Discriminants - Past Edexcel 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]

   . **Question 3 - Jan 2005**

2. 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]

   . **Question 5 - Jan 2007**

3. 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]

   . **Question 7 - May 2007**

4. 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]

   . **Question 8 - Jan 2008**

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

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

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

   . **Question 8 - Jun 2008**

6. 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]

. **Question 7 - Jan 2009**

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7. The equation $x^2 + 3px + p = 0$, where p is a non-zero constant, has equal roots. Find the value of p. [4]

. **Question 6 - Jun 2009**

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8. 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]

. **Question 8 - Jan 2011**

9.

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

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]

. **Question 7 - May 2011**

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10. The equation

$$(k+3)x^2 + 6x + k = 5, \text{ where } k \text{ is a constant,}$$

has two distinct real solutions for x.

   (a) Show that k satisfies

$$k^2 - 2k - 24 < 0$$

[4]

   (b) Hence find the set of possible values of k. [3]

. **Question 9 - Jan 2013**

Solutions

1. $k = 6$
2. $k < -\frac{17}{8}$
3. (a) -
   (b) $k < -2$, $k > 6$
4. (a) -
   (b) $-8 < k < 4$
5. (a) -
   (b) $-8 < q < 0$
6. (a) -
   (b) $k < 1$, $k > 4$
7. $p = \frac{4}{9}$
8. (a) -
   (b) $k < -3$, $k > 1$
9. (a) $k^2 + 2k + 9$
   (b) $(k+1)^2 + 8$ so $a = 1$, $b = 8$
   (c) $(k+1)^2$ is always positive so $(k+1)^2 + 8$ is always bigger or equal to 8
10. (a) -
    (b) $-4 < k < 6$