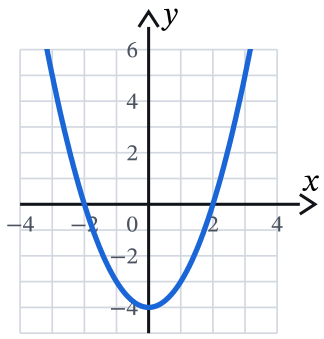
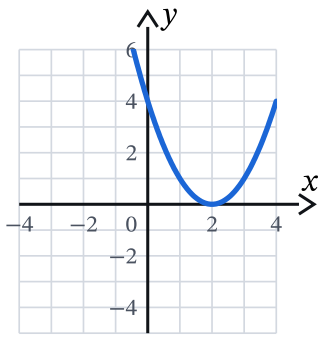
Name _____ Date _____

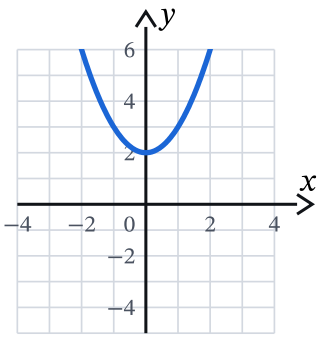
How Many Zeros?



$x^2 - 4$: $D = 16 > 0$, two



$x^2 - 4x + 4$: $D = 0$, one



$x^2 + 2$: $D = -8 < 0$, none

Remember

The **discriminant** $D = b^2 - 4ac$ tells how many zeros $f(x) = ax^2 + bx + c$ has: for $D > 0$ **two**, for $D = 0$ **one** (the parabola touches the x-axis), for $D < 0$ **none**. The vertex is exactly between the zeros: $x_V = \frac{x_1 + x_2}{2}$.

1 ON YOUR OWN Work out the discriminant and find the zeros.

Function	D	Number of zeros	Zeros
$x^2 - 6x + 5$			
$x^2 + 4x + 4$			
$x^2 - 2x + 5$			
$2x^2 - 3x - 2$			
$-x^2 + 6x - 9$			
$x^2 + x + 1$			

Names (group) _____ Date _____

2 IN A GROUP **For which c?** The group explores $f(x) = x^2 + 4x + c$. Move the parabola in the app (*Three forms* mode, slider c) and complete.

two zeros for c ☐

one zero for c ☐

no zeros for c ☐

Check with the discriminant: $D = 16 - 4c$.

---

3 ON YOUR OWN **Challenge: zeros and coefficients.** For $x^2 - 5x + 6$ work out the zeros, their sum and their product. Compare with $-\frac{b}{a}$ and $\frac{c}{a}$.

$x_1 =$ ☐ $x_2 =$ ☐ $x_1 + x_2 =$ ☐ $x_1 \cdot x_2 =$ ☐

4 IN A GROUP **True or false?**

Every parabola crosses the x-axis.	**true** /	**false**
If $a > 0$ and $c < 0$, the parabola has two zeros.	**true** /	**false**
A parabola with vertex $V(2, 3)$ and $a > 0$ has no zeros.	**true** /	**false**

★ ON YOUR OWN **Exit card.** How many zeros does $f(x) = x^2 - 6x + 9$ have? $D =$ ☐ zeros: ☐