LESSON MAKER PRO

Find the Zeros

Use factored form to find where a quadratic equals zero.

HIGH SCHOOL · MT.CORE.ALG.QUAD.3.c

MT.CORE.ALG.QUAD.3.c "Understand that quadratic expressions can be represented in multiple forms and the specific features of each form by: Understanding the relationship between factored form and the zeros of the function, and"

NAME _____ DATE _____

THE ZERO-PRODUCT RULE

A zero is an x-value that makes a function equal 0. In factored form, set each factor equal to 0 and solve. A nonzero number multiplying the factors does not change the zeros, and a repeated factor gives the same zero twice.

WORKED EXAMPLE

Find the zeros of $f(x)=6(x-11)(x+13)$.

1. Set the function equal to 0: $0=6(x-11)(x+13)$.
2. Set each factor equal to 0: $x-11=0$ or $x+13=0$.
3. Solve: $x=11$ or $x=-13$.

Answer: The zeros are 11 and -13.

PRACTICE 6 problems

1 Find both zeros of $f(x)=(x-4)(x+9)$.

ANSWER _____

2 Find both zeros of $f(x)=-3(x+5)(x-8)$.

ANSWER _____

3 Find both zeros of $f(x)=2x(x-10)$.

ANSWER _____

4 Find both zeros of $f(x)=(4x-1)(x+12)$.

ANSWER _____

5 What is the only zero of $f(x)=-(x+2)^2$?

ANSWER _____

6 Write a quadratic function in factored form with zeros -4 and 9 and a leading coefficient of 5.

ANSWER _____

APPLY IT Show your work

1 In a video game, a character throws a ball upward from a 20-meter platform. Its height above the ground after t seconds is h(t)=-5(t+1)(t-4). At what time does the ball hit the ground? What does the other zero mean in this situation?

WORK SPACE

ANSWER _____

2 A school esports tournament models its profit in dollars by P(x)=-2(x-5)(x-25), where x is the ticket price in dollars from 0 to 30. Which two ticket prices make the tournament break even?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A quadratic function f(x)=a(x+3)(x-8) has f(0)=48. Find a and write f(x) in factored form. Explain why changing a to any other nonzero number would not change the zeros.

WORK SPACE AND ANSWER

ANSWER KEY

Find the Zeros

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find both zeros of f(x)=(x-4)(x+9).	**4 and -9**
2	Find both zeros of f(x)=-3(x+5)(x-8).	**-5 and 8**
3	Find both zeros of f(x)=2x(x-10).	**0 and 10**
4	Find both zeros of f(x)=(4x-1)(x+12).	**1/4 and -12**
5	What is the only zero of $f(x)=-(x+2)^2$?	**-2**
6	Write a quadratic function in factored form with zeros -4 and 9 and a leading coefficient of 5.	**f(x)=5(x+4)(x-9)**

PART 2 · APPLY IT

1. **The ball hits the ground after 4 seconds. The other zero, -1, is before the throw, so it is not a time when the ball hits the ground in this situation.** Set each factor equal to 0 to get t=-1 and t=4. Only t=4 is after the throw.
2. **$5 and $25** Break-even means P(x)=0. Setting each factor equal to 0 gives x=5 and x=25.

CHALLENGE

Substituting x=0 gives 48=a(3)(-8), so a=-2 and f(x)=-2(x+3)(x-8). The zeros remain -3 and 8 because a nonzero multiplier cannot make the product equal 0.

Accept zeros in either order. In problem 6, accept an equivalent factored form with leading coefficient 5.