A-Level Starter Activity

Jethwa Maths

Topic: The Discriminant Chapter Reference: Pure 1, Chapter 2	8 minutes

1. The equation $(k + 3)x^2 + 6x + k = 5$, where k is a constant

Has two distinct real solutions for x.

a. Show that k satisfies, $k^2 - 2k - 24 < 0$ **(3)**

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

2. 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 $k^2 + 2k - 3 > 0$ **(2)**

b. Find the set of possible values of k. **(3)**

Solutions

1a.

$(k + 3)x^2 + 6x + k = 5$ $(k + 3)x^2 + 6x + (k - 5) = 0$	**M1**
Two distinct solutions, $6^2 - 4(k + 3)(k - 5) > 0$ $36 - 4(k^2 - 2k - 16) > 0$ $36 - 4k^2 - 8k + 60 > 0$	**M1**
$k^2 - 2k - 24 < 0$	**M1**

1b.

$(k - 6)(k + 4) < 0$	**M1**
$k - 6 = 0$ $k = 6$ $k + 4 = 0$ $k = -4$	**M1**
As $y < 0$, $-6 < y < 4$	**M1**

2a.

$b^2 - 4ac > 0$ $(k - 3)^2 - (4)(1)(3 - 2k) > 0$	**M1**
$k^2 - 6k + 9 - 12 + 8k > 0$ $k^2 + 2k - 3 > 0$	**M1**

2b.

$k^2 + 2k - 3 > 0$ $(k + 3)(k - 1) > 0$	**M1**
$k = -3$ or $k = 1$	**M1**
As $y > 0$, $k < -3$ or $k > 1$	**M1**