan 06 Q10

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4. The equation $x^2 + 2px + (3p + 4) = 0$, where p is a positive constant, has equal roots.

(a) Find the value of p. **(4)**

(b) For this value of p, solve the equation $x^2 + 2px + (3p + 4) = 0$. **(2)**

June 06 Q8

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5. The equation $2x^2 - 3x - (k + 1) = 0$, where k is a constant, has no real roots.

Find the set of possible values of k. **(4)**

Jan 07 Q5

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6. The equation $x^2 + kx + (k + 3) = 0$, where k is a constant, has different real roots.

(*a*) Show that $k^2 - 4k - 12 > 0$. **(2)**

(*b*) Find the set of possible values of k. **(4)**

June 07 Q7

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7. The equation

$$x^2 + kx + 8 = k$$

has no real solutions for x.

(*a*) Show that k satisfies $k^2 + 4k - 32 < 0$. **(3)**

(*b*) Hence find the set of possible values of k. **(4)**

Jan 08 Q8

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8. Given that the equation $2qx^2 + qx - 1 = 0$, where q is a constant, has no real roots,

(*a*) show that $q^2 + 8q < 0$. **(2)**

(*b*) Hence find the set of possible values of q. **(3)**

June 08 Q8

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

(*a*) Show that k satisfies

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

(3)

(*b*) Hence find the set of possible values of k. **(4)**

Jan 09 Q7

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10. The equation $x^2 + 3px + p = 0$, where p is a non-zero constant, has equal roots.

Find the value of p. **(4)**

June 09 Q6

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11. $f(x) = x^2 + 4kx + (3 + 11k)$, where k is a constant.

(a) Express $f(x)$ in the form $(x + p)^2 + q$, where p and q are constants to be found in terms of k.

(3)

Given that the equation $f(x) = 0$ has no real roots,

(b) find the set of possible values of k. **(4)**

Given that $k = 1$,

(c) sketch the graph of $y = f(x)$, showing the coordinates of any point at which the graph crosses a coordinate axis. **(3)**

Jan 10 Q10

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12. (a) Show that $x^2 + 6x + 11$ can be written as

$$(x + p)^2 + q,$$

where p and q are integers to be found. **(2)**

(b) Sketch the curve with equation $y = x^2 + 6x + 11$, showing clearly any intersections with the coordinate axes.

(2)

(c) Find the value of the discriminant of $x^2 + 6x + 11$. **(2)**

June 10 Q4

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13. The equation $x^2 + (k - 3)x + (3 - 2k) = 0$, where k is a constant, has two distinct real roots.

(a) Show that k satisfies

$$k^2 + 2k - 3 > 0.$$

(3)

(b) Find the set of possible values of k. **(4)**

Jan 11 Q8

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14. $f(x) = x^2 + (k + 3)x + k,$

where k is a real constant.

(a) Find the discriminant of f(x) in terms of k. **(2)**

(b) Show that the discriminant of f(x) can be expressed in the form $(k + a)^2 + b$, where a and b are integers to be found. **(2)**

(c) Show that, for all values of k, the equation f(x) = 0 has real roots. **(2)**

June 11 Q7