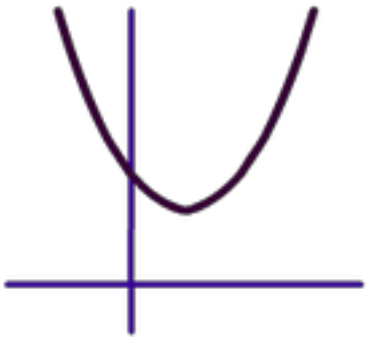
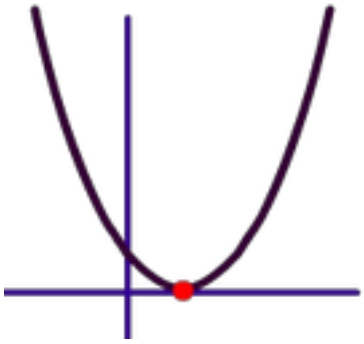
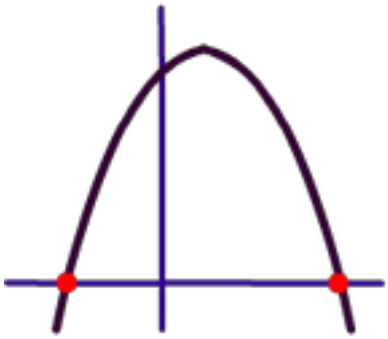
Discriminant

Quadratic function: $ax^2 + bx + c$
We can use quadratic formula to find the roots of the function.

Quadratic formula = $\dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

Discriminant can determine the numbers of root for a quadratic function.

$$\Delta = b^2 - 4ac$$

		
$\Delta < 0$	$\Delta = 0$	$\Delta > 0$
No real root **or** No solution	One real root **or** Two equal roots	Two real distinct roots

1. Find the nature of solutions of the following quadratic functions by using discriminant.

(a) $x^2 + 4x - 2$
(b) $3x^2 - 2x + 9$
(c) $4x^2 + 8x + 4$

2. For the following equations, find all values of k for which the equation has **one real roots**.

(a) $(k+1)x^2 + kx + k = 0$
(b) $kx^2 - 2x + k = 0$

3. For the following equations, find the discriminant and draw the sign diagram. Find all values of k for which the equation has **on real roots**.

(a) $2x^2 + (k-2)x + 2 = 0$
(b) $2x^2 + kx - k = 0$

Exercise
Paper 1

1. Let f*(x)* = m $-\frac{1}{x}$, for x ≠ 0. The line y = x – m intersects the graph of *f* in two distinct points. Find the possible values of *m*.

2. Let $f(x) = 3\tan^4 x + 2k$ and $g(x) = -\tan^4 x + 8k\tan^2 x + k$, for $0 \leq x \leq 1$, where $0 < k < 1$.

The graphs of f and g intersect at exactly one point. Find the value of k.

Paper 2

1. (calculator) Let $f(x) = kx^2 + kx$ and $g(x) = x - 0.8$. The graphs of f and g intersect at two distinct points.

Find the possible values of k.