Names (pair) _____ Date _____

Vieta's Formulas

1 IN PAIRS Share the work: **student A** solves the top three equations and **student B** the bottom three. Solve them in any way and complete the table.

	equation	x_1	x_2	$x_1 + x_2$	$x_1 \times x_2$
student A	$x^2 - 5x + 6 = 0$				
	$x^2 - 2x - 8 = 0$				
	$x^2 + 7x + 10 = 0$				
student B	$x^2 - 9 = 0$				
	$x^2 - 4x = 0$				
	$2x^2 - 7x + 3 = 0$				

2 IN PAIRS Compare the sum of the solutions with the coefficients a and b, and the product with a and c. Look at the last row too, where $a = 2$. What do you notice? Write the rule.

$x_1 + x_2 =$ ____ $x_1 \times x_2 =$ ____

Remember

Vieta's formulas (François Viète, 16th century): the solutions of $ax^2 + bx + c = 0$ satisfy $x_1 + x_2 = -\frac{b}{a}$ and $x_1 \times x_2 = \frac{c}{a}$. For $a = 1$: the sum of the solutions is $-b$ and the product is c.

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3 IN PAIRS Prove Vieta's formulas. Add and multiply $x_1 = \frac{-b+\sqrt{D}}{2a}$ and $x_2 = \frac{-b-\sqrt{D}}{2a}$, where $D = b^2 - 4ac$.

$$x_1 + x_2 = \frac{\square}{2a} = \square$$

$$x_1 \times x_2 = \frac{\square}{4a^2} = \frac{\square}{4a^2} = \square$$

4 IN PAIRS Without solving, check whether the given numbers are the solutions of the equation.

$x^2 + 2x - 15 = 0$	3 and -5	**yes** / **no**
$x^2 - 8x + 10 = 0$	2 and 6	**yes** / **no**
$x^2 + x - 6 = 0$	-3 and 2	**yes** / **no**
$2x^2 - 5x + 2 = 0$	2 and $\frac{1}{2}$	**yes** / **no**

5 IN PAIRS One solution of $x^2 + 3x - 28 = 0$ is 4. Find the other solution without solving the equation. Check with the product.

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★ ON YOUR OWN **Exit card.** What are the sum and the product of the solutions of $3x^2 - 6x - 9 = 0$?

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