Name _____ Date _____

Using the Discriminant

Example

The trinomial $x^2 - 8x + 16$ has discriminant $D = 64 - 64 = 0$. The equation $x^2 - 8x + 16 = 0$ has one solution $x = 4$, and the trinomial is **the square of a binomial** : $x^2 - 8x + 16 = (x - 4)^2$.

1 ON YOUR OWN Work out the discriminant. Is the trinomial the square of a binomial? If it is, write it as a square.

trinomial	D	a square?	written as
$4x^2 - 12x + 9$		yes / no	
$x^2 + 10x + 25$		yes / no	
$9x^2 + 6x + 1$		yes / no	
$x^2 + 4x + 16$		yes / no	
$25x^2 - 20x + 4$		yes / no	

2 ON YOUR OWN Work out the discriminant. If D is the square of a whole number, factorise the trinomial.

trinomial	D	a square number?	factorised
$x^2 + 5x + 6$		yes / no	
$x^2 + 5x + 3$		yes / no	
$x^2 - x - 20$		yes / no	
$x^2 + 4x + 1$		yes / no	
$2x^2 + 7x + 3$		yes / no	

Names (pair) _____ Date _____

Remember

The discriminant tells **how many solutions** an equation has, without solving it. If $D = 0$, the trinomial is the square of a binomial. If D is a square number, the solutions are rational and we can factorise the trinomial without square roots. The question *Can …?* often means: *Is* $D \geq 0$*?*

3 IN PAIRS A rectangle has perimeter 20 cm. Can its area be 24 cm²? 30 cm²? 25 cm²? For each area, write an equation and work out the discriminant. What is the largest possible area?

4 IN PAIRS A ball is thrown upwards. After t seconds its height is $20t - 5t^2$ metres. Does it reach a height of 25 m? What about 20 m? Answer using the discriminant.

5 IN PAIRS Choose a number c so that the equation $x^2 + 8x + c = 0$ has: a) two solutions, b) one solution, c) no solutions.

a) $c =$ ☐ b) $c =$ ☐ c) $c =$ ☐

★ ON YOUR OWN **Exit card.** Is $x^2 - 14x + 49$ the square of a binomial? Does $3x^2 + 2x + 1 = 0$ have real solutions?