LESSON MAKER PRO

Find the Zeros

Factor a quadratic to see where its value is zero.

GRADE 8 · 8A.AF.A.6.a

8A.AF.A.6.a "Factor quadratic expressions with leading coefficients of one, and use the factored form to reveal the zeros of the function it defines."

NAME _____ DATE _____

FACTOR, THEN SOLVE

To factor $x^2 + bx + c$, find two numbers that multiply to c and add to b. Write the expression as $(x + m)(x + n)$. The zeros are the x-values that make either factor equal zero.

WORKED EXAMPLE

Factor $x^2 + 13x + 40$ and find its zeros.

1. Find two numbers that multiply to 40 and add to 13: 5 and 8.
2. Factor: $x^2 + 13x + 40 = (x + 5)(x + 8)$.
3. Set each factor equal to zero: $x + 5 = 0$ or $x + 8 = 0$.

Answer: (x + 5)(x + 8); zeros: x = -5 and x = -8

PRACTICE 6 problems

1 Factor $x^2 + 9x + 14$ and find its zeros.

ANSWER _____

2 Factor $x^2 - 7x + 12$ and find its zeros.

ANSWER _____

3 Factor $x^2 + x - 12$ and find its zeros.

ANSWER _____

4 Factor $x^2 - 4x - 21$ and find its zeros.

ANSWER _____

5 Factor $x^2 - 6x + 9$ and find its zeros.

ANSWER _____

6 Factor $x^2 - 16$ and find its zeros.

ANSWER _____

APPLY IT Show your work

1 In a game, a player's net points after x rounds are modeled by $P(x) = x^2 - 10x + 21$. Factor P(x). After how many rounds are the net points zero?

WORK SPACE

ANSWER _____

2 At a school dance, a playlist's net votes after x songs are modeled by $V(x) = x^2 - 11x + 28$. Factor V(x). After how many songs are the net votes zero?

WORK SPACE

ANSWER _____

CHALLENGE One step up

One zero of $x^2 + bx + 18$ is $x = -3$. Find b, factor the expression, and find its other zero. Show how you know.

WORK SPACE AND ANSWER

ANSWER KEY

Find the Zeros

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Factor $x^2 + 9x + 14$ and find its zeros.	**(x + 7)(x + 2); zeros: x = -7 and x = -2**
2	Factor $x^2 - 7x + 12$ and find its zeros.	**(x - 3)(x - 4); zeros: x = 3 and x = 4**
3	Factor $x^2 + x - 12$ and find its zeros.	**(x + 4)(x - 3); zeros: x = -4 and x = 3**
4	Factor $x^2 - 4x - 21$ and find its zeros.	**(x - 7)(x + 3); zeros: x = 7 and x = -3**
5	Factor $x^2 - 6x + 9$ and find its zeros.	**(x - 3)(x - 3); one zero: x = 3**
6	Factor $x^2 - 16$ and find its zeros.	**(x - 4)(x + 4); zeros: x = 4 and x = -4**

PART 2 · APPLY IT

1. **P(x) = (x - 3)(x - 7); after 3 or 7 rounds** The factors are (x - 3) and (x - 7). Set each factor equal to zero to find the round counts.
2. **V(x) = (x - 4)(x - 7); after 4 or 7 songs** The factors are (x - 4) and (x - 7). Set each factor equal to zero to find the song counts.

CHALLENGE

Since -3 is a zero, 9 - 3b + 18 = 0, so b = 9. The expression is (x + 3)(x + 6), and its other zero is x = -6.

Accept factors in either order and zeros in either order. In problem 5, accept $(x - 3)^2$ and a single zero of x = 3.