LESSON MAKER PRO

Find the Zeros

Factor each quadratic to find where its value is zero.

HIGH SCHOOL · A1P.AF.A.6.a

A1P.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 expression equals zero when either factor equals zero.

WORKED EXAMPLE

Factor $x^2 + 27x + 182$ and find its zeros.

1. Find two numbers that multiply to 182 and add to 27: 13 and 14.
2. Factor: $x^2 + 27x + 182 = (x + 13)(x + 14)$.
3. Set each factor equal to zero: $x + 13 = 0$ or $x + 14 = 0$.

Answer: (x + 13)(x + 14); zeros: -13 and -14

PRACTICE 6 problems

1 Factor $x^2 + 9x + 20$ and find its zeros.

ANSWER _____

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

ANSWER _____

3 Factor $x^2 - 10x + 25$ and find its zero.

ANSWER _____

4 Factor $x^2 + 2x - 15$ and find its zeros.

ANSWER _____

5 Factor $x^2 - 7x + 10$ and find its zeros.

ANSWER _____

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

ANSWER _____

APPLY IT Show your work

1 A school club models its balance, in dollars, after selling x batches of pins as $B(x) = x^2 - 9x + 18$. Factor B(x). For how many batches does the model predict a balance of $0?

WORK SPACE

ANSWER _____

2 In a video game, a character's height relative to a platform, in meters, is $H(x) = x^2 - 5x + 4$, where x is time in seconds. Factor H(x). At what times is the character level with the platform?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A classmate says $x^2 - 4x - 21$ has zeros 7 and 3 because $7 \times 3 = 21$. Explain the mistake. Then factor the expression and give its zeros.

WORK SPACE AND ANSWER

ANSWER KEY

Find the Zeros

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Factor $x^2 + 9x + 20$ and find its zeros.	**(x + 4)(x + 5); zeros: -4 and -5**
2	Factor $x^2 - x - 12$ and find its zeros.	**(x - 4)(x + 3); zeros: 4 and -3**
3	Factor $x^2 - 10x + 25$ and find its zero.	**(x - 5)(x - 5); zero: 5**
4	Factor $x^2 + 2x - 15$ and find its zeros.	**(x + 5)(x - 3); zeros: -5 and 3**
5	Factor $x^2 - 7x + 10$ and find its zeros.	**(x - 5)(x - 2); zeros: 5 and 2**
6	Factor $x^2 - 6x$ and find its zeros.	**x(x - 6); zeros: 0 and 6**

PART 2 · APPLY IT

1. **B(x) = (x - 3)(x - 6); 3 or 6 batches** The numbers -3 and -6 multiply to 18 and add to -9. Set each factor equal to zero to get x = 3 or x = 6.
2. **H(x) = (x - 1)(x - 4); at 1 and 4 seconds** Factor H(x) using -1 and -4, which multiply to 4 and add to -5. The character is level with the platform when H(x) = 0, at x = 1 and x = 4.

CHALLENGE

The two numbers used to factor must multiply to -21 and add to -4, so 7 and 3 do not work. The expression factors as (x - 7)(x + 3), and its zeros are 7 and -3.

Accept factors in either order. For the repeated zero in problem 3, accept $(x - 5)^2$ as the factored form.