Names (pair) _____ Date _____

Using Vieta's Formulas

Example

An equation with solutions 2 and -5 : the sum is -3 and the product is -10 . For $a = 1$,

$b = -(x_1 + x_2) = 3$ and $c = x_1\, x_2 = -10$:

$x^2 - (x_1 + x_2)x + x_1\, x_2 = 0 \;\Rightarrow\; x^2 + 3x - 10 = 0$

1 IN PAIRS Write a quadratic equation with whole-number coefficients whose solutions are the given numbers. **Student A** does the left column and **student B** the right one. Then swap sheets and check your partner's equations with Vieta's formulas.

student A

1 and 4 : ☐

0 and 7 : ☐

$\frac{1}{2}$ and 3 : ☐

student B

-2 and 3 : ☐

5 and 5 : ☐

$\sqrt{2}$ and $-\sqrt{2}$: ☐

2 ON YOUR OWN Solve in your head: look for two numbers whose sum is $-b$ and whose product is c.

$x^2 - 9x + 14 = 0$

$x_1 =$ ☐ $x_2 =$ ☐

$x^2 + x - 12 = 0$

$x_1 =$ ☐ $x_2 =$ ☐

$x^2 - 11x + 30 = 0$

$x_1 =$ ☐ $x_2 =$ ☐

$x^2 + 10x + 21 = 0$

$x_1 =$ ☐ $x_2 =$ ☐

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Remember

If x_1 and x_2 are the solutions of $ax^2 + bx + c = 0$, then $ax^2 + bx + c = a(x - x_1)(x - x_2)$. Many expressions in the solutions can be worked out from the sum and the product, e.g. ${x_1}^2 + {x_2}^2 = (x_1 + x_2)^2 - 2x_1 x_2$.

3 IN PAIRS The solutions of $x^2 - 5x + 3 = 0$ are x_1 and x_2. Without solving the equation, work out:

$x_1 + x_2 =$ ☐ $x_1 \times x_2 =$ ☐

${x_1}^2 + {x_2}^2 =$ ☐ $\frac{1}{x_1} + \frac{1}{x_2} =$ ☐

$(x_1 - x_2)^2 =$ ☐

4 IN PAIRS Factorise the trinomial using the solutions of the matching equation.

$2x^2 - 5x - 3 =$ ☐

$x^2 - 2x - 1 =$ ☐

$3x^2 + 5x - 2 =$ ☐

5 IN PAIRS A rectangle has perimeter 26 cm and area 40 cm². What are the sum and the product of its side lengths? Write an equation whose solutions are the sides, and solve it.

★ ON YOUR OWN **Exit card.** Write an equation whose solutions are -3 and 4. For $x^2 + 4x - 1 = 0$, work out ${x_1}^2 + {x_2}^2$ without solving.