THE DISCRIMINANT

1	2	3	4	5

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THE DISCRIMINANT

$\Delta = b^2 - 4ac$

QUADRATIC OP. 1

2 real roots

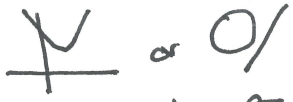
$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

QUADRATIC OP. 2

1 repeated root

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

QUADRATIC OP. 3



no real roots

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$b^2 - 4ac > 0$

$b^2 - 4ac = 0$

$b^2 - 4ac \geqslant 0$

$b^2 - 4ac < 0$

Show that the roots of $px^2 + px + qx + q = 0$ are real for all values of p and q

$b^2 - 4ac$

$= (p+q)^2 - 4(p)(q)$

$= p^2 + 2pq + q^2 - 4pq$

$= p^2 - 2pq + q^2$

$= (p-q)^2 - q^2 + q^2$

$= (p-q)^2$

$\geqslant 0$ for all values of p and q because it is something squared.

$\Rightarrow$ So, the quadratic $px^2 + px + qx + q = 0$ has real roots for all values of p and q