

Factor to Find

Use factors to identify every zero of a polynomial function.

HIGH SCHOOL • AII-A.APR.3

AII-A.APR.3 "Identify zeros of polynomial functions when suitable factorizations are available."

NAME _____

DATE _____

ZEROS FROM FACTORS

A zero is an x-value that makes a polynomial function equal 0. When a polynomial is factored, set each factor equal to 0 and solve for x. A repeated factor gives a repeated zero.

WORKED EXAMPLE

Find the zeros of $f(x) = (x - 13)(x + 10)$.

1. Set each factor equal to 0.
2. $x - 13 = 0$, so $x = 13$.
3. $x + 10 = 0$, so $x = -10$.

Answer: The zeros are 13 and -10.

PRACTICE 6 problems

- 1** Find all zeros of $f(x) = (x - 5)(x + 2)$.

ANSWER _____

- 2** Find the zeros and state the multiplicity of each zero: $f(x) = (x - 4)^2(x + 6)$.

ANSWER _____

- 3** Find all zeros of $f(x) = (3x - 7)(x + 9)$.

ANSWER _____

- 4** Find all zeros of $f(x) = x(x - 11)(x + 5)$.

ANSWER _____

- 5** Find all zeros of $f(x) = (2x + 1)(x - 7)(x + 4)$.

ANSWER _____

- 6** Find the zeros and state the multiplicity of each zero: $f(x) = -(x - 12)^3(5x - 2)$.

ANSWER _____

APPLY IT Show your work

- 1** A student band's concert profit, in dollars, is modeled by $P(x) = (x - 6)(x - 18)$, where x is the number of tickets sold in groups of 10. At what ticket sales levels is the profit 0?

WORK SPACE

ANSWER _____

- 2** At a track meet, a ball's height above a low platform is modeled by $h(t) = -(t - 2)(t - 14)$, where t is measured in tenths of a second. When is the ball at platform height? Give the times in seconds.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Find all zeros of $f(x) = (x^2 - 49)(x + 8)^2(3x - 5)$. State each multiplicity and explain how the factors lead to your answer.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Find all zeros of $f(x) = (x - 5)(x + 2)$.	5, -2
2	Find the zeros and state the multiplicity of each zero: $f(x) = (x - 4)^2(x + 6)$.	x = 4 has multiplicity 2; x = -6 has multiplicity 1.
3	Find all zeros of $f(x) = (3x - 7)(x + 9)$.	7/3, -9
4	Find all zeros of $f(x) = x(x - 11)(x + 5)$.	0, 11, -5
5	Find all zeros of $f(x) = (2x + 1)(x - 7)(x + 4)$.	-1/2, 7, -4
6	Find the zeros and state the multiplicity of each zero: $f(x) = -(x - 12)^3(5x - 2)$.	x = 12 has multiplicity 3; x = 2/5 has multiplicity 1.

PART 2 • APPLY IT

- The profit is 0 at $x = 6$ and $x = 18$, which represent 60 tickets and 180 tickets.** Set each factor equal to 0. The zeros are 6 and 18, then multiply each by 10 tickets per group.
- The ball is at platform height at $t = 2$ and $t = 14$, or 0.2 second and 1.4 seconds.** The negative sign does not change the zeros. Set $t - 2$ and $t - 14$ equal to 0, then convert tenths of a second to seconds.

CHALLENGE

$x = 7$, multiplicity 1; $x = -7$, multiplicity 1; $x = -8$, multiplicity 2; $x = 5/3$, multiplicity 1. Since $x^2 - 49 = (x - 7)(x + 7)$, each factor can be set equal to 0.

Accept zeros in any order. Accept equivalent fraction forms only when they equal the stated value, and require multiplicities where requested.